Program indicators: their role and use in the integrated social or community programming

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ABSTRACT. The paper wishes to relocate the theme of social indicators within one of their most congenial reference frames, that of the social or community programming-evaluation process. It defines what a program is and also the meaning "program structure". Further, it argues the relationship between objectives in the definition of program structures, and it develops a procedure to build the program structure and to apply a program analysis and evaluation. Finally, it considers, more in general, the nature and classification of program indicators and the criteria for the choice of types of program indicators in different circumstances. The discussion is supported with two examples of program structuring and the related selection of program indicators taken from two very different programs instigated by the Italian government: one is a program of aid for the poor and undernourished population of the third world; and the second is the 10 year plan for the environment beyond the year 2000.

1. Foreword

I do not want to discuss the validity of such differences in orientations. I will limit myself to state that we take for granted that social indicators (as we intend here) are, in a way or another, resolutely social programming oriented (social programming strongly concentrates all the problems on which debate and consolidation of the social indicators movement itself was carried out)[1]. And this all to the point of suggesting denominating them decidedly: "program indicators"[2].

It is well known that in the last decades a certain "mistrust" in any form of planning - when not an actual ban - has been largely shared[3]. Recently, however,

[1] Beyond the already quoted works, see also: Biderman (1966), Gostkowski (1972); Fox (1974 b and 1985); Hainal and Kiss (1988); and Cicerchia (1993a and 1993b).

[2] On the role of social indicators for planning, we are taking for granted that the wide international debate carried out in the 1970s and 1980s is familiar to the reader, with particular attention for the planning of development, in particular at UNESCO, see for example UNESCO (1976, 1978, 1980, 1981, 1984 and 1988), and the contributions of Rao, (1976); Yeh, (1974); Ramkrishna, (1981); Beckerman, (1984); Miles, (1985); Michalos, (1988).

[3] On the crisis of the albeit timid attempts at national planning throughout the world following the oil crisis of 1973 (in GB, France, Holland, Norway, Italy, and even in the United States where the

the need for programming has been re-launched from a number of perspectives - often totally new, often tied to optimize public resources that are increasingly scarce if compared with the needs. This made it possible to envisage a more systematic convergence of traditional scientific approaches that find themselves in a state of increasing crisis (economics, sociology, town planning, system engineering, etc.), to respond adequately to the new needs, and made it to emerge, in that convergence, something like a new autonomous discipline, called "planning science" or "planology".

To this emergence is due the development of the theme of program evaluation and monitoring; a theme to which is connected with that of program indicators, as instruments for both evaluation and monitoring.

This contribution intends therefore to synthesize a brief but systematic "taxonomic" reflection on program indicators.

An important premise to this reflection on program indicators is that they, in this contribution, are dealt with independently from the scale and the nature at which the planning process (of which they are, as said, instruments) takes place. In other terms, if this process takes place at the "national", "regional" or "local"; sectorial or global; public or private scale, and so on and so forth[4].

This is obviously an abstraction. In fact, concretely, indicators depend on the above said scale where they apply in their contents and - to a large extent - also in their form, number and architecture.

Here, we will limit ourselves to speak of them only for those general methodological aspects that can be common to more scales, more contents, more architectures (hoping that all this could contribute to improve -methodologically - their single applications).

This approach is by now accepted in the theory of planning, even if poorly represented in its debates, and given that it has not yet received – in my opinion – sufficient attention in a systematic way, through a kind of autonomous discipline (that I have called “planning science” or “planology”). In the most bright and advanced cases of such a “general” approaching (like, for instance, that of Warfield, from the systems engineering source) all this was very clear a long time ago. Given the importance of such an approach for the reading of the present

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swansong of a final attempt to construct a national planning system was that of the report of the "Advisory Committee on National Growth Policy Processes" of 1976), there is a vast literature which it is not our place to recall here. We can refer only to essays contained in a collective volume edited by Stuart Holland (1979), and to the contributions included by Delors, Balogh, Ruffolo, Zinn, Wieczoreck and by the writer.

[4] In reality in the literature this “integration” of scales (which is also a factor of integration of contents) until now has been very limited. The definition of goals and the construction of the “program structures” on the national scale (and macro-economic or macro-social) have been a prerequisite of *development planning studies* (in particular aimed at developing countries): see Cant (1976); Drewnowski (1974), Scheneider (1975); Land (1981); for the developed countries: Porwit (1978b); Zapf (1979); Innes (1975 and 1981). On the contrary studies in *systems analysis and engineering* have more concentrated on projects on local territorial scales and on the scale of the single operators as large and as complex as these may be. They essentially reflect the “theory of organization and decision-making”. Among the authors of these disciplines who more than others have tried to bring the methods of planning to “societal” scales are Warfield (1976) and Patton and Sawicki (1986).

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paper on program indicators, we consider it useful to reproduce, in the footnote, the words of Warfield himself, in a relevant *memento*[5].

2. Program and "program structure"

We observe, first of all, that program indicators exist to the extent that there is a program. However stupid this observation, if kept in mind it could help us avoid giving rise to concepts of which we often lose the real sense.

In this sense, if "program indicators" live as a reflection of a program, they are also the instruments through which the program becomes something precise, real, "measurable", and valuable in concrete terms.

But what is a program?

Let us take a random definition: for instance that a program is a "*process by which to prepare a set of decisions for future action, aimed to achieve objectives*

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[5] "Discussions of planning often refer to a particular type of *planning unit*, the entity for which planning is to be carried out. Among the types of planning unit considered in planning literature are corporations, schools, research and development organizations, cities, states, regions, nations, and the world as a whole. A particular planning unit typically identifies its *environment*, that complex of elements external to the planning unit with which it interacts in the course of its activities. For a particular unit, it is usually possible to identify individuals who bear considerable responsibility and have authority to make decisions relevant to its operations. The individuals, collectively, are called the *management*, and singly are identified as *managers*.

The clear advantage in limiting discussions of planning to a particular type of planning unit and its management lies in the readiness with which such discussions lend themselves to interpretation in a particular context of application. While each planning unit is unique in some respects and the environments of two planning concepts and experiences are transferable among units of a given type, in spite of their distinctive properties.

Past success in transferring planning concepts from one planning unit to another of the same type suggest that it may also be possible to transfer planning concepts between types of planning unit. Discussion of planning that are not restricted to a specific type of planning unit require some effective focus that would otherwise be provided by concentrating on the specific type. Such a focus has sometime been provided by discussing planning for systems, programs, or projects.

Clearly one disadvantage of approaching planning without the linkage to a particular type of planning unit lies in the burden placed on the reader to adapt the discussion to apply to a particular application context. This disadvantage can be justified if there are significant offsetting advantages. Among the conceivable advantages of such an approach are the following:

- If planning can be understood generically, the understanding may be relevant to a large variety of situations, adding to the flexibility of the individual engaged in planning.
- The presentation can focus upon fundamental concepts of planning; hence the loss of immediate connection to a planning unit type is balanced by a deeper understanding of the nature of planning.
- Advances in planning within one type of planning unit may be more readily transferred to another type of planning unit, thereby adding to the total societal capability.

Moreover a general approach to planning does not replace other approaches, but simply supplements them and helps to place them in a broader context" (Warfield 1976, pp. 119 –120).

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through preferable means"[6]. As such - simplifying more and more - a program is composed of a set of objectives, seen together with a set of means apt to achieve them. This overall view is what we shall call "program structure".

Program frame - that is, a logical and ordered formulation of the objectives and the means to implement a program, is the indispensable basis of program indicators.

It represents in fact:

- a sort of articulated organization of a *system* of objectives that are in a certain sense coexisting and correlated and
- a *chain* organization of objectives in relationship with the relative means or instruments apt to achieve them.

It is the effort to give as much rational and perceptible an organization as possible to the whole of "objectives" and "means" apt to achieve them; to give each possible action its proper place and function - now as objective, now as an instrument - according to the mutual relationships between objectives and the typical chain existing in the means-objective sequence.

The *relationship* of an objective with the other objectives (that can hinder it, but also help it) and the means apt to achieve it must somehow be measured and quantified. This to know how the achievement of a given objective is hindered or favored by the pursuit of another objective, or how such achievement implies the use of *which and how many* means/ resources. And that to know also how to mobilize these means (mobilization that becomes a objective itself) a certain amount of other means / resources is needed.

To measure and quantify this relation are therefore necessary program indicators (or measures).

We will proceed now to analyze the nature of the relationships between objectives and between objectives and the means apt to achieve them.

3. The relationship between objectives

The relationship between different objectives is almost inherent in any sort of program, of any scale and nature. It is unlikely that a program (especially that of a public operator) will have one single objective; and even if this were the case, it would have an indirect relationship with the objective of another program of a collateral nature. One can thus state that any program implies a direct or indirect relationship between objectives.

The direct or indirect relationship between objectives can be established along two viewpoints: a *logical-functional* one that might also be called objective viewpoint, and a *psychological-motivational* or preferential one that might also be called the *subjective* viewpoint.

The logical-functional (or objective) point of view considers the relationship existing among different objectives *per se.* The psychological-preferential (or

[6] It is the definition by Y. Dror (1963) that I continue to consider one of the most satisfying. Other definitions are collected in a book of mine (Archibugi, 1979).

subjective) point of view considers the relationship existing between different objectives not *per se*, but *relative to the subjects that express them*.

3.1 The logical-functional point of view

As already said, the logical-functional point of view considers the relationship existing among different objectives per se. This relationship can be: a) a *compatibility* relationship and b) a *hierarchical* relationship.

a) *Compatibility Relationship*

Two objectives or more can be mutually compatible when to pursue or to achieve one of them does not create obstacles to pursue or to achieve the other; conversely, they will be *incompatible* when it does.

An obstacle can be *technical* or *economic*.

