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The Programming Approach and the Regional Science: A critical reappraisal

by

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Abstract

In this paper (a reappraisal of a subject already discussed in a paper presented at the 34^o Congress of the ERSA in Groningen) the thesis is argued that, despite some favourable beginnings towards an integration between planning and regional science in the past two or three decades, the marriage has not actually taken place, and an "ambiguous relationship" has in fact developed. The reason for this is found in the inappropriate scientific development of planning science and theory, and also in a difficult adoption by all social disciplines (economics, sociology, political sciences) - and thus also by regional science - of a rigorous and authentic *programming* approach.

Here we discuss the theoretical obstacles which have impeded the development of a meta-disciplinarity of regional science (as Alonso hoped in 1968), and the passing from the "positive-normative" approach, also prevalent in regional science, to a "programming" approach. These obstacles are discussed from two points of view: a) that of the "realistic" insufficiency of traditional (and thus regional) economic theory with regard to decision processes (through the deep analyses of Walter Isard in his "General Theory"); and b) that of the meaningfulness and usefulness of the decisional use of descriptive-normative models, which still prevail in regional sciences (through the more recent contribution by Bell, Raiffa, and Tversky, eminent decision theorists).

The paper goes into - through a critique of Isard's approach, on the one hand, and that of Bell, Raiffa and Tversky on the other - outlining what is the methodological paradigm which would lead regional science to guarantee a useful scientific basis for planning, as always hoped, and according to the masterly teaching of Ragnar Frisch (who has been rather neglected by more recent developments in regional modelling).

The Programming Approach and the Regional Science: A critical reappraisal

1. The Origins of Regional Science and Planning

That, from their very origins, regional science and economic planning have had such a close relationship that one might even think they are identical, is so obvious as to risk sounding banal. William Alonso, one of the most respected representatives of "regional science", in an essay with the title *Beyond the Inter-Disciplinary Approach to Planning*¹ produced for a symposium on regional development held in Tokyo in 1968, in which he criticised "interdisciplinarity" in planning and pleaded for a "metadisciplinarity", claimed:

"Thus, every year several hundred scholars gather at the Regional Science Association Conference and present and discuss papers. The participants may be economists, geographers, planners, political scientists, sociologists, systems analysts, and the like, but at these meetings they present and receive papers which share a defined range of topics, a body of techniques, and certain standards of validation. They share, to a large degree, a technical language and competence, and they read much of the same literature. These meetings are not inter-disciplinary, but rather meta-disciplinary, since the participants gather together not because of their diversity but because of their commonality" (p. 171).

In considering the didactic aspect of the metadiscipline of planning, Alonso added that "there are concise and clear texts by which students may be trained in these subjects ..." (p. 171); and indicated as "representative" of the metadiscipline the already well known book by Walter Isard on the *Methods of Regional Analysis: An Introduction to Regional Science* (1960)². "My point, in brief" - continued Alonso - "is that especially in the hard social sciences, but also in the soft ones, there has begun to develop a meta-disciplinary competence that rests in particular individuals, and that this provides a better model for the incorporation of the social sciences into the planning process than does the idea of an inter-disciplinary team." (p.172). It is undoubted that -

in Alonso's view - planning and regional science should have been united on the scientific and didactic plane.

1.1 Planning and Regional Policy as the Natural Ground for Integration

The natural union has also occurred however with the stimulus - from the post war period onwards - of policies of regional reequilibrium, or simply regional policies, in all Western countries, in those of Eastern Europe, and in many of those in the Third World (although in the latter case the greater stress was certainly on national development). For the OECD countries an initial summing up of experience, and above all of the capacity for development of regional policies from 1960 was made in the context of a Study Conference that took place in Bellagio in Italy in June 1960. Walter Isard (in collaboration with Thomas Reiner) gave the introductory paper on the theme of "Analysis Techniques for Regional and National Planning"³. In the first part of this, "techniques" were not dealt with at all, rather the problems of the relationship between regional and national planning were examined, with a clear awareness of the multi-dimensionality of planning itself:

"Il faut pleinement tenir compte de ces diverses dimensions, si l'on veut établir un bon programme régional de développement économique. ... La première dimension du plan reflète le niveau de l'échelle administrative. Un premier niveau de planification est représenté par l'échelon régional, un deuxième par l'échelon national; les zones urbaines incluses dans les régions constituent un troisième niveau important ... Une autre dimension utile de la planification reflète la diversité des activités économiques ... Une troisième dimension concerne l'ensemble des lois et des structures politiques existantes ... Une quatrième dimension concerne le milieu physique environnant ... un bon programme régional de développement économique - comme d'ailleurs un programme national ou urbain - doit tenir compte de toutes ces dimensions de la planification." (W. Isard & T. Reiner 1961 pp. 19 - 20).

The paper continues with examples that demonstrate the need to integrate regional plans with national ones in order to be able to operate efficiently at a national level.

It is only in the second part of the text that the authors synthetically illustrate what they call "analytical planning techniques": i.e. comparative costs analysis, industrial complex analysis, input-output analysis, costs benefits analysis. Research on models of gravitation and interregional linear planning is mentioned without, however, illustrations being given.

1.2 The Obstacles and Theoretical Gaps in the Development of Metadisciplinarity

In this contribution, we wish to uphold the thesis that, in spite of these beginnings, that were very favourable to an integration between planning and regional science, in the two or three past decades the marriage has not given clear fruits of integration, and the metadisciplinarity to which Alonso aspired has not really developed. We would like to explore why. Let us state immediately that we believe we can identify these reasons, without doubt, in the actual crisis of planning, which - having failed in general in all countries (first, second and third world) - has not produced even the sufficient conditions for creating an adequate "scientific" maturity.

But, if this is true, we consider nevertheless that the obvious fruits of integration and the development of the metadiscipline have not been had, also because of an inadequate scientific development of planning theory in general, and the difficult adoption of a really "programming" approach in the development of the traditional disciplines of the social sciences: economics, sociology, political sciences.

The "*programming*" approach (i.e. the *decision-oriented* approach), analysis *based on decision-making problems*, and the overcoming of the paradigms of positive economics (like those of positive sociology or positive political science), constitute a compelling argument, that we would not like to confront here face on⁴, but only with reference to those aspects that concern the so-called regional sciences.

On the other hand, we would underline that, although the need for multi-disciplinary integration (or for the metadisciplinarity postulated by Alonso) has not emerged only on the regional or spatial scale, it finds here (as I have long claimed⁵) a privileged scale of

application. This is because of the fact that on the spatial scale behaviour and *economic* factors find more opportunity and greater reasons for becoming mixed up with behaviour and *non-economic* factors, such as "social" and "political" ones.

Notwithstanding this, what we would call a clear "programming" approach has consequently been lacking in regional analysis⁶. This is because there has continued to weigh heavily on it, a "neo-classical" conception of the economic system and of the behaviours that regulate it, despite the fact (as mentioned) that it could have been the sector of interdisciplinary encounter that was most "sensitive" to the needs of metadisciplinarity!

In this contribution, we mean to discuss the theoretical "obstacles" that have impeded the development of metadisciplinarity and the passage from the "positive" approach to the "programming" approach (which in my opinion would be its essential condition). We have faced them from only two stand points, which we consider nevertheless to be fundamental:

- (1) that of the "*realistic*" *insufficiency* of traditional economic theory with regard to decision-making processes; and
- (2) that of the meaningfulness and usefulness of the utilisation of descriptive models for decision-making.