We will call *technical* an obstacle when a mean, which is considered useful or indispensable for the achievement of an objective, has a negative impact on another objective (and its pursuit), thus generating a technical incompatibility.

We will call *economic* an obstacle when the means for the achievement of more than one objective are limited and do not allow to achieve more than one objective at a time, even if objectives are technically compatible with each other; in this case, an economic *incompatibility* is generated.

b) *Hierarchical Relationship*

There is a hierarchical scale among objectives that poses them all, in a chain, in a subordination relationship. Any objective can become the instrument of a higher objective, and any instrument can become the objective of a lower instrument.

If there is no dominance/subordination relationship, between two or more objectives there can be a connection relationship with reference to the same higher objective, or to one or more lower objectives.

The levels of the hierarchical scale in the objectives system can be infinite (in section 5 we will illustrate a standard scale).

c) *"Direct" and "Indirect" hierarchical Relationship*

Hierarchical relationships can have many dimensions.

One dimension – which we will call "direct" – develops itself along only one autonomous hierarchical line of objectives/means, and one or more dimensions – which we will call "indirect" – develop themselves along different hierarchical lines of objectives/means.

The indirect dimensions generate an objectives/means relationship matrix, by means of which are identified possible (even non existent) relations, and relative achievement indicators between any "objective" (at any level) and all "means" present in the program structure; or – but it is the same thing – between any "means" and all the objectives, also present in the same program structure.

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The operational techniques – of analytical and evaluative types – of these multi-dimensional matrices are numerous and are beyond the purpose of this paper[7].

3.2 The psychological-preferential point of view

It has been said that he psychological-motivational (or preferential and subjective) point of view considers the relationship existing between different objectives not per se, but relative to the subjects that express them.

Subjective relationships - that can be expressed in a system of weights that each subject attaches to each objective - can be expressed in two ways:

1. In the diversity (among the different subjects) of the objectives expressed;
2. In the different importance attached (priority) to each objective (among the different subjects).

Subjective relationships, indicated in the mentioned modes (and possibly in others) can find their collocation in the program structure, in a multi-dimensional matrix[8].

4. Program structure

The objectives system, (also linked as means), thus articulated, creates the "program structure", that is the logical frame of reference (*logframe*) for the analysis of technical or economic compatibility, functional subordination or dominance relationships, of any objective or problem in the elaboration of a problem and in the evaluation or choice processes that are related to it.

The above-described system of relationships between objectives - from which program structure derives -can extend indefinitely. In reality, the operational levels of a program structure depend on the width of the program they refer to. Since any program, to be easily managed, must represent a field that is not too broad (taking care however and establishing the appropriate relationships with its context, upstream and downstream its location), proceeding in our reflection we will assume that a program, to be manageable, will be articulated only into a given limited number of levels.

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[7] An adaptation of such matrices to planning theory can be found in many authors. Among them we recall: Chadwick (1971, chap. 4); Chapin (1985, chap. 10); and Hill M. (1973, chap. VII). On the fundamentals of the systemic multi-objective logic one can see Warfield (1976, chaps. 5, 6, 7); Hill J.D and Warfield (1973); and Keeney and Raiffa (1976).

[8] The presence of a diversity of objectives, either in the case of the relationship that we have called objective or the relationship that we have called subjective, opening the possibility of conflict, cooperation, or indifference, always makes room for multi-dimensional matrices. The operational treatment of such matrices is by now a classic of systems engineering and decision-making theory. For this, see Hall A.D. III (1962); Keeney and Raiffa (1976); and Bell, Keeney, and Raiffa (1977).

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Choosing a standard number of levels, we will select four of them, that characterize any sort of program, in any section of the hierarchical scale, potentially infinite; and for each level we will adopt an *ad hoc* "nomenclature"[9].

i. We call the *first level* that of "Aims" (that could also be called "category of aims") which holds a place in the structure hierarchy for the very general aims of the program);
ii. We call the *second level* that of "Strategic objectives" (that can also be called "category of objectives"), which holds a place in the hierarchy for the strategic character of its objectives for the program.
iii. We call the *third level* that occupied by the "*Actions programs*", that have a field specificity and are in turn articulated in single actions (and that constitute the heart of a program)
iv. We call the *fourth level* that of "*Actions*" (or Operations), that, given their specificity can be of a very varied nature: laws, administrative operations, whatever measures, and intervention "projects". These actions can also be called "*Program elements*", because they represent the "elementary units" of the program itself.

We repeat that this organization of a program structure into four levels and their denomination is totally conventional, and depends on circumstances and on the nature of the program.

A program of large dimensions can increase the number of levels. A program of modest dimensions can reduce it. It seems however difficult to reduce in any circumstance levels to less than three: *objectives-programs-actions*. It depends on the programs operational field if programs (the third level) are to be articulated in more than one level (sub-programs); or if actions (fourth level) are to be articulated in more than one level (main actions and subordinated or support actions).

It is to recommend that the program structure, in its “structuring” (see next par. 5) take account also of the possible “indirect” hierarchical relationship (which have been mentioned above).

5. General program structuring

Program structure is then the result of a process of goals analysis, and their relationships, that we will call "*program structuring*". Without this process and a definite program structure it is objectively impossible to determine a system of indicators concerning a program whatever.

[9] These nomenclatures do not have, obviously, any value *per se*. They only serve to recall the reciprocal function of the chosen levels, with reference to current applications. One could also adopt a mere ordinal nomenclature: first, second, third, etc.). But such a nomenclature, even more neutral to single concrete applications of a program, risks in the single cases to disfavor the reference to the real hierarchical and linked structure of the objectives/means relationship.

Program structuring, and the goals analysis by which it originates, starts by the definition (in the most "epigraphic" form possible) of the list of objectives connected to the program. Once these objectives are listed, one will proceed to "order" them in accordance with their compatibility and logical subordination relationships, as we have said.

Once "ordered" by these relations, one will proceed to analyze the ways through which the achievement of the goal in question can be expressed or "measured".

The logical process of program structuring will assume the graphic representation of *scheme 1*. With such program structuring, a good deal of the work for identifying program indicators is already started.

Obviously, *several levels* of cross reading are possible of a program structuring, depending on the aspect one wishes to analyze; e.g.:

a) actions concerning the same actors can have different territorial value;

b) (intermediate) objectives pursued through given actions can also represent, in turn, means for the achievement of a general objective;

C) an objective can be achieved through a plurality of actions, mutually independent, whilst the same action can affect different objectives.

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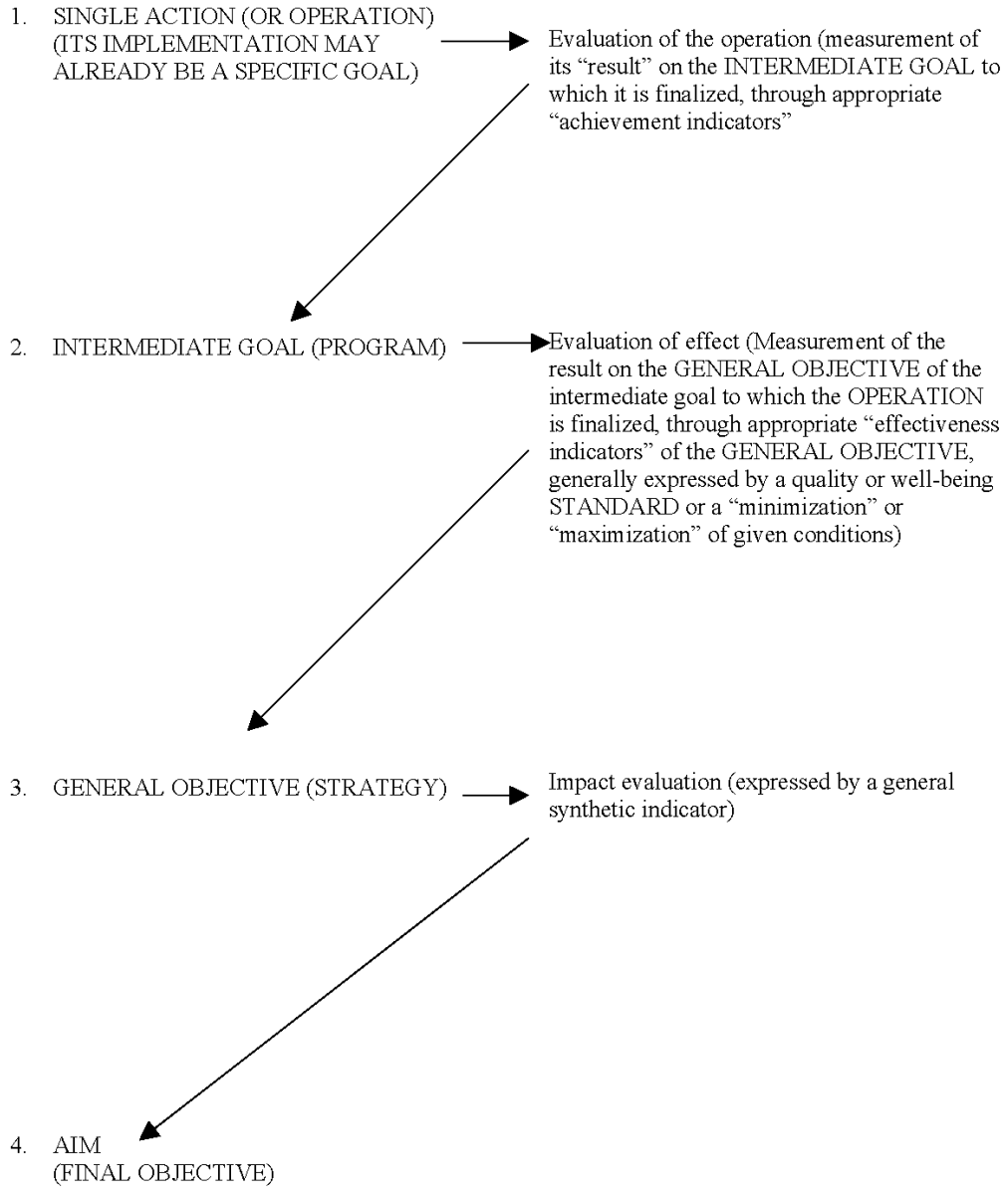
Scheme 1: Schematic representation of the logical process of a program structuring.