These two standpoints will be faced with the support of two important theoretical contributions by authors who come from the same disciplines being discussed here, and whose critical evaluation - for this reason - seems, in our opinion, to have particular importance⁷. For *regional science*, Walter Isard (who, it can be said, was its founder, even from the point of view of its scientific community); and, for *decision-making theory*, Howard Raiffa, who was, along with others, one of its most authoritative analysts.

2. The Realistic Insufficiency of Traditional Economic Theory with Regard to Decision-Making Processes

Traditional economic theory (and consequently the location theory, from which regional or spatial economics have taken their cue) was discussed, among others, by Isard, in his most important work: the *General Theory* (of 1969)⁸. In order to deal with the theme among regional scientists, I believe it is correct to favour reference to Isard, in preference to any other author⁹.

“It has become increasingly evident to those of us in economics, regional science, and other social sciences that our applied research relating to both planning and policy-making suffers greatly from our inadequate ability to project behavior. True, we have developed some relatively strong analyses such as the marginal approach in economic and location theory, and strong operational techniques such as comparative cost, industrial complex, and interregional linear programming. But these have been based on such postulates as a one-state-of-the-environment world and profit maximisation. Unfortunately, these postulates and others associated with them lead to theoretical results and projections that cannot be said to correspond closely to observed behavior, at least insofar as we are able to describe and measure such behavior.” (p. 116).

Given this, Isard examines the nature and characteristics of "some new sets of postulates" that are hopefully more realistic and useful for the projection of behaviour. He thus joins forces with a group of scholars who, after having had their fill of theories and theorem founded on maximisation¹⁰, recognise its practical lack of foundation and propose its overcoming. And he sets about overcoming the failure of the traditional approach, intending with "new sets of assumptions, hopefully to achieve a more effective base for understanding and projecting behavior." (p. 117).

Where and how does Isard hope to find such "new sets of assumptions"? It is here that Isard's vast research, of impressive proportions and which ranges over a good part of the theories on social structure, is admirable for the architecture of this new "general theory", whilst being perplexing for the inveterate belief in actually grasping that set of

"more realistic" assumptions, that could make the projections for an operational approach to planning and policy more reliable. In fact, one might ask (and at the end he himself asks the same question, but, as we will see, only at the end) whether with the "complication" of cases, by means of the relaxation of the simplifying assumptions, a good service is done to the cause of the sought *operational projection of behaviour*. Without doubt, each case becomes per se - theoretically - more "realistic". But how can we identify in the realities of observation *ex post*, and, even worse, in the realities of projection *ex ante*, such a detailed correspondence with the theoretical case (and with its all the more sophisticated system of derived assumptions and the system of behavioural projections that results from it)?

2.1 *The Relaxation of Assumptions and the Multiplication of Cases*

In order to clarify better the perplexity, it is necessary to first describe, albeit briefly¹¹, Isard's route. In the first part of his exploration, which was motivated by the collapse of the meaningfulness of the assumptions of traditional theories, he begins to explore all the possibilities of "extending" the usual decision-making models that classical theory provides.

First, staying within the ambit of classical economic and location theory, as it refers to individual behaviour, Isard proposes a new definition of it, by means of:

1. relaxing the assumption of a "*one state-of-the-environment- world*", with the introduction of "*many states*". Thus doing, he considers necessary "a complete re-examination of the meaning of optimizing behavior and the building from the ground up of a more satisfactory structure for decision-making". (pp. 17-18). This relaxing of assumptions which, as mentioned, fits into the scheme of traditional economic theory, allows for cases which - whilst being reduced to the bare essential by Isard himself - already proliferate about ten types, with more or less important variations, both in the system of assumptions, on the one hand, and in the projected behaviour, on the other;
2. *the introduction of the variable "attitudes"*. Isard writes: "So long as only one defined state of the environment could exist, economic and location theorists were not

compelled to consider the attitude of a profit-maximizing individual". But "when in the following section we wish to increase the realism of the analysis by admitting several possible states of the environment, we find that we have to consider the individual's attitude as another basic variable" (p. 130). What are these "attitudes"?

On the subject of attitudes and personality characteristics Isard refers to an already established literature (Churchmann, 1961, Simon, 1957, Edward, 1961, and others). He enriches and renders more sophisticated the axioms of this literature in his interpretation of the effects of "personal style", "taste", "capacity of choice", etc. The essential types of attitude that Isard considers are the following:

- a. "*the 100 per cent conservative*", who "is willing only to consider *sure things*" (p. 138);
- b. "*the expected payoff calculator*" whose "objective is to maximize expected payoff" (pp. 133-134);
- c. "*the 100 percent conservative regretter*", whose "objective is to minimize the level of regret which certainly cannot be exceeded" (p. 134);
- d. "*the expected regret calculator*", whose "objective is to minimize expected regret" (p. 135).

Already the cases arising from the various combinations of these "types" of attitude produce the description of further cases. In Isard, summarising them, the following are realised:

- a. "*the 100 percent optimist*": this is the extreme case of the person who is "certain that for any given action he will receive the *highest* possible payoff" (p. 136);
- b. "*the 100 percent pessimist*": the other extreme with the person who is "certain that whatever action he takes, the worst will occur, i.e. he will be left with the least possible payoff" (p. 137);
- c. "*the 100 percent conservative*", who, as already mentioned, "is willing only to consider *sure things*" (p. 138);

- d. the "*Hurwicz individual*" (with a mixture of optimism and pessimism), who "looks at the best and worst outcomes that can be associated with any action, and assigns a weight (probability) to each of these outcomes" (pp. 138-139);
- e. "*the equiprobable expected payoff calculator*"; this type "is motivated to maximize expected payoff, and who knows that each state of the environment has an equal chance of occurring. Alternatively, he may have no information about the occurrence of the several states of the environment and may simply assume that they will occur with equal probability" (p. 140);
- f. "*the 100 percent pessimistic regretter*", who "is certain that whatever the action he takes he will be left with the highest possible regret" (p. 141);
- g. "*the 100 percent conservative regretter*"; whose "objective is to minimize the level of regret which certainly cannot be exceeded" (p.134);
- h. "*the equiprobable expected regret calculator*" (p. 141).

With those indicated above, the total number of cases introduced by Isard as variations to the system of traditional assumptions, rises to twenty. Each has its own system of assumptions, and system of projected behaviour.

2.2 *The Extension of the Functions-Objective to "Noneconomic Commodities"*

However Isard's research into new "more realistic" situations with the introduction of "new sets of variables" does not stop here.

Iconoclastic fury directed against the inexpressive and unrealistic sanctuaries of the (neo-) classical approach to "economic" behaviour, leads him to extend the analysis of factors determining behaviour (of individuals, groups and institutions) to *noneconomic* factors and objectives, by means of the incorporation in the classic "function-objective" - the would-be expression of a function of social well-being (in its general version) - of "non-tangible" variables (which Isard calls "commodities", in order to characterise the market moment, and the nature of objects of "exchange" between individuals, groups,

institutions, even if it is an exchange that does not take place through the traditional market and, much less so, through the monetary market¹²).

Isard lends himself to a stimulating classification of the so-called "noneconomic commodities", which deserves to be recounted here, albeit briefly.