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6. Program analysis (and evaluation)

At any scale of operation, the "action programs" (third level) will always play a crucial role: the role of an *inter mediator* of the relationships between aims/strategies of a program and single actions or operations; a role of *interface*, then, between objectives of any plan or program and the means to pursue or implement it.

The logical frame of goals and actions that we have established as a first stage of a process of any plan or program building, is not enough to characterize the plan or program, if this does not account for *results* or *effects* that the relationship, identified in abstract, between goals and means can obtain, and the time it requires to achieve them.

Therefore, the analysis of goals and the means apt to achieve them, together with that of "program indicators" apt to measure them, must be immediately followed by a realistic evaluation - for each program - of the *results that are expected* from it.

This realistic evaluation is what is commonly called "*program evaluation*", and implies an analysis of the costs and benefits of alternative means (or methods, or "policies", depending on the operational scales), as well as of the involved subjects, inasmuch as any operation always implies operators, besides - naturally - those who are expected to benefit from it.

We will call this analysis of the results that can be obtained with the use of instruments and means appropriate to the pursuit of the different goals, a program analysis and evaluation. That is, an analysis applied to the chosen program structure.

Program analysis and evaluation, therefore, is made on the basis of an analysis and evaluation of the results that can be expected in the selected goals/means relationship, results *measured* through appropriate program indicators.

This relationship of the objectives/means will be of either the “direct” or “indirect” type, as said in preceding paragraphs.

7. Program indicators

Once the program structure is built, the next step is then to build a systematic methodology of programming/program evaluation through the building of a system of indicators adequate for each of the objectives that have been identified.

A program structure with no indicators remains in fact an abstract classification. To make it operative, to both evaluation and programming purposes, it is necessary to express each objective (at any level in the program structure) through an indicator or measure of its own. Dealing with "goals", we will obviously and primarily speak of "*goal achievement indicators*" (or simply "achievement indicators" taking for granted the existence of a goal in a program structure).[10]

Depending on the level of the goal to achieve, many kinds of "achievement indicators" can however be identified. It is advisable to dwell briefly on them.

[10] More considerations of goal achievement indicators organized in matrices are found in Hill (1973).

1. *General aims indicators*: they should represent the progress obtained in bridging a given gap between aspirations and factual situations non-corresponding to aspirations. Progress could be represented by the achievement, measurable by the ratio of the number of people meaningfully reached by a program (or a policy) effects to the target population (i.e., the population that is interested and legitimated to benefit from the program). Normally these indicators refer to macroeconomic and macro social categories and variables.

2. *Strategic objectives and general programs indicators*: these are the indicators that refer to the achievement of the second-level goals in the program structure, those concerning strategies and programs of a general kind, by which the complex of effective actions for the achievement of general aims has been identified. They usually indicate the achievement obtained (through a program already implemented or to be implemented) compared to certain programmatic standards of the same level, or to maximization or minimization of an "objective variable".

3. *Instrumental programs indicators*: these are indicators that refer to an action program that is already instrumental for the implementation of a general program, and refers to second level (intermediate) goals. They normally represent the operational core of any program. The achieved targets are always measured by achievement indicators that generally relate the resources used to the physical results obtained.[11]

4. *Action (or intervention) indicators*: these are the indicators of the most elementary level of the program structure, that of elementary actions or operations of the entire goals system. These indicators must measure how much has been achieved or must be achieved in the execution of actions that are scheduled by specific programs (referring to specific population portions or limited territorial areas); they can be expressed with the most varied measurement units, from *physical units* of all the *necessary inputs* (production function) to carry out the action, to the *monetary parameter* (the overall value of the expenditure for carrying out that action). This last level of the program structure can be followed by a set of indicators that can be

[11] The absence of a well articulated program structure (and of its relative indicators) is what has constituted the weak point of a modeling of socio-economic systems based for the most part on macro-economic and macro-social variables. These (macro) economic model are – it is well known – at the base of the (quantitative) theory of economic policy (Tinbergen and followers); and these models are based on relationships between (macro) objective-variables (for instance GNP, employment, import/export accounting, etc.) and (macro) instrumental-variables (for example fiscal pressures, discount rate, public investment etc.). In fact, these abstract in respect to historical and cultural circumstances, and uprooted from an appropriate normative assessment. This is the reason for which these models are rightly criticized (for instance Matzner (1994)). However, if these models are integrated a) in a vision and frame of reference more disaggregated; b) with a program structure; c) with more precise indicators; they can recuperate their validity, mainly as models of assessment of the comprehensive compatibility of the objectives. (For this we refer to the works, unfortunately not well known, of Frisch (1976) and Johansen (1977-79).

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defined "means indicators", and measure just the means employed for attaining the objectives.[12]

All these indicators can be applied, obviously, even to cases of objectives/means relationships of an “indirect” type (see preceding paragraphs).

In some cases, *additional indicators* can be added to the above list. These enrich - compared to the main linkage of the program structure - the possible interrelations between "other" phenomena, not included in those selected in the program structure, and the goals of the program structure.

In the same way, *transition indicators* can be considered useful. They permit us to establish an "intermediate" relationship between phenomena that are not necessarily the object of a "goal" in the program structure, and therefore not mentioned in it, but that represent a necessary passage between goals that at a first glance are not connected with one another.

8. Nature and classification of program indicators

Program indicators must therefore perform two fundamental functions:

a) "indicate" the acquisition or achievement degree of the goal they refer to; in this case, they could be labeled as "*achievement indicators*";

b) indicate the effect or impact degree effect reached in achieving the goal in question; in this case, they could be called "*effect indicators*".

Achievement indicators are indicators that express a satisfaction level (of a need, an aspiration, a desire). The information they convey is whether the phenomenon they express is such as to adequately represent the proposed goal.

Effect (or impact) indicators are indicators that express what and how much use of means and resources (that is what costs) are necessary to obtain advancement in terms of satisfaction level.

This is also the reason why achievement indicators, indicating the achievement degree of a goal, may also be called "*goal indicators*". While effect indicators, indicating the effect produced by the use of given resources or means, may also be called "*means indicators*".

In reality, the phenomenon is always the same. It is however its location with the program structure that attributes a different role to it, now as a goal, now as a mean; and consequently also the indicator that indicates and measures it in the indicated sequence is to be called like the phenomenon to which it is related.

Each achievement indicator of a goal of a given level in the program structure will act as *input* of an effect indicator of an immediately higher goal in the same program structure (the achievement indicator of which will itself become the output).

[12] An exemplification of the sequence between the various levels of indicators is given in the two examples reported in the Appendix.

The relationship between the two goals, of which the one higher in the program structure is the output of the lower, that becomes the input of it, is therefore an *input/output relationship*. This concatenation gives rise to a series of *productivity indicators*, that are at the same time *effectiveness* and *efficiency indicators*, depending on the way they are used: as I/O or O/I.

Thus, if the achievement (goal) indicator and the effect (means) indicator may be considered the same, depending on their use, there is another indicator that expresses, or indicates, the effect, on the basis of which, with a certain amount of means one obtains a given goal. This indicator is that of the *relationship* (*or ratio*) between achievement indicator and effect indicator (or between goal and means indicators). We will call it *productivity relationship* or *indicator*.

This relationship can be expressed both posing the achievement (goal) indicator at the numerator and the effect (means) indicator at the denominator; and, conversely, posing the effect (means) indicator at the numerator and he achievement (goal) indicator at the denominator.

In the first case, the indicator indicates that per each goal achievement unit one must use (has used) a given amount of means. In the second case it indicates that per each means unit used one achieves a certain amount of goal.

The relationship of the first case could be defined, conventionally, as an "*effectiveness*" relationship; that of the second case, an "*efficiency*" relationship.

Naturally, the use preference that can be attributed to one or another of the two relationships depends on circumstances: on the phenomenon, technical characteristics of the quantification one is dealing with, etc.

It is by means of these relationships between program indicators (both achievement and effect indicators), relationships that give rise to a third indicator (productivity indicator, that, depending on cases, is divided in turn into efficiency of effectiveness indicator), that we can measure the results or effects of any kind of course of actions.

This can be made both ex ante, as anticipation of the future, and *ex post*, as registration of the past or the present. In the case of the *ex post* measure, the achievement indicators will measure how many means have been (are) necessary to achieve a certain result (at any level of the program structure) or - what is almost the same - how many results have been obtained with a given amount of means. In the case of the *ex ante* measure, the indicator will measure how many means will be necessary to obtain certain results, or what results are to be expected with the use of certain amount of means (always at any level of the program structure).

9. Other considerations on program indicators

As we have seen so far, program indicator are variables that help measure how and how much goals can be reached, although in the *means/goals* linkage that is present in any program structure, and therefore in any program.

Program indicators, besides the fundamental role that they have to perform as programming, evaluation and program monitoring instruments, present intrinsic characteristics not strictly connected to the use we described in the previous section,

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but that however deserve to be summarily recalled. There are various "classifications" in use of indicators that it is advisable to keep in mind when selecting indicators in a program structure, and deserve only a few general comment.[13]

First of all, program indicators may be *static or dynamic*.

9.1 Static Indicators

Static indicators are those that express a *situation state* (*situation indicators*). In turn, these situation indicators can refer to a past situation (e.g. the initial state of the program) as well as to a future situation (e.g. the final program situation). The first describe the situation at the beginning of the period considered by the program, or in an epoch before the program interventions, or, for each action, before it. The second describe the situation at the end of the period considered by the program, or after the completion of its actions.

Moreover, the said final situation indicators may be of two kinds: anticipation (or hypothetical) and final balance (or effective). The first are *ex post* situation indicators, because they express a situation that is a *posteriori* of the planning process, and are analogous to those that are registered at the beginning of the considered period; in fact they are anticipated or programmed for the situation at the end of *the program*, or at *stages of it*, after that the planned actions have been carried out. They are for their nature *conjectural indicators*, as in any provisional budget, and therefore subject to be belied by facts. The second are instead indicators of real situations, as in any final balance, and describe the effectual situation that one has at the end of the period considered by the program and after that the programmed actions have been concluded. The only errors that may trouble them are those (however not negligible) of data gathering.

For anticipation indicators, indicator accuracy lies in the accuracy of the conjecture. For final balance indicators indicator accuracy lies in the accuracy of the observation. There is a certain antinomy between the requisites of the indicators of the first and second kind: a good anticipation indicator should be chosen considering the elements that are best apt to prevision; a good final balance indicator considering the elements that are best apt to be surveyed.

In practice, the priority choice between the two kinds of indicators depends strictly on the evaluation one intends to do: for an *ex ante* evaluation it will be necessary to establish hypothetical indicators and from their comparison to choose the intervention that will result more profitable; in an *ex post* evaluation effective indicators will be considered and from their analysis one will decide, for instance, if the intervention is to be repeated.

In the *on going* evaluation (or monitoring), finally, the continued control will be necessary for the two kinds of indicators to make sure that the intervention is proceeding in the desired direction.

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[13] About such classifications beyond the mentioned work of Forte (1974) and Miles (1985), see also Porwit (1978°) and Rao (1978).

In evaluation, that is an essential component of the programming processes and therefore strongly tied with selection processes of program indicators, it is necessary not to neglect, among anticipation indicators, also hypothetical indicators of "non intervention": that is indicators that refer to the final situation of the program period, in the case that one does not proceed to any program action. If logically the difference is clear enough between a situation where one has not intervened with a program (or action) and the situation as it will be through the intervention of a program (or an action), in practice, it is not easy to grasp differences, because of the amount of variables that influence situations, with or without a program.

Theoretically one could think that a provisional situation without programmatic interventions will be identical to the actual situation; in practice, the evolution of circumstances will produce however changes.

9.2 Dynamic indicators

In contrast to situation indicators are usually located "dynamic", movement indicators. They do not consider the situation in a given moment (program departure or arrival); rather they consider change in itself (so to say), the "doing" in a given time span.

Thus intended, however, "dynamic" program indicators go back to the objective-result/means-effectiveness linkage, dealt with in the sections 7 and 8. And in particular they refer to those that we have defined "*productivity indicators*" (both effectiveness and efficiency).

In fact the relationship goal (or achievement) indicator and means (or effect) indicator constitutes the dynamic relation of the plan process.

As we already said, with goal (or achievement) indicators one measures what is expected, or has been obtained (depending on the fact that we are in an *ex ante* or *ex post* perspective), with a certain effort of actions, means, resources employed, and measures the sacrifice (costs) of resources that one wants to establish.

With effect indicators one assesses the cost, in terms of resources and activities that is borne in view of the result to obtain.

But with productivity indicators (efficiency or effectiveness indicators, depending on the chosen numerator between goals or means indicators) one assesses the amount of result per employed resources or activities unit.

Means or results significance increases when they can be connected each other, because a goal - seen in its subjective aspect of satisfaction of a need or in that, objective, of the output apt to satisfy it - is not fully appreciated if not in relation to the effort that one must make to achieve it, the resources and energies that are sacrificed for it. And at the same time, one cannot adequately assess a cost or activity or action, if not in relation to the results they lead to.

Repeating in another way what has already been said in section 7, while achievement indicators serve to evaluate the complete or partial attainment of a given goal, productivity indicators provide a given measure of the relationship between the employed means (or resources) level, i.e. input, and the level of the achieved goals (or results), i.e. output.

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The most common productivity indicator is that generally expressed as:

$$\frac{\text{N. units of achieved result}}{\text{N. units of employed resources}}$$

We have called it also "effectiveness indicator".
To it another productivity indicator is counterpoised, that is expressed, contrary to the above, as:

$$\frac{\text{N. units of employed resources}}{\text{N. units of achieved result}}$$

and, this indicator can also be called an "efficiency indicator".

In monetary terms, the above relationship is easily transformable (giving rise to a measure of the financial-economic effectiveness) in:

$$\frac{\text{(monetary) Value of the achieved results}}{\text{(monetary) Value of the employed resources}}$$

and the reverse (giving rise to a measure of the financial-economic efficiency):

$$\frac{\text{(monetary) Value of the employed resources}}{\text{(monetary) Value of the achieved results.}}$$

A combination of the "physical" results/means relationship (or the reverse) with the financial-economic one can give rise to different cases: we identify, for language ease, results with the physical goals that one wants to attain and resources with the "financial-economic" costs that one must sustain, and we obtain this kind of casuistics:

a) goals achieved/with low economic costs: it is the case of a good productivity and good efficiency;
b) goals achieved/with high economic costs: it is the case of a good productivity but with scarce efficiency;
c) goals partially achieved or not achieved/with low economic costs: it is the case of scarce productivity with good efficiency;
d) goals partially achieved or not achieved/with high economic costs: it is the case of a scarce productivity and equally scarce efficiency.

Many other casuistics would be produced if one were to refer economic results to the physical costs of the above relationship.

We can however stress the importance of productivity indicators, as far as they express an essential relation between the achieved results and use of means-resources, but also because they assure, at the empirical measurement level, the logical link that is created, in the program structure, between a lower level goal (intended as input or resources use) and one of a higher level (intended as output or expected result).

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We must also recall that sometimes it is difficult or impossible to measure precisely the results, in terms of needs satisfied or outputs apt to satisfy them, and one must be content to measure intermediate goods and established activities, inputs that have been used as proxy of a not viable satisfaction measurement. Thus data that per se refer to means (means indicators) become indicators for the assessment of goals achievement (goal indicators).

On the basis of an examination of all the kinds of indicators that have been mentioned in the previous sections, we can say that - in a sense - static (achievement of effect) indicators are indicators fit for use in the field of general planning, and as aim and objective indicators in the larger operational scale programs. Dynamic (productivity indicators, both of efficiency and effectiveness) indicators are instead more fit for the evaluation field. This without denying the close link that connects the two processes.

Therefore, while building a program structure (of a plan, a program, a project), one will continuously refer to indicators that describe a situation, present or planned; and when using the same program structure to evaluation purposes, it is necessary to build a system of indicators that measure the passage from each goal level, identified in the structure, to the one of a higher order, using essentially productivity indicators, that are dynamic.

10. The choice of (program) indicators

We have distinguished in the preceding paragraph, the indicators that express physical size from those that express monetary values. Some have suggested classifying the series of indicators into three categories:

a. physical indicators
b. "economic" indicators
c. *indicators of the quality of life*

The *physical indicators* express size in terms of physical units of a good or service (but also of a factor of production, for example labour).

The *economic indicators* express the monetary value of a good or service.

The indicators of the quality of life are of a different type. They may be, in the first place, both physical and economic, because they express a different type of measurement of the value of the good or service, which they must measure, with reference to determined social reality. For example: the number of beds in the hospital system (or otherwise) is a physical indicator with regard to the capacity of a hospital, but the number of bed places per inhabitant in a community (local, regional, national) may be considered an indicator of the level of health protection of that community, and therefore an indicator amongst the "quality of life" category.

This classification, which may also be acceptable, is situated nevertheless in a transversal way to that of the program indicators that are strictly linked to the program structure (as illustrated above). That is, any program indicator, of any type of those already seen, could be of the type of the three classes proposed (and of other classes not reported here).

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The question can be posed: among these categories of indicators, and the others already indicated previously relative to the program structuring, when should we use this or that type of indicator?

In fact, the point on which it is opportune to insist is that the selection of indicators to be used depends not on whether they belong to this or that taxonomic category (e.g. whether physical, monetary, quality of life, etc), but on the role, which they have in the program structure to which they are applied. In other terms there may be some achievement indicators which, given the nature of the goal to which they are applied, it is advisable and sometimes indispensable for them to be "physical" indicators"; in other cases they could well be only physical indicators; likewise for indicators of effect and so on.

In general it can be said that the choice will depend on the nature and type of planning and evaluation which is being carried out, on the nature itself of the goods and services implied and more in general on the socio-economic reality of the country and environment in which the plan or evaluation is being made[14].

The choice therefore must be entrusted very much to common sense, experience and knowledge of the statistical data; some have tried to express empirical rules for the orientation of the evaluator. Given that the program structure has to be kept well under control, and that we must stray from it in the selection of program indicators (a requirement of pertinence which moreover is included here below among the first requirements of the indicators themselves), the following general recommendations are valid, on the basis of which the program indicators will have to be as much as possible:

a) *pertinent*: they must be related strictly to the goals (of the program structure);
b) *valid*: capable of measuring characteristics, procedures or specific situations;
c) *reliable*: the measurements carried out, if repeated, must give constant and stable results, independently from who and when, the measurement is carried out;
d) *sensitive*: i.e. they must sensitively record the changes that have intervened in the observed situation;
e) *economically valid*: i.e. in measurement with the times and costs for their collection;
f) *current*: it must be possible collect them rapidly and they must maintain their meaningfulness for the entire duration of the survey.

Rarely are there indicators, which satisfy all these requirements. But as has been said, the choice of indicators requires good knowledge:

- of the needs for information of the decision-makers who receive the technical assistance and apply the planning process;
- of the best needs to obtain the necessary data for the construction of the indicators;

[14] For example, in countries which have a large part of the economy that is not monetary, the physical and quality of life indicators are much more significant than the "economic" ones; thus likewise in the ecological or cultural field.