First of all, we should recall that before the list of noneconomic commodities that Isard proposes as an instrument for making the decision-making system "operational", and for which the general theory should be the instrument, he designed a *structure* of the social system. He borrowed this structure from the well-known work of the sociologist Talcott Parsons (who had had, in the decades following the Second World War, a particularly strong influence in the American scientific community). Inheriting the tradition of pragmatism from Dewey, Parsons developed, from 1951 onwards, a "*General Theory of Action*", which he gradually perfected, in collaboration with colleagues and students¹³, until arriving at the two volumes of the "*Theories of Society*" in 1961¹⁴. The "*social act*" in Parsons is always a combination, of unequal weights, of four essential extreme or "pure" *acts*: that give rise to four *subsystems* of the general social system:

- a. "*the adaptive or economy subsystem*, wherein behavior involves primarily the overcoming of environmental constraints and the active manipulation of the scarce resources of both the environment and the social system in order to acquire commodities (facilities) meaningful for a variety of system goals. Within this subsystem fall organizations which have typically been designated economic firms";
- b. "*the goal-attainment or polity subsystem*, wherein behavior primarily involves the setting of priorities or valuation of the diverse, heterogeneous goals of a complex social system, taking into account the needs and directions of both the whole society (or collectivity) and individuals and groups. In this subsystem fall 'political man' and political policy-forming organizations";
- c. "*the integrative subsystem*, wherein behavior primarily involves, within a restricted set of groups or individuals or both, the control of conflict and disruptive tendencies to deviant behavior and the promotion of harmony and cooperation. In this

subsystem fall 'integrative' organizations (social groups and institutions and certain legal institutions)";

- d. "*the pattern-maintenance subsystem*, wherein behavior involves primarily the attainment of stability of institutional and interaction patterns and values, and, in a more comprehensive sense than in the integrative subsystem, the management of forces creating tensions among social, economic, and political organizations and individuals with diverse internalized motivational commitments. In this subsystem fall organizations such as religious and educational institutions" (*ibidem*, pp. 495-497).

From the structure of the "social acts" framed in these four subsystems, and taking inspiration from other very similar important works carried out by sociologists (such as Bertram Gross and Alfred Kuhn), Isard deduces a list of 13 "noneconomic commodities" that go to make up the usual lists of "economic" commodities.

This is not the place to delve into the general theory of the social system adopted by Isard, but only where note should be taken of the *quantity and quality of the "variables"* that he means to introduce in order to make the behaviour "more realistic", and not only more "economic", of groups, organisations, institutions and individuals. It is a behaviour that cannot be disassociated and disintegrated, by components or factors which, whilst existing and having an influence on the behaviour, are always associated from other factors (even if never in equivalent quantities).

The "noneconomic" commodities that Isard intends to include in the general system of social transactions, and as a motivational base of behaviour (of organisations, groups and individuals), are:

- a. the commodity "*solidarity*". It is the "integration of diversified perspectives within an organization (collectivity, or group). It is a commodity which has reference to an organization only, and is produced by interaction of individuals within the organization, or by the interaction of the organization with other behaving units. It is not a commodity which is capable of being possessed by an individual. It embraces

cohesiveness (the strength of attraction of individuals to the organization) as well as loyalty (faithfulness of individuals to the values and standards of the organization). One hundred percent solidarity implies joint preference ordering";¹⁵

- b. the commodity "*power*". It is the "ability to influence decisions of an individual or organization. It may be both an individual or organization, through delegation or otherwise. By this definition ... power embraces the ability to exercise authority, to compel obedience, the exercise of authority implying an asymmetrical relation between two behaving units"¹⁶;
- c. the commodity "*respect*": it is the "weighted combination of status, honor, recognition, prestige, esteem, and expressive social approval which an individual or organization receives. The weights may be objectively specified, or simply subjective";
- d. the commodity "*rectitude*": it is a "weighted average of religious and moral values such as virtue, goodness, righteousness, responsibility, honesty, and integrity. The weights may be objectively specified, or simply subjective. Its possession by an individual is recognized by the individual, other individuals, and organizations";
- e. the commodity "*affection*": it is the "kindness, friendliness, love and goodwill bestowed upon an individual or organization, by other individuals and organizations. It embraces popularity";
- f. the commodity "*sociality*": it is the "pleasant feeling generated by interaction of individuals in an organization or circle. It is a commodity which can be produced by a collectivity only, and not by an individual. As a member of the organization, each individual receives a share of this commodity as a return (anticipated or unanticipated)";
- g. the commodity "*participation*" is the "involvement in the decision-making and other activities of an organization, involvement that is associated with the active 'belonging to' an organization"¹⁷;
- h. the commodity "*well-being*" is the "health and safety of the individual";
- i. the commodity "*skill*" is "proficiency in practice, whether in arts, crafts, trade or profession; it also embraces the ability to be inventive and creative";

- j. the commodity "*enlightenment*" is "knowledge and insight concerning the physical environment and personal, social, and cultural relations";
- k. the commodity "*achievement*" is "accomplishment of an individual as evaluated by that individual. It is a commodity that can be consumed by an individual only, and its consumption may be associated with the removal of the tension associated with n-achievement (need for achievement)" (*ibidem*, pp. 565-567).

In addition to the 11 "non-economic" commodities listed above, Isard gives another two, whose definitions are principally orientated to the requirements of the general theory that he will develop. These are:

- a. "*love-tendered*" is a "commodity which is produced only when an individual out of pure love gives a family member, friend, or any other individual some commodity of value (e.g. corn, flowers, the commodity-affection), with the intention of increasing the happiness (utility) of the recipient and without expectation of a *quid pro quo*. The positive outcome of the commodity-love tendered balances the negative inputs of the commodities involved in unilateral giving, its consumption accounting for inner satisfaction (utility) which the individual achieves from his unilateral giving. Since the commodity-love tendered has utility to the individual, and since utility is defined only over a commodity space, we treat the commodity-love tendered as a real commodity. But it is one which is not marketable. Whatever amount of this commodity is produced by an individual is directly consumed by him";
- b. the commodity "*sanctions*" which "differs from most other commodities in that it cannot be produced by organizations or individuals. It is a commodity which accrues to a participant (an individual or organization) in his interactions with society. With each input-outcome plan (consisting of all commodities other than the commodity-sanctions) that the participant may choose is associated a well-defined amount of the commodity-sanctions, the magnitude of which is taken to reflect society's net approval or disapproval of that plan. In this sense, the commodity-sanctions is an atypical commodity; yet, we conceive it to have significance (utility)

for the individual and to enter into the profit decisions of organizations. In this latter sense, it is a real commodity; so we treat it as such". (*ibidem* p.568).

Finally Isard introduces, as a noneconomic commodity, the "vote" ; as a "resource that is frequently perishable. It is an input in a situation where the output is a decision (the decision being one of the several - at least two - alternatives available for selection). It is an explicit unit expression of support or opposition to alternatives available for selection" (p. 568).

2.3 *The General Theory and the Accounting Frame for Decision-Making Processes*

Having widened in this way the field of "commodities" exchanged and of the motivations of the "social acts" and decisions and choices inherent in them, Isard continues with an illustration of the "*general, social, political, and economic theory for a system of regions*". Apparently he applies openly here the same theorems of the general theory of economic equilibrium (of Walrasian origin) in the more recent version of Arrow and Debreu (1954) and of Isard himself and Ostroff (1958).