- and of the limits imposed by the available resources and techniques[15].

For the rest, the program indicators may be indicated as necessary, even when there is an absence of a suitable availability of data, to induce the responsible authorities to promote a survey of those data, if considered indispensable for a good application of the program in question (this is the case of wide-ranging and strategic programs).

[15] For example, the rate of child mortality may be a good indicator for the continuous observation of health in countries where there exist complete systems for registering anagraphic data; but it is not in any way convenient for the monitoring of projects where the target population is reduced in comparison to the average density or if the only way of getting data available is the survey.

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Appendix

Two Examples of program structuring and the related selection of program indicators.

The two examples that are proposed here are taken from two very different "Programs"[16] instigated by the Italian Government.

a. the first concerns a "Program of aid for poor and undernourished populations of the Third World" (FAI Program 1985-89).
b. the second is the Italian "Ten-year plan for the environment" for the year 2000 (the DECAMB program, 1990-92).

Both examples[17] reproduce only a particular section of the respective programs. In the case of the FAI Program, the structure is reproduced together with the program indicators of one only of the four general aims of the program: the achievement of "*Food Safety*"[18]. In the case of the DECAMB Program, we have reproduced only the structure and program indicators of one of the 14 programs of the DECAMB: relative to "*waste management*"[19].

In the case of the FAI Program (*see Figure A*) the relationship between achievement indicators inserted in the squares together with the goals/means to which they refer, and the productivity indicators (which are placed in the circles) which intermediate between one level and another of the program structure (as said in Section 9).

In the case of the DECAMB program (*see Figure B*), the productivity indicators are not explicated (therefore there are no circles); but they are to be imagined as the relationship (both of efficacy and efficiency) between the achievement indicators inserted, together with objectives/means of competence, in the squares of the figure, at the various levels of the program structure. In this case the program indicators assume different denominations, according to their specific role; but may be considered all, substantially, achievement indicators.

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[16] Both programs were coordinated by the author.

[17] The two programs were elaborated by two different administrations of the Italian Government (the former by the Ministry for Foreign Affairs, FAI Program; the Ministry for the Environment, the latter) with the consultancy of the Planning Studies Centre, under the direction of the author.

[18] The other general aims (first level) of the Program were: "Health Safety", "Environmental Safety" and "Minimum Life Standard". See Centro di Studi e Piani Economici, 1987.

[19] The other DECAMB programs concern: "Urban Environment"; "Nature Conservation"; "Air Management"; "Water Management"; "Soil Conservation"; "Forest Management"; "Compatible Agriculture"; "Compatible Transport"; "Coastal Areas Management"; "Compatible Energy"; "Management of Industrial Risks". For each program, a program structure and a system of program indicators of the type summarized here for "Waste Management" were elaborated. See: Ministero dell'Ambiente (1992), and Centro di studi e piani economici (1992).

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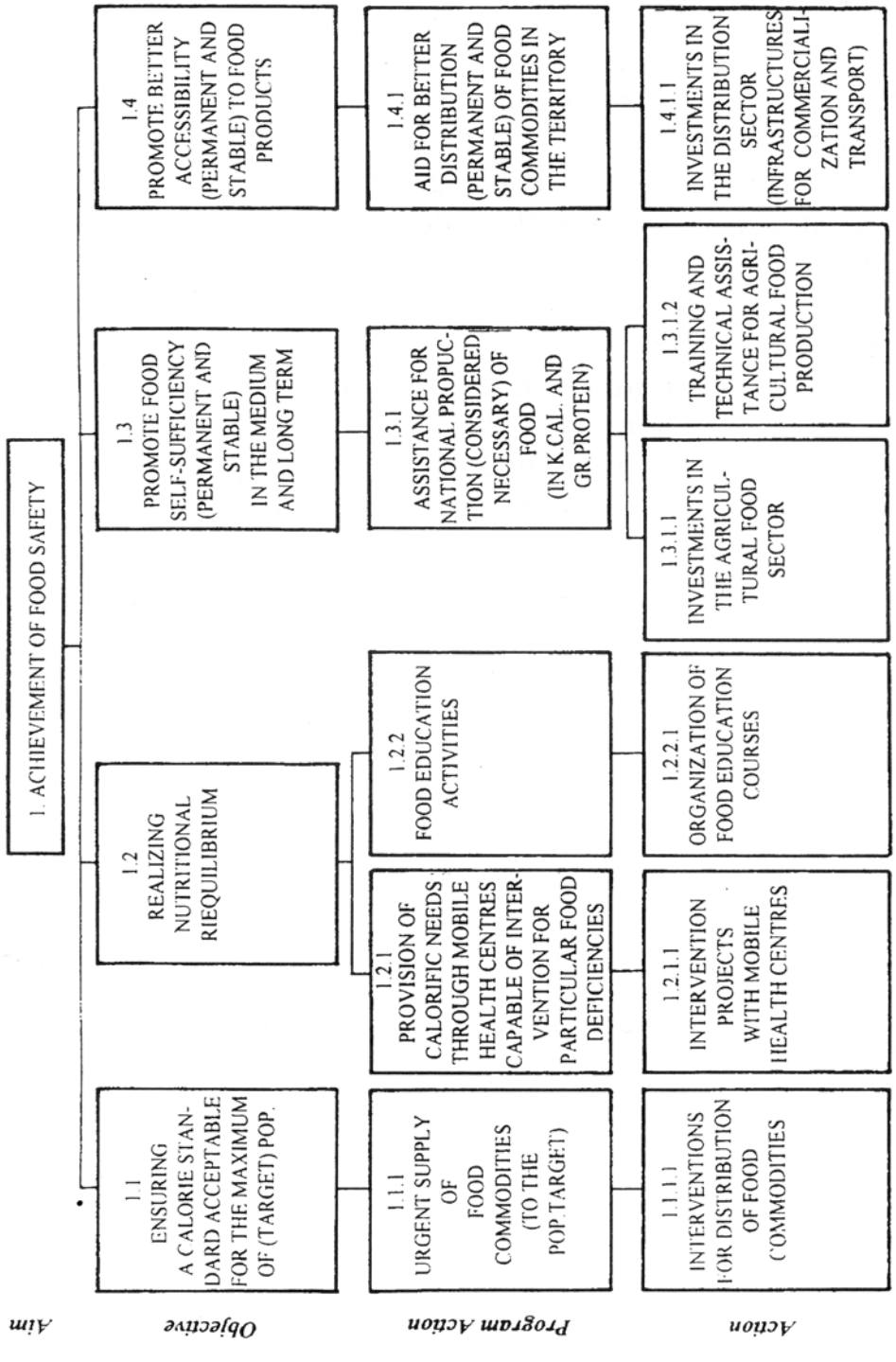

Figure A1. – The "FAI"[1] Program "Food safety" Section: general program structure ([1]"FAI": *Ministero degli Affari Esteri, Fondo Aiuti Italiani* [Ministry of Foreign Affairs, Italian Aids Fund]).

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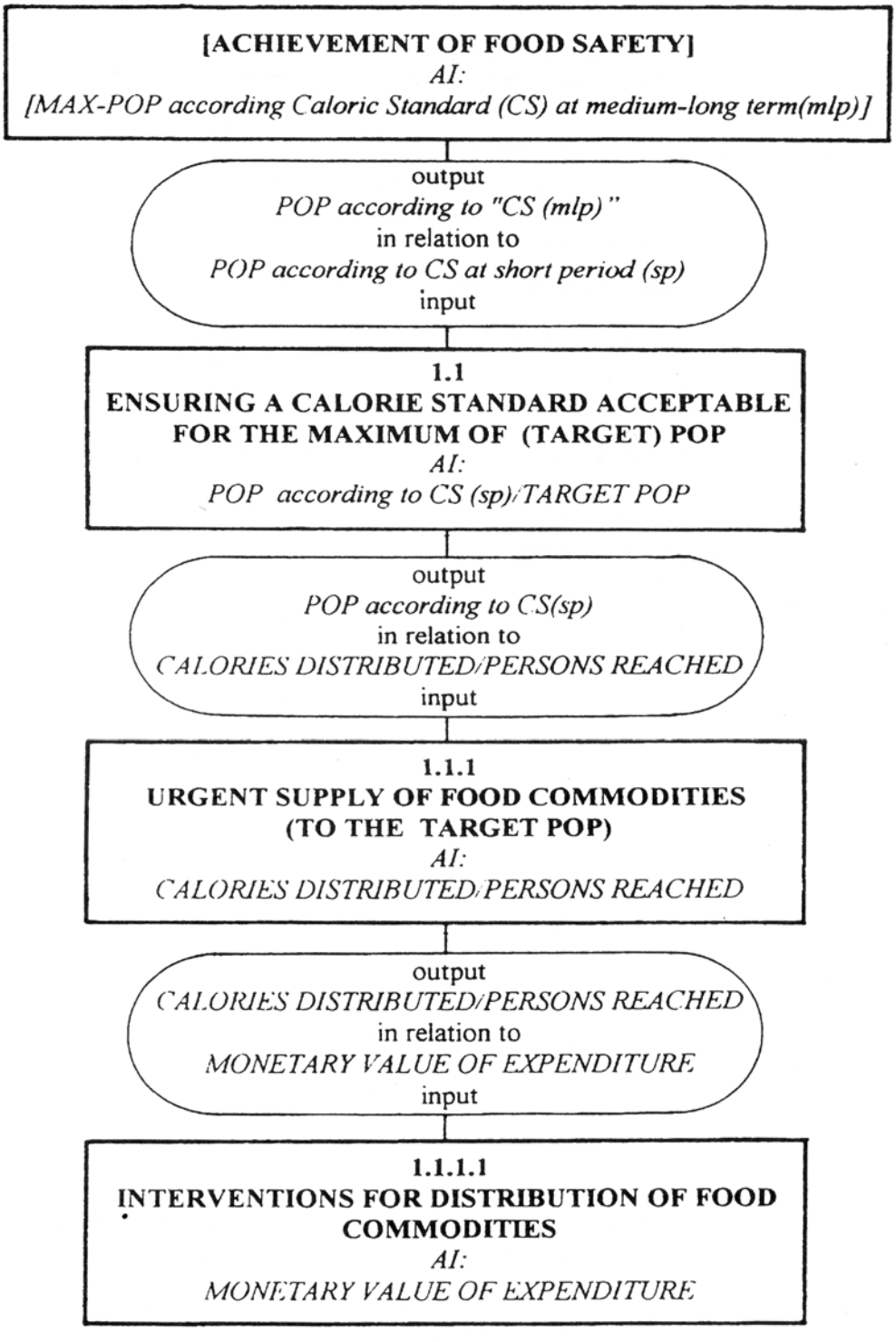

Figure A2. The "FAI" Program Aim 1: "Food safety" Achievement Indicators Objective 1.1.