But let us reconsider the previously mentioned perplexities. May a complex system like the one provided by Isard, be a source for the protection of more realistic behaviour which is thus advantageous for the construction of "decision-making models", with which decision-makers (individuals, groups, and organisations, but above all the public decision makers of planning policy) may take knowing decisions for the future on the basis of appropriate decision-making models founded on them?

In order to make the decision-making procedures more "realistic", passing from the already seen schemes with a single participant to those with two participants and finally to those with "n-participants", Isard lists a good 77 (!) *different cases of decision situations*, with as many *assumption systems* (now abandoned, then recreated) and behavioural projections (so obviously theoretical as to have only an academic value). And this - note - with the condition of excluding another series of "cases" that would be implied if one was to free oneself from a great number of "implicit" assumptions; and ultimately with the condition that we consider really working the presence of decision

factors coming from the "market" of "noneconomic commodities": those commodities which - in truth - have not been brought into play in the analysis of decision processes, but only in the still very approximate architecture of a general accounting system (the multi-regional, social, political economic accounting frame).

Isard himself glimpses the reason for a certain perplexity concerning the "decision analysis" carried forward so far in his breathless quest for greater "realism". In the conclusion to his gigantic work, in the last chapter (Chapter 16) which is dedicated to a "retrospect and prospect on some critical areas for future research" Isard thus writes:

"True the logical structure of the analysis of these chapters, with the associated mathematical statements in the Appendix chapters, may appear impressive to some scholars. To others, however, the list of unrealistic assumptions, explicit and implicit, may appear still more impressive - and may lead them to view the derived logical structures as refinements concerned with the consistency of a system, and which in successive rounds of reformulation and restatement increasingly turn in upon themselves and grow more and more remote from reality." (p. 823).

And so, yes, I confess that I, too, belong to this latter category of readers. I get the impression that, in the quest for "realism", one ends up in situations that are yet more unrealistic. But - and this is the point for us - only because an unsuitable approach is adopted: that of "positive" analysis! In the programming approach - i.e. that which is linked to hypotheses of *future* behaviour, mainly of groups and governments, there is no more need for this "extreme" *realism* - which seems to distance itself so far from reality as to take on the aspect of extreme *chance*. In the programming approach - which is totally aimed at an *ex ante* decision - the classification of possible types of decision behaviour must be addressed to the "reasonableness", to the theoretical probability of certainty, that may render coherent and acceptable a complex set of attitudes, motivations, decisions, which are made coherent by their policy-oriented explication, negotiation, the adoption of co-operation procedures, and by the spread of information, etc.

Isard himself, on the other hand, shows he is aware, on more than occasion, of these aspects: for example, when he realises that his own analysis of "interdependent decision situations in political space" (§16.11) is defective; and feels that there should have been "introduced the judicial and regulatory processes of government units explicitly through restricting action spaces, etc., and perhaps through imposing certain co-operative procedures" (p. 833). But we are in the logic of "explaining" behaviour and not "hypothesising it" (which is subtly but strategically different).

If the multi-functional, multi-sectorial, and multi-regional model of Isard was only motivated by the construction and elaboration of an *Accounting Frame* (which Isard himself considers the most important outcome of his elaborate general theory) we would have nothing to say: a sufficiently taxonomic scheme would be had to construct a system of economic and non-economic accounts, perhaps facing up to very frightening problems of data collection, interpretation, the acceptance of statistical approximations, but useful for a possible planning of decisions.

It is not inappropriate to say that Isard has provided with the general theory a very important contribution to planology, by means of the construction of a General Accounting Framework in the Social System¹⁸ (for which see Chap 13, and in particular §13.12 where he gives a concise explication in table form). Isard's attempt aims, as said, at extending "the competitive-equilibrium frameworks of Arrow and Debreu ... to a broader system wherein we consider social and political commodities in addition to economic goods" (p. 599). Isard acknowledges moreover - at the end of his impressive exposition - that there is a "need for a more adequate accounting framework in the political (polity or goal-setting) subsystem" (p. 836), and that stress was placed more on theoretical aspects than on the construction of the framework. In spite of this, Isard's scheme is a very important contribution, together with that of others (Gross 1966, Fox 1985, Drewnowski, 1974 and Archibugi, 1971 and 1974), to the schematisation of accounting reference frames for planning, founded on *extended or integrated accounts*, that include not only economic accounts but also social, environmental, political ones etc. as well.

But the operability of the accounting Frame seems to be founded by Isard on the collection, analysis and projection of *behavioural relations*, and on the quantification of parameters extracted from reality *ex post* to be projected in the future.

In this case, one gets the impression that the very criticism that Isard fears, of a sophistication that goes round and round, seems plausible. The behavioural relationships become in such a way the object of decision analyses, and not just descriptive ones. They are analysed, in other terms, for their supposed or verified value not only for the past, but also for the decisions that relate to the future; and this, in fact, represents an error in methodology, that is risky for the false assumptions on which it would be founded: i.e. the idea of being able to achieve "realistic" behaviour that as such may be projected into the future. It is a question, in fact, of the much used "*decision use*" of *descriptive models*.

On this point we would extend the analysis of the relationships between planology and regional science (with reference also to the evaluation developed by the theorists of decision-making processes, as we will see more clearly in Para. 3).

Furthermore, the analysis of general equilibrium (as understood in Isard's general theory) is founded on a set of explicit or implicit conditions, that is so big that its usefulness for planning is nullified. It postulates a *harmony ex ante* of any spontaneous combination of factors, conditions, negotiating forces, decision processes, desires or choices etc.; and corresponds more or less to the same harmony that any analysis *ex post* is able to modelise - in the search for realism - on the basis of the events observed.

Thus, from the point of view of general equilibrium, the decision problem (aimed at the future) it is not just that of the "projection" of "realistic" behaviour, but also that of postulating "reasonable" behaviour (as Isard himself calls it on more than one occasion¹⁹), that has been elaborated with care as regards a) the decision situations of the majority of social subjects (individuals, and also organisations, interest groups, governments of all shapes and sizes); and b) the decision-making systems in force or which are hypothetical.

This "programming" approach could be assimilated with the concept of a "utopian" analysis (in the scientific sense of the word). On this point it may be of interest to recall

what has been said by two authors of very different disciplinary extraction, but who both see in the "utopian" overturning of the positive approach, the way out of the crisis of economic science. The first, Bruno De Finetti, in his essay on "*Utopia as the Necessary Presupposition for any Meaningful Formulation of Economic Science*"²⁰, states:

"The utopistic formulation of economic science is made up of the examination of the possibilities of efficient functioning of systems imagined as mental "utopistic" schemes" (...)

The specific task of economic science, in the utopistic formulation that it is urgent to promote, consists (...):

- of translating into a precise form the desired things initially expressed in a more or less vague and indeterminate way,
- of examining the intrinsic consistency, and suggesting, if necessary, how to modify them or integrate them, and;
- of the delineation of forms of social organisation that aim at leading to desired situations, with the examination and comparison of their aptitude to function in a simple, easy and efficient, way, with a tendency thus to stability rather than to deregulation that favours the rise of malfunctions and abuse.

(...) A Utopia will almost never be a model that will be realised in a practical form, but vice versa, none of the many and varied possible radical improvements that today's very poor forms and structures need, could be in reality conceived and implemented without having first been conceived, studied and examined in the form of Utopia." (p. 13-16).

(...) accepting the defined attitude, the 'value judgements' are the first indispensable premise. Starting from the preference criteria inspired by them, and bearing in mind the objective confining circumstances (...) one must seek and determine the optimal solution that is theoretically achievable (in the absence of institutional constraints). After which the institutional structure remains to be identified, or rather the set of organisational-juridical-accounting conventions that are to be chosen (...), bearing in mind that, in relation to the existing circumstances,

this is revealed as the most suitable for the realisation in the most practical way of a situation approaching optimality". (pp. 18-19).

And the second, Daniel Bell, in an essay on "Models and Reality In Economic Discourse" (1981), states:

"The crucial question is whether the obverse of the rational is the irrational rather than the non-rational, and whether or not non-rational motivations can provide a valid assumption for an understanding of economic behavior i.e., the behavior which seeks to enhance the wealth and welfare of mankind" (pp. 70-71).

"(...) economic theory should not be taken as a 'model' (or template) of how human beings behave, for these will always be inadequate, but as a 'Utopia', a set of ideal standards against which one can debate and judge different policy actions and their consequences." (p. 80).

3. The Decision-Making Use of Descriptive Models

The decision-making use of descriptive models, as said, is the second aspect from which we wish to further examine the ambiguous relationship between regional science and planology. For this further step, we will be supported by the latest developments had in studies on "decision theory", and, to be precise, a collection of essays edited by Bell, Raiffa and Tversky (1988) aimed at the elaboration of *descriptive, normative and prescriptive interactions of decision-making*.

For a long time decision theory has founded its models on a dichotomy: the distinction between the "*normative*" aspect and the "*descriptive*" one of decision-making (*should be* as opposed to *is*). Bell, Raiffa and Tversky, after twenty or thirty years of developments in (neo-classical) decision theory (von Neumann & Morgenstern, Simon, Luce & Raiffa, amongst the most well-known), place in doubt not only the usefulness, but also the validity of the traditional dichotomy. They introduce a "realistic"

and "pragmatic" critique of decision that leads to a *third* approach, the "*prescriptive*" one, which is similar in many ways - *mutatis mutandis* - to the programming approach. They go so far as to say that when one discusses planning decisions one should conform to this approach (at least for the planners, i.e. those who have to advise the decision-makers). According to Bell, Raiffa and Tversky, descriptive analysis of decisions should answer the following questions:

"How do real people think and behave? How do they perceive uncertainties, accumulate evidence, learn and update perceptions? How do they learn and adapt their behavior? What are their hang-ups, biases, internal conflicts? How do they talk about their perceptions and choices? Do they really do as they say they do? Can they articulate the reasons for their actions? How do they resolve their internal conflicts or avoid such resolutions? Do they decompose complex problems, think separately about component parts of problems, and then recombine or integrate separate analyses? Or do they think more holistically and intuitively? What are the differences in types of thought patterns for people of different cultures, of different experience levels? What is the role of tradition, imitation, superstition in decision making (or non-making)? How can 'approximate' real behavior be described? How good are various mathematical models in predicting future behavior?"

In short, descriptive analysis is concerned with how and why people think and act the way they do. At times it may involve intricate mathematical modeling and require sophisticated statistical analysis. It is highly empirical and clinical activity that falls squarely in the province of the social sciences concerned with individual behavior. Scholars can study the domain without any concern whatsoever of trying to modify behavior, influence behavior, or moralize about such behavior." (p. 16).

Passing to normative analysis, the authors observe that this activity is more difficult to characterise since it presents different facets. In the first place, there is the idea that the normative theory has something to do with the way how ideal, rational, super-intelligent people should think and act. "Such analyses abstract away known cognitive concerns of real people, their internal turmoils, their shifting values, their anxieties and

lingering post-decisional disappointments and regrets, their repugnance (or zest) for ambiguity or danger, their inabilities to do intricate calculations, and their limited attention span." (p.16). The Authors feel that the "hallmarks" of such normative analyses are "coherence and rationality as captured usually in terms of precisely specified desiderata or axioms of the form: if the decision maker believes so and so, he should do such and such. As usual in any mathematical system, the power of any set of desiderata comes from their logical, synergistic, joint implications".

"Axioms, basic principles, and fundamental desiderata are motivated by what some investigator thinks is logical, rational, intelligent behavior. Then like any mathematical axiom system (such as sets of axioms for geometry) the academic researchers play variations on the themes: what happens if this axiom is dropped, or if this axiom is modified in such and such a way?

This exercise is rewarding if exercise in the mathematical implications are profound or aesthetically pleasing. The exercise can also be rewarding if the researcher can see a better concordance between the abstract system and some aspects of behavior that is empirically verifiable or that the researcher imagines is verifiable. Thus there is a dynamic interaction between the real world, imaginations about the real world, and the abstract mathematical system. There are extant a host of abstract models of decision making bearing some relation to decision making as it is, or as it is perceived to be, or as it should be in someone's mind." (p. 17).

According to Bell, Raiffa and Tversky, "in the usual parlance, an abstract system that purports to describe or predict behavior is called a *descriptive* model; an abstract system that attempts to capture how ideal people might behave is called a *normative* model. There is a little difficulty, - they write "in categorizing some models as clearly descriptive or normative. One trouble is that some normatively motivated models are often used, as mentioned above, as first-cut descriptive models. Other clearly normatively motivated models go through successive modifications that try to make more them more useful for descriptive and predictive purposes and then it may be

difficult to say whether these modifications should be classified as normative or prescriptive. On the other hand, some descriptively motivated models are occasionally modified to come a bit closer to what some analyst believes is a proper norm for wise behavior. And then the model falls into the grey area. Is it descriptive or is it normative?" (p. 17).

Bell, Raiffa and Tversky recognise, rightly so, that on the subject there is noteworthy logical confusion and that order must be put into the concepts.

In the studies that (we might say) belong to the programming approach strand, and not to decision theory, a certain order in concepts has been made and not just recently. The surpassing of the ambiguous descriptive-normative dichotomy of the approach which is nevertheless "positive", has allowed for more elaborate concepts in typological classification of the "econometric" relationships between plan model variables. For example, doubts have been expressed about the validity of the estimation of coefficients founded on historic series; distinctions have been developed in conceptual differentiation and, above all, in the use of equations (definitional, structural and behavioural); the concept of "autonomous" relationships has been introduced; the quantification in "observed" and "programmed" values has been articulated, etc. In short a methodological area has been developed that some have thought to call "planometrics"²¹. The elaboration of these themes falls - obviously - beyond the scope of this contribution, even if it constitutes - as one can easily understand - an epistemological premise.

3.1 The Illogic of the "Realistic" Validity of Behavioural Projection

Let us leave aside for a moment the problem of cases in which a "hybridising" of normativeness and descriptiveness takes place. And let us emphasise, in the passages quoted, the radically different nature of the two approaches, more for the different meaning that is assumed with respect to the purpose of the analysis, than for their intrinsic quality.

If, in fact, our purpose is that of extracting from reality objective behaviour (leaving aside its ethical or rational value) which has the characteristic of (relative) scientific certainty, in order to construct upon it projections (as future replication) of this same behaviour as a constraint on our (even "free") decisions for the future, then our duty would be that of conforming only to descriptive analysis and - although imperfect - of taking on only the behaviour indicated *ex post*. In this case, however, everything rests on an assumption: that the behaviour - so "real" and so "unrational" - has the ("rational") gift of replication. This assumption seems even more heroic than many "rational" assumptions that render the normative models so "unreal".