Social Indicators Research **39**: 239-279, 1996.

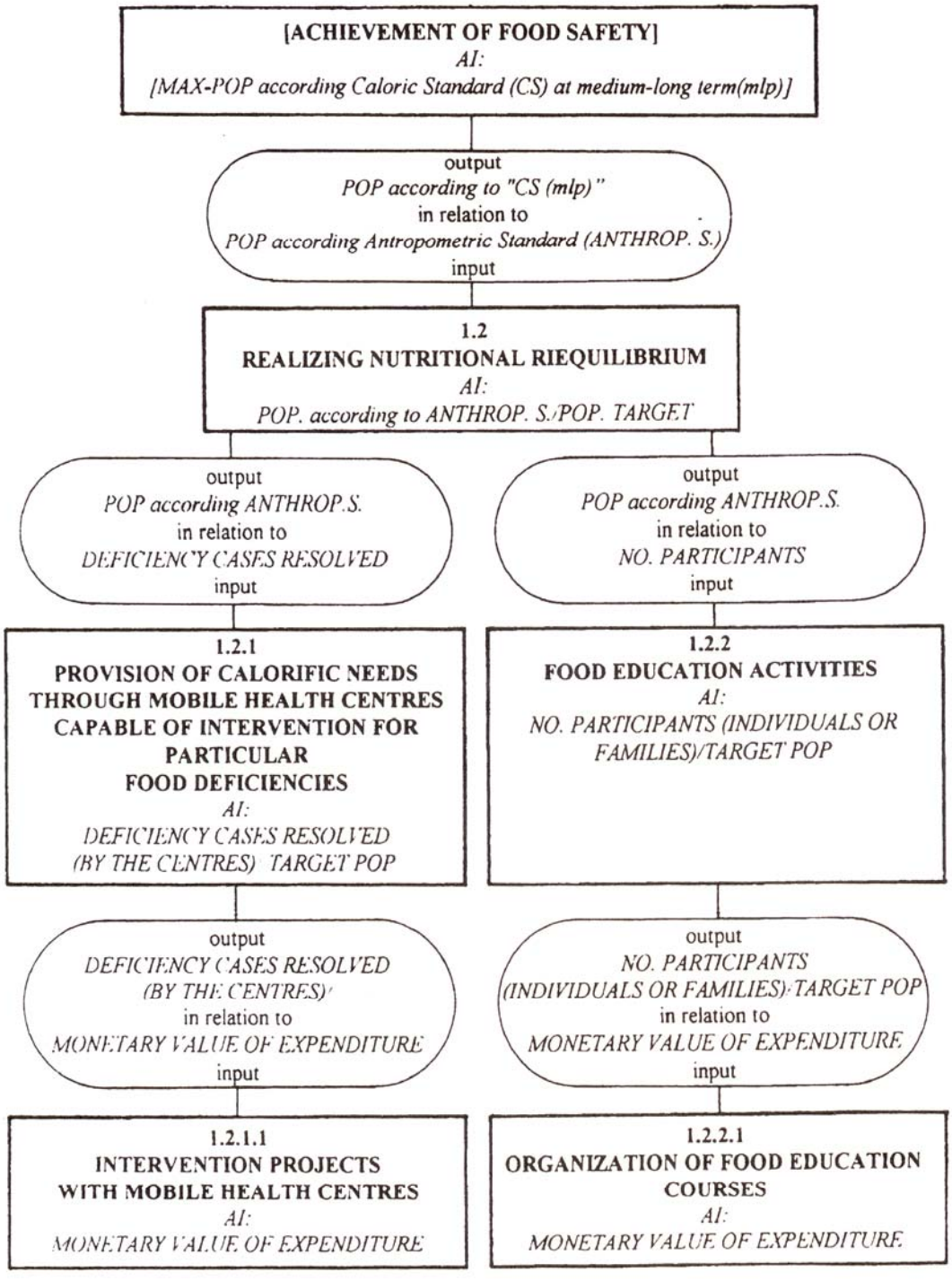

Figure A3. The "FAI" Program Aim 1: "Food safety" Achievement Indicators Objective 1.2.

Social Indicators Research **39**: 239-279, 1996.

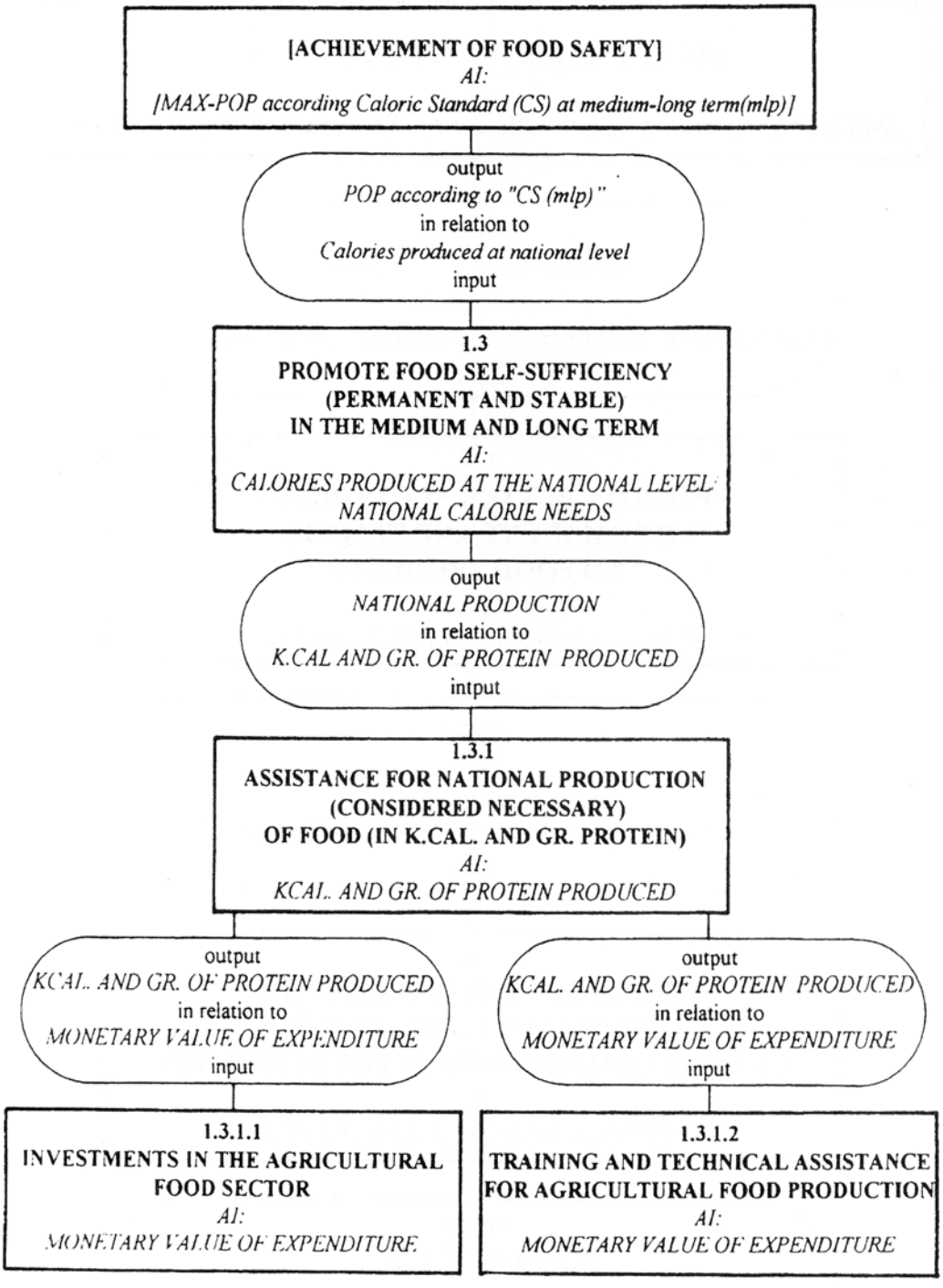

Figure A4. The "FAI" Program Aim 1: "Food safety" Achievement Indicators Objective 1.3.

Social Indicators Research **39**: 239-279, 1996.

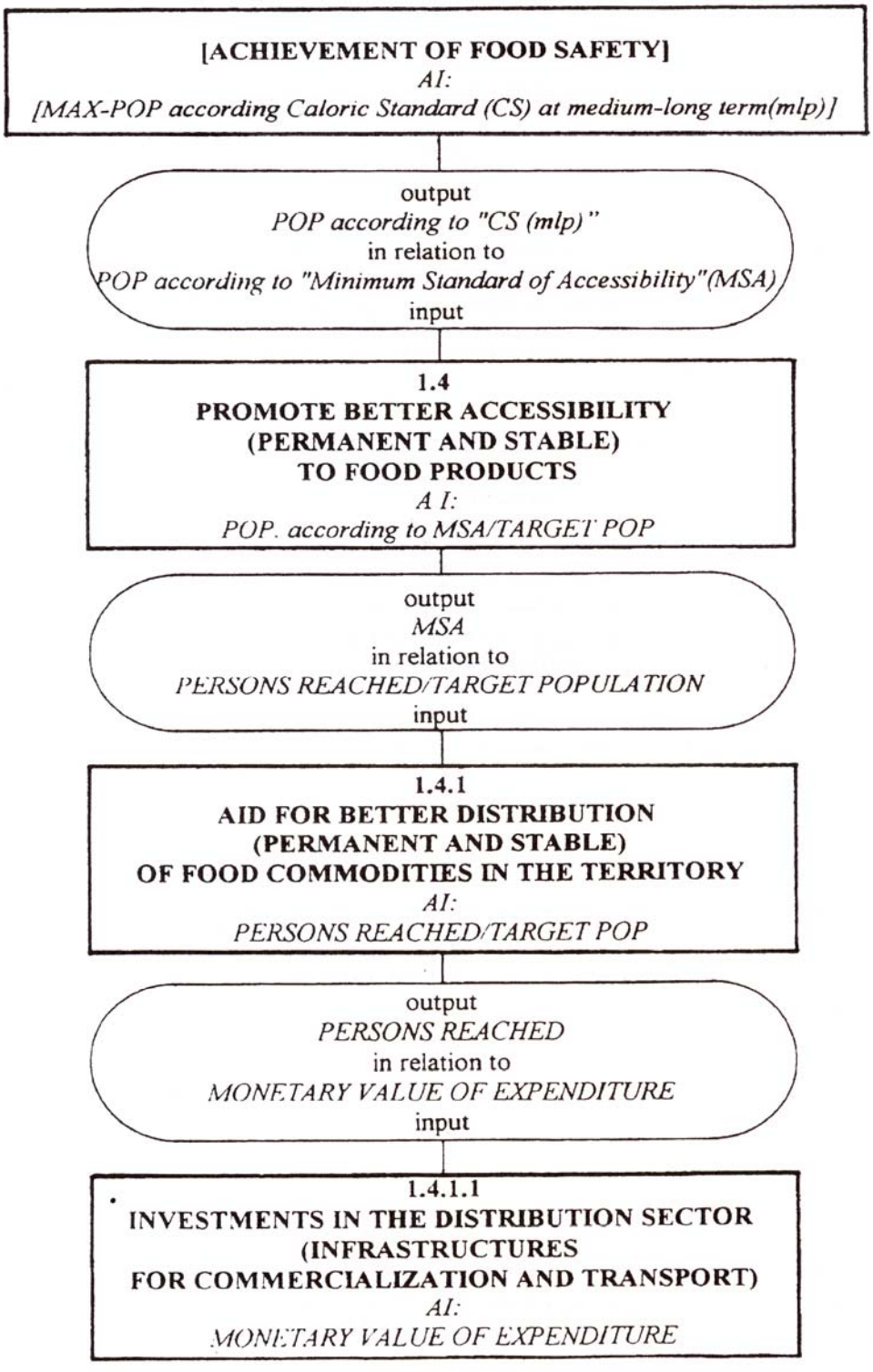

Figure A5. The "FAI" Program Aim 1: "Food safety" Achievement Indicators Objective 1.4.

Social Indicators Research **39**: 239-279, 1996.

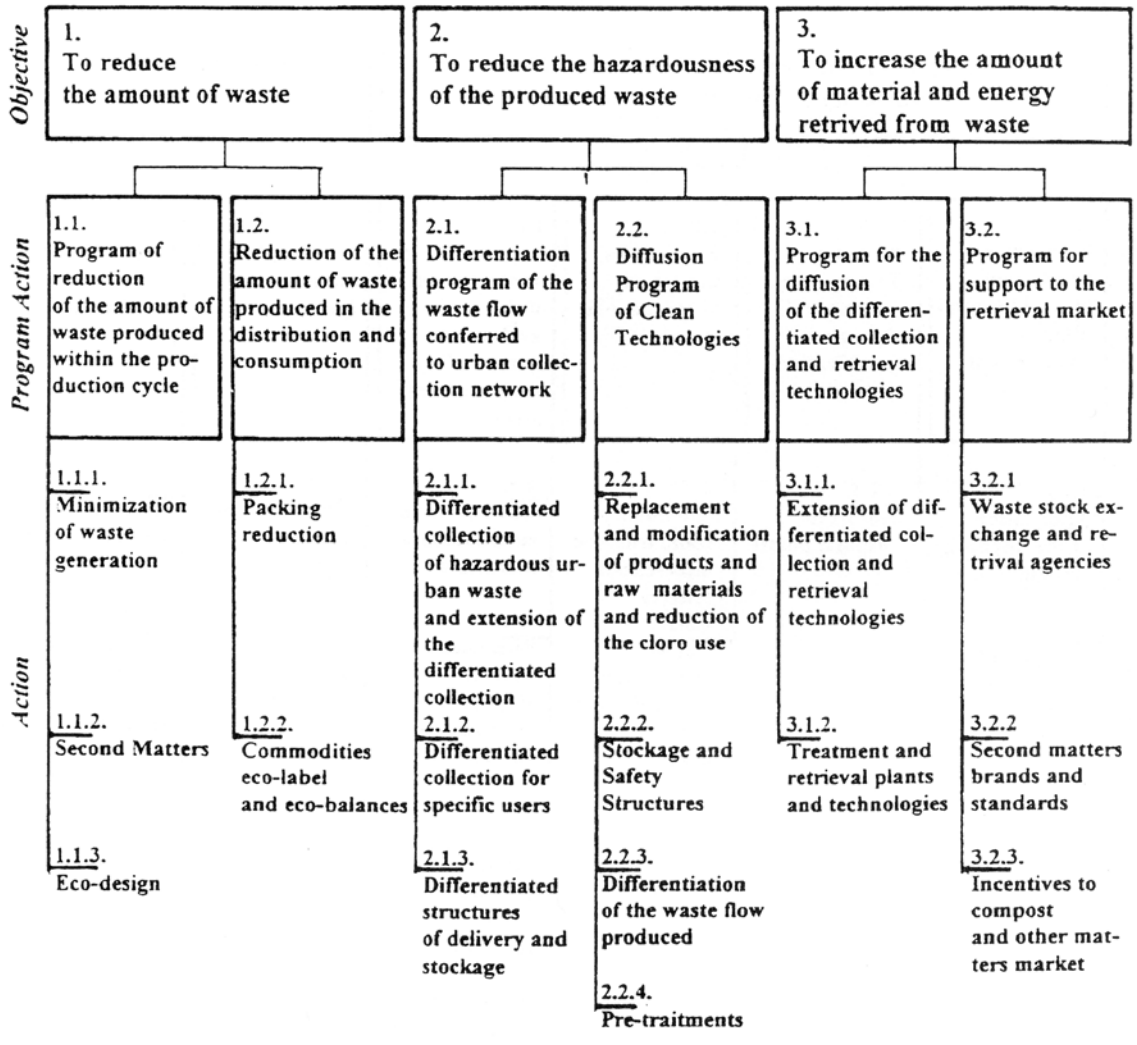

Figure B1. The "DECAMB" (National Environmental Plan) "Waste Management Program": General Program Structure ("Decamb": *Ministero dell'Ambiente, Piano decennale per l'ambiente* [Ministry of Environment, The Ten-Years Environmental Plan]

Social Indicators Research **39***:* 239-279, 1996.