If, on the contrary, our purpose is to understand the reality and behaviour that we have recorded *ex post* in their *raison d'être* and motivations, and if we do not worry about using the said knowledge because of their improbable future discounts, in a decision process for the future, we will in this case try to be so "rational" in replicating reality in all its details, in simulating it in all its conditions, constraints and states, as to become highly unrealistic in wishing to project it in improbable and uncertain future states.

The two types of analysis, normative and descriptive, and the respective models that derive from them, must serve two completely different purposes: the descriptive one is a type of analysis that can serve "decision-making" purposes, and the normative one is a type that can serve "scientific" purposes.

The programming approach is that which overcomes the persistent equivocation that has developed in economics, sociology, psychology, political science, and in many derived disciplines, which are also very close to decision and planning processes (like, for example, regional science), but which have a *positivist imprint*: the idea that one can deduce in the behaviour of man and his social derivatives (groups, organisations, associations, and even governments) "laws" or "norms" of behaviour, upon which an aprioristic theory and behaviour paradigms can be constructed, and be translated perhaps into parameters between behaviour variables in the so-called decision models. On this fallacious idea Gunnar Myrdal²² and Ragnar Frisch made some masterly observations a while ago that deserve to be recalled here. I will reproduce only one

insightful passage by Frisch on the subject of the "half logic" which underpins the use of predictive models in planning.

"In most countries the shift of viewpoint is, however, based on a kind of half-logic which I have never been able to understand and which, I think, will never be able to yield fundamental solutions. On the one hand one still retains the on-looker viewpoint, and tries to make projections on this basis (growth models of the current types). And on the other hand one will afterwards try to use such projections as a basis for decisions. How can it be possible to make a projection without knowing the decisions that will basically influence the course of affairs? It is as if the policy maker would say to the economic expert: 'Now you, expert, try to guess what I am going to do, and make your estimate accordingly. On the basis of the factual information I thus receive I will then decide what to do'. The shift from the on-looker viewpoint to the decision viewpoint must be founded on a much more coherent form of logic. It must be based on a *decision model*, i.e. a model where the possible decisions are built in explicitly as essential variables." (Frisch, 1976a, pp. 91-92).

Unfortunately, in current usage "decision model" has ended up meaning any model that is useful for taking decisions, among these included all the descriptive models used when necessary.

It is my opinion that regional science is imbued with this mistake. In fact, in order to avoid the "half logic" about which Frisch writes, it would be necessary to define as decision models only those constructed on the basis of variables (and on the hypothesised behaviour of such variables) that are *strictly linked to the decision process*, and not antecedent to it.²³

And "general equilibrium", (of which a theorisation is certainly effective, so that decisions are founded on the operational awareness of the complexity of the decision problems) should be conceived not as a pre-condition, but rather as an *outcome* of the decision process itself.

3.2 *The "Prescriptive" Approach and the Programming Approach: Common Pragmatic Bases*

Returning to the main arguments of Bell, Raiffa and Tversky, they themselves - on the basis of some acute observations on descriptive and normative models - conclude, as has been said, that there is a *third* approach to be favoured in planning processes, which resembles greatly that which we call "programming approach": the "*prescriptive*" approach.

"What should an individual do to make better choices? [The authors ask] What modes of thought, decision aids, conceptual schemes are useful - useful not for idealized, mythical, de-psychologized automata - but for real people? And since real people are different, with differing psyches and emotions, capabilities, and needs, good advice has to be tuned to the needs, capabilities, and emotional makeup of the individuals for whom the prescriptive advice is intended. It becomes even more complicated when individuals who think one way have to interact with experts who think along different paradigmatic lines, as, for example, between a rational decomposer and a holistic intuiter." (p. 17).

It is clear that decision theory, which is anchored on the socio-psychological foundations of decision behaviour, tends to categorize logical decision processes with regard to the "individual", rather than with regard to the decisions of groups, organisations, institutions, and perhaps of governments, with their range of representativeness. And, as target people and clientele for their consultancy work, decision theorists have managers mainly in mind. But this does not create great differences of approach, *mutatis mutandis*, between the prescriptive approach, and the programming approach that is principally aimed at conceiving and assisting decisions in complex systems of social and community planning, and on decision-makers with political responsibility.

Let us underline some interesting elements of decision theory, having affirmed the trichotomy, because it is very convergent with the need to overturn the approaches, as they have followed each other in the relationship between "positive science" and "planning science" (or planology).

Bell, Raiffa and Tversky conclude that the difference between the three functions of choice models - descriptive, normative, and prescriptive - , , can be clarified by examining the criteria by which they are evaluated:

"Descriptive models are evaluated by their *empirical validity*, that is, the extent to which they correspond to observed choices.

Normative models are evaluated by their *theoretical adequacy*, that is, the degree to which they provide acceptable idealizations or rational choice.

Prescriptive models are evaluated by their *pragmatic value*, that is, by their ability to help people make better decisions." (p. 17-18)

The Authors state that "all three criteria are difficult to define and evaluate, as any student of the philosophy of science knows too well". I totally agree with their remark that "it is evident, nevertheless, that the criteria are different; an argument against a normative model need not be an argument against a descriptive model and vice versa."²⁴ (p. 18)

4. The End of the Ambiguous Relationship between Regional Science and Planology?

In this contribution we wished to illustrate our assumption that decision processes must be based on decision models that are defined as such, not simply so that they can be used for decision purposes - as can well be the case of the descriptive models - but also so that they are *constructed with regard to decision hypotheses*. And we wished to do this following the critical paths of two schools of thought that have distinguished themselves for their great analytical work in the construction of models for planning: regional science and decision theory.

These paths are similar to those taken by those (the Author included) who have committed themselves to defending a sort of "autonomy" in the programming approach with respect to the theorems of classical economics (and in particular to the theorems of regional economics), on the one hand, and to the theorems of decision theory scholars based on the analysis of "human behaviour", and on its scientific projectability, on the other²⁵.

The lack of clarity in the differences of approach, has created in fact much incomprehension and many errors in planning practice, and many models of limited usefulness and value that are described as "decision" models, because they are still anchored to "descriptive" formulations; models that have come to assume more clearly, in the light of today's considerations, the character of "pseudo-decision" models.

In the past numerous ambiguities occurred. And the problem of a developing a clear methodological and epistemological foundation was not understood, as it seems to be understood today in light of the further interesting developments of the evoked disciplines.

I think that a more intense debate on this theme would do nothing but improve approaches to planning and support a more direct pragmatic efficacy in the strands of study that refer to regional science), for a construction of a more precise methodology of planning.

¹ Published subsequently in the Journal of the American Institute of Planners (W. Alonso, 1971) from which the excerpts are taken here.

² It was Isard's second important contribution to regional science, and concerned "analysis techniques" (W. Isard, 1960). The first (from 1956) was on *Location and Space Economy: A General Theory Relating to Industrial Location, Market Areas, Land Use, Trade and Urban Structure* (Isard, 1956), and was declared by the Author to be not "operational". It attempted to unify within "one conceptual framework the various theories relating to agricultural location and land patterns, location and spatial configurations of industry, supply and market area analysis, rent and urban land use patterns, interregional and international trade, urban systems and the urbanization process, with emphasis on transportation and distributions patterns" (Isard, 1969, p. vii). Isard goes on to say that "the basic 'substitution principle' was a key concept, found to be central in the several theories examined; and through graphic and mathematical analysis, the several theories were interwoven into a more unified framework and each further developed" (ibidem). But such a theory was not operational. Thus the second volume was produced. However, Isard warns in the preface to the third and final volume of his trilogy (which should have become a quadrilogy in the intention of the Author) that in this volume "which presented the set of available tested tools and techniques, emphasis was placed on those which could effectively contribute to the analysis of urban-regional problems ...; the fields of sociology, geography, political science, anthropology and planning were underrepresented ..." (ibidem).

³ See W. Isard & T. Reiner, 1961.

⁴ For some years now in the international scientific community, a certain re-awakening of theoretical planning studies has been manifest, which has given rise to important steps towards new methodologies. Allow me to mention some writings by the Author that bear witness to this (Archibugi, 1992a & b). It is worth remembering that a "First World-Wide Conference on Planning Science" took place recently in Palermo (Sept. 1992), under the auspices of the United Nations University (Tokyo), UNESCO, and the European University Institute of Florence, and that on this occasion the scholars who attended decided to create a World Academy for the Advancement of Planning Science, whose honorary presidents were Jan Tinbergen and Wassily Leontief. For more developed appraisal on the general "programming approach" see Archibugi, 2000b.

⁵ See Archibugi, 1969 and 1974.

⁶ In his authoritative and lucid introduction to the well known volume on the progress of regional economic theory (1986), Peter Nijkamp expressed the opinion that: "the policy orientation of regional economic theories and methods deserves due attention. Regional economic policy analysis is still an underdeveloped field and is often only a derivative of notions from planning theory and economic policy theory." (P. Nijkamp & E.S. Mills, 1986 p. 16). About "programming approach" see the cite Archibugi, 2000b.

⁷ We are dealing moreover with disciplines that represent two strands of study that can be considered among the matrices of planology. For further reflection on planology's matrices, the reader is referred to a work in progress by the Author (Archibugi, first draft 1993).

⁸ Walter Isard, et al., *General Theory: Social, Political, Economic and Regional with Particular Reference to Decision-Making Analysis*, MIT Press, Cambridge, 1969 (pp. 1040).

⁹ This represents also a critical-historical contribution to the evolution of thought on regional science.

¹⁰ Isard himself states with a certain sadness, how "most of the social sciences have been concerned with one or more aspects or types of rational and optimizing behavior. Much of economics concerns behavior designed to minimize cost and effort or to maximize profits, utility, and the economic welfare of the social body. Much of political science, especially the new behavioristic political science, emphasizes processes whereby individuals and groups act to maximize, for example, their vote, their power, their control over influence networks, or the probability of their retaining a position or status already achieved. Administrative theory also deals with optimization, for example in its emphasis upon efficiency and cost minimization in the performance of functions or attainment of specific goals. Public policy formation (inclusive of political economy) is easily interpreted as involving for each issue the selection of that alternative which either minimizes or maximizes some measure or function within the setting of numerous institutional constraints. A good part of psychology pertains to the individual attempting to maximize satisfaction within a complex political-social-economic (stimulus) environment which provokes responses and fosters, inhibits, and otherwise influences drives, learning, and adaptation. Sociology investigates the structure and function of social groups and institutions, many of which may be viewed as optimizing certain objectives subject to restraining elements: for example, maximizing friendship, morale, and pattern stability subject to spatial, economic, and other prescribed constraints" (p. 117).

¹¹ However, direct acquaintance with the volume is recommended.

¹² See Chapter 12 in particular.

¹³ See T. Parsons et al., 1951, 1953, and 1957.

¹⁴ See T. Parsons et al. 1961. See also the collective volume on Talcott Parsons, edited by Max Black, 1961.

¹⁵ Personally I have studied this commodity ("solidarity") under a different point of view: as factor of changing in the pattern of the "capitalistic" economy (and "society") toward a new "associative economy" or post-capitalist society. (See Archibugi, 2000a).

¹⁶ Ideas and specifications may be found on this "noneconomic" commodity in a vast literature on policy science. Isard has referred to authors such as Banfield (1961), Harsanyi (1962), Gross (1964) and Dahl (1957).

¹⁷ On this, see in particular the works by McClelland (1953 and 1961) and Gross (1964).

¹⁸ For which see Chap 13, and in particular §13.12 where he gives a concise explication in table form

¹⁹ Although on this point Isard states: "It is difficult to define exactly what is meant by 'reasonable' in this context. For our purposes, we choose to adopt the approach suggested by Luce and Raiffa" (ibidem, p. 842). Isard is referring to Luce & Raiffa,

1958, p. 332. The guiding principles evoked here are briefly: "Efficiency ... Simplicity... Normality... Strategy ... Pre-indeterminacy ... ". For further elaboration see *ibidem*, §16.14 p. 842.

²⁰ I consider this essay one of the most important Italian contributions of recent decades to the progress of theoretical and methodological reflection in economics.

²¹ Thus Zauberman with his *Aspects of Planometrics* (1967). For a wide-ranging "planological" examination of these distinctions, see the vast bulk of work by Ragnar Frisch, and, in particular, the essays from the last period of his life that have been collected posthumously by F. Long (Frisch, 1976); and above all the systematic treatment on the "use of models" in planning and decision, contained in the fundamental work by Leif Johansen on macroeconomic planning (1977-78).

²² See the essay by Myrdal: *How Scientific are the Social Sciences?* (Myrdal, 1972).

²³ Frisch in another writing dedicates himself to a typological outline of models for planning (in an essay which constitutes one of the pillars of planning studies) (Frisch, 1976b).

²⁴ It is not necessary to say that the task of constructing models of a prescriptive type, above all in relation to helping political decision-makers to make better decisions, is that of planology (freed critically and methodologically from the undue assumptions of "neo-classical" behaviour theory, and also from other, more classic ones of "positive" economy).

²⁵ An important technical development in decision theory which, whilst being up till now "extraneous" to the discussion between the "positive" approach and the "programming" approach to decision behaviour, is that which goes under the name of "multi-objective decision analysis". Howard Raiffa was one of the first to deal with the subject (Keeney & Raiffa, 1976), but the best critical summation of the many versions and uses of the method (which has great relevance for the estimation and modelisation of preferences, and thus for planology) is given in an essay by P. Nijkamp & P. Rietveld (1986). An excellent treatment of multicriteria analysis methods applied to planning can also be found in Voogd (1983). The multi-objective decision methods, in all their range of types and application, have in any case done a great service to the development of the programming approach.

BIBLIOGRAPHICAL REFERENCES

- Alonso W. (1971), *"Beyond the Inter-Disciplinary Approach to Planning"*, Journal of the American Institute of Planners, n. 37., 1971.
- Archibugi F. (1969), *Physical Planning and Economic Planning in National Development*, Report prepared for the UN Centre for Housing, Building and Planning, "Interregional Seminar for Urban, Regional and National Development", Bucharest, Rumania, 22 Sept-7 Oct 1969.
- Archibugi F. (1971), *Un quadro contabile per la pianificazione nazionale*, [An Accounting Frame for National Planning] in: V. Cao-Pinna, ed., *Econometria e Pianificazione* [Econometrics and Planning], Etas-Kompass, Milano, 1971.
- Archibugi F. (1974a), "Il processo integrato di pianificazione, economica e territoriale", Rapporto al Convegno internazionale su "Programmazione economica e pianificazione territoriale", [The Integrated Process of Economic and Territorial Planning, Report to the International Conference on "Economic and Land-Use Planning"], Libera Università degli studi di Trento, Trento 5-6 ottobre 1974, in: *Politica e Mezzogiorno*, XII, n. 1, 1975.
- Archibugi F. (1974b), *A System of Models for the National Long-Term Planning Process*, UN-ECE Seminar on "The Use of Systems of Models in Planning", Moscow, 2-11 Dec 1974 (See revised version: *The Configuration of a System of Models as an Instrument for the Comprehensive Management of the Economy*, Paper for the "XII International Input-Output Conference", Seville, 1993.
- Archibugi F. (1992a), *The Resetting of Planning Studies*, in: A. Kuklinski, *Society, Science, Government*, KBN, Warsaw, 1992.
- Archibugi F. (1992b), *Towards a New Discipline of Planning*, Paper prepared for "The First Worldwide Conference on Planning Science", Palermo 8-11 Sept. 1992, Planning Studies Centre, Rome, 1992.
- Archibugi F. (1993), *Introduction to Planology*, Planning Studies Centre, Rome, 1993.
- Archibugi, F. (2000a), *The Associative Economy: Insights beyond Welfare State and into Postcapitalism*, Macmillan, London 2000.
- Archibugi, F. (2000b), *The "programming approach": methodological considerations based on the contributions by Frisch, Tinbergen and Leontief*, paper presented to the EAEPE Conference 2000 (Berlin 2-5 November 2000)
- Arrow K. J. & G. Debreu (1954), "Existence of an Equilibrium for a Competitive Economy", in: *Econometrica*, 22, No. 3, pp. 265-290, July 1954.
- Banfield E. C. (1961), *Political Influence*, The Free Press of Glencoe, New York, 1961.
- Bell D. & I. Kristol (eds.) (1981), *The Crisis in Economic Theory*, Basic Books, 1981 (trad. it., *Comunità*, 1982).
- Bell D. E., H. Raiffa & A. Tversky (eds.) (1988), *Decision Making: Descriptive, Normative and Prescriptive Interactions*, Cambridge University Press, Cambridge, 1988.
- Black M. (ed.) (1961), *The Social Theories of Talcott Parsons*, Prentice-Hall, Englewood Cliffs, N. J., 1961.
- Churchman C. West (1961), *Prediction and Optimal Decision*, Prentice-Hall, Englewood Cliffs, N. J., 1961.
- Dahl R. A. (1961), *Who Governs?*, Yale University Press, New Haven, Connecticut, 1961.
- De Finetti B. (1973), *L'utopia come presupposto necessario per ogni impostazione significativa della scienza economica* [Utopia as a Necessary Presupposition for any Meaningful Formulation of Economic Science], in: B. De Finetti, (ed.), *Requisiti per un sistema economico accettabile in relazione alle esigenze della collettività*, [Requirements for an

-
- Acceptable Economic System in Relation to the Needs of the Collective], Angeli, Milano, 1973.
- Drewnowski J. (1974), *On Measuring and Planning the Quality of Life*, Mouton, The Hague, 1974.
- Edwards W. (1961), "Behavioural Decision Theory", *Annual Review of Psychology*, No. 12, pp. 473 - 498, 1961.
- Fox K. A. (1985), *Social System Accounts, Linking Social and Economic Indicators Through Tangible Behaviour Setting*, Reidel, Dordrecht, 1985.
- Frisch R. (1976a), *Preface to the Oslo Channel Model: A Survey of Types of Economic Forecasting and Programming*, in: R. Frisch, *Economic Planning Studies* (F. Long, ed.) Reidel, Dordrecht, 1976.
- Frisch R. (1976b), *From Utopian Theory to Practical Applications: The Case of Econometrics*, in: R. Frisch: *Economic Planning Studies* (F. Long, ed.) Reidel, Dordrecht, 1976.
- Gross B. M. (1964), *The Managing of Organisations*, Vols. 1 and 2, The Free Press of Glencoe, New York, 1964.
- Gross B.M. (1966), *The State of the Nation: Social Systems Accounting*, in: Raymond A. Bauer (ed.) *Social Indicators*, MIT Press, Cambridge, Mass., 1966.
- Harsanyi J. C. (1962), "Measurement of Social Power, Opportunity Costs and the Theory of Two Persons Bargaining Games", in: *Behavioural Science*, 7 (67-80), 1962.
- Isard W (1956), *Location and Space-Economy*, MIT Press, Cambridge Mass., 1956.
- Isard W. (1960), *Methods of Regional Analysis: An Introduction to Regional Science*, MIT Press, Cambridge, Mass. 1960.
- Isard W. et al. (1969), *General Theory: Social, Political, Economic, and Regional with Particular Reference to Decision-Making Analysis*, MIT Press, Cambridge Mass., 1969.
- Isard W. & D. J. Ostroff (1958), "Existence of a Competitive Interregional Equilibrium", *Papers, Regional Science Association*, No. 4, pp. 49-76, 1958.
- Isard W. & Th. Reiner (1961), *Les Techniques Analytiques de Planification Régionale et Nationale*, in: W. Isard & J.H. Cumberland (eds.), *Planification Economique Régionale*, OECE-AEP, Paris, 1961.
- Johansen L. (1977-78), *Lectures on Macro-Economic Planning*, 2 vols., North-Holland, Amsterdam, 1977-78.
- Keeney R. & H. Raiffa (1976), *Decisions with Multiple Objectives*, Wiley, New York, 1976.
- Kuhn A. (1963), *The Study of Society: A Unified Approach*, Richard D. Irwin and the Dorsey Press, Homewood, Ill., 1963.
- Luce R. D. & H. Raiffa (1963), *Games and Decisions*, Wiley, New York, 1963.
- McClelland D. C. et al. (1953), *The Achievement Motive*, Appleton-Century-Crofts, New York, 1953.
- McClelland D.C.(1961), *The Achieving Society*, Van Nostrand, Princeton, New Jersey, 1961.
- Myrdal G. (1972), "How Scientific are the Social Sciences?", in: *Cahiers de l'Isea*, Serie H. S. no. 14, 1972.
- Nijkamp P. & P. Rietveld (1986), *Multiple Objectives Decision Analysis in Regional Economics*, in: P. Nijkamp (ed.), *Handbook of Regional Economics*, North-Holland, Amsterdam, 1986.
- Parsons T. (ed.) (1961), *Theories of Society*, The Free Press of Glencoe, Ill. 1961.
- Parsons T. & E. A. Shils (1951), *Toward a General Theory of Action*, Harvard U. P., Cambridge. Mass., 1951.
- Parsons T., R. F. Bales & E. A. Shils, (1953), *Working Papers in the Theory of Action*, The Free Press of Glencoe, Ill., 1953.
- Parsons T. & N. J. Smelser (1957), *Economy and Society, A Study in Integration of Economic and Social Theory*, Routledge and Kegan Paul, London, 1957.
- Simon H. A. (1957), *Models of Man*, Wiley, New York, 1957.

-
- Von Neumann J. & O. Morgenstern (1947), *Theory of Games and Economic Behavior*, Princeton University Press, Princeton, N. J., 1947.
- Voogd H. (1983), *Multicriteria Evaluation for Urban and Regional Planning*, Pion Limited, London, 1983.
- Zauberman A. (1967), *Aspects of Planometrics*, University of London, The Athlone Press, 1967.