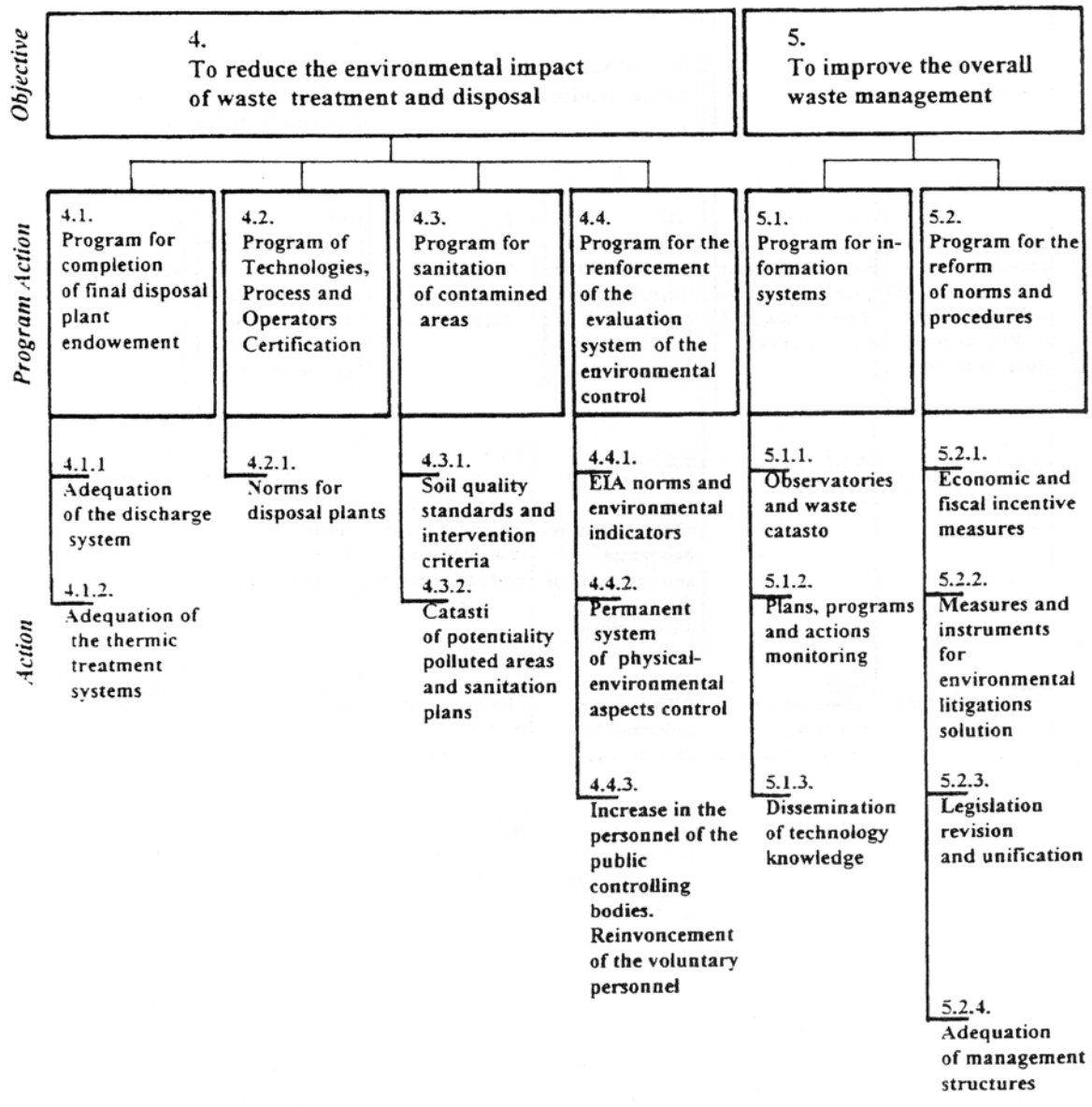

Figure B2. The “DECAMB” (National Environmental Plan) “Waste management program” General Program Structure.

Social Indicators Research **39***:* 239-279, 1996.

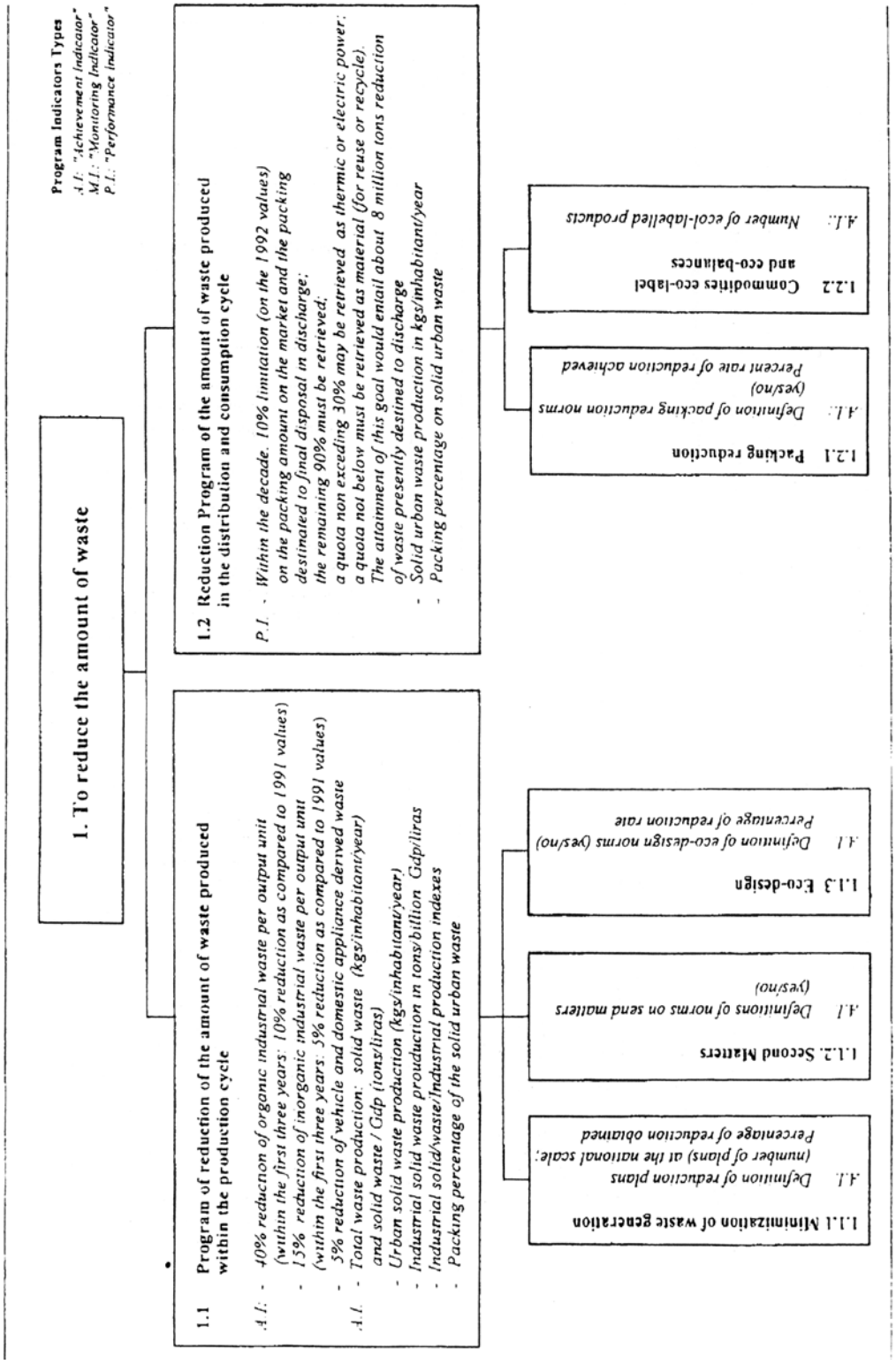

Figure B3. The "DECAMB" Programs "Waste Management": Achievement Indicators: Objective 1.

Social Indicators Research **39**: 239-279, 1996.

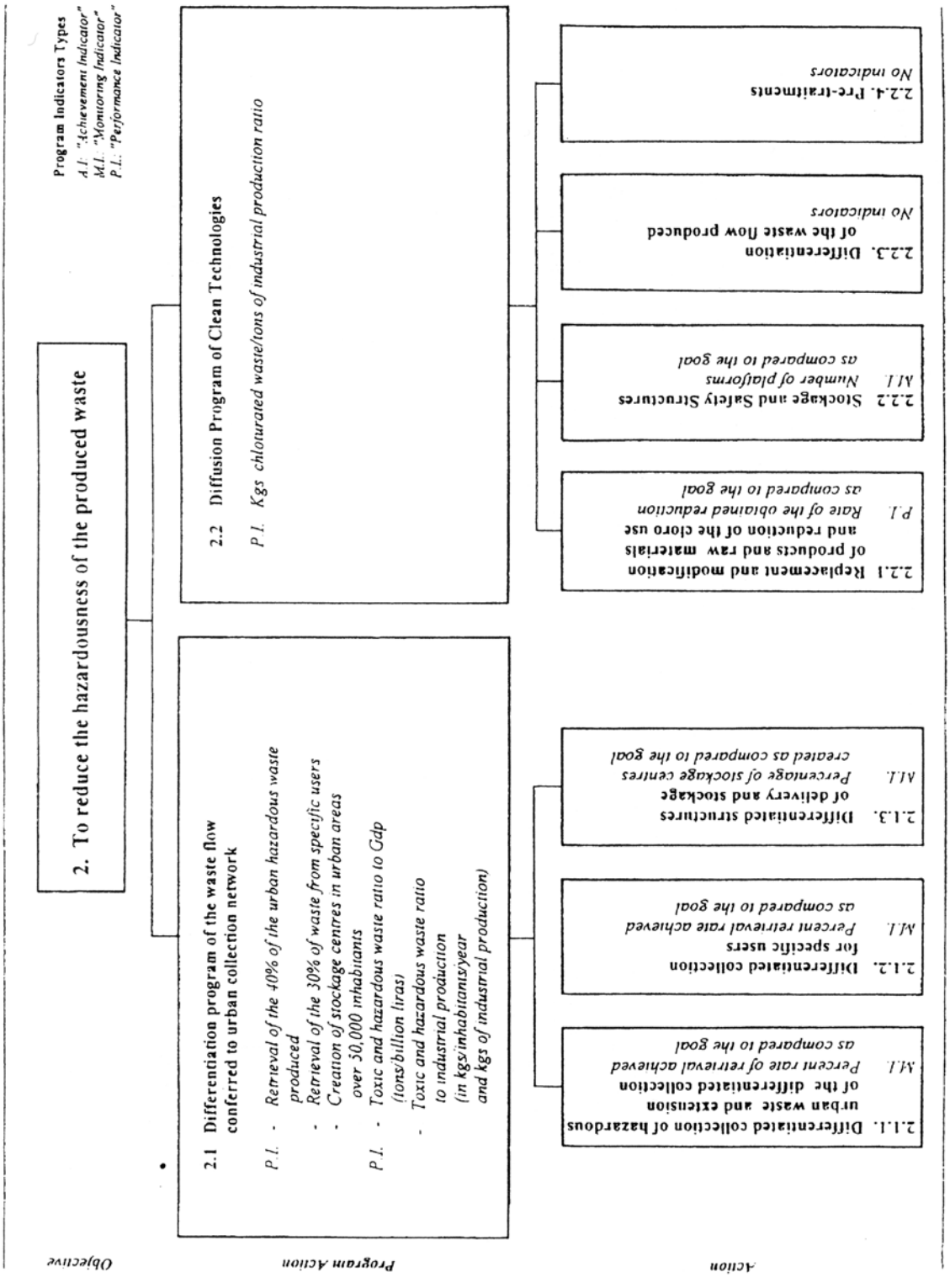

Figure B4. The "DECAMB" Programs "Waste Management": Achievement Indicators: Objective 2.

Social Indicators Research **39***:* 239-279, 1996.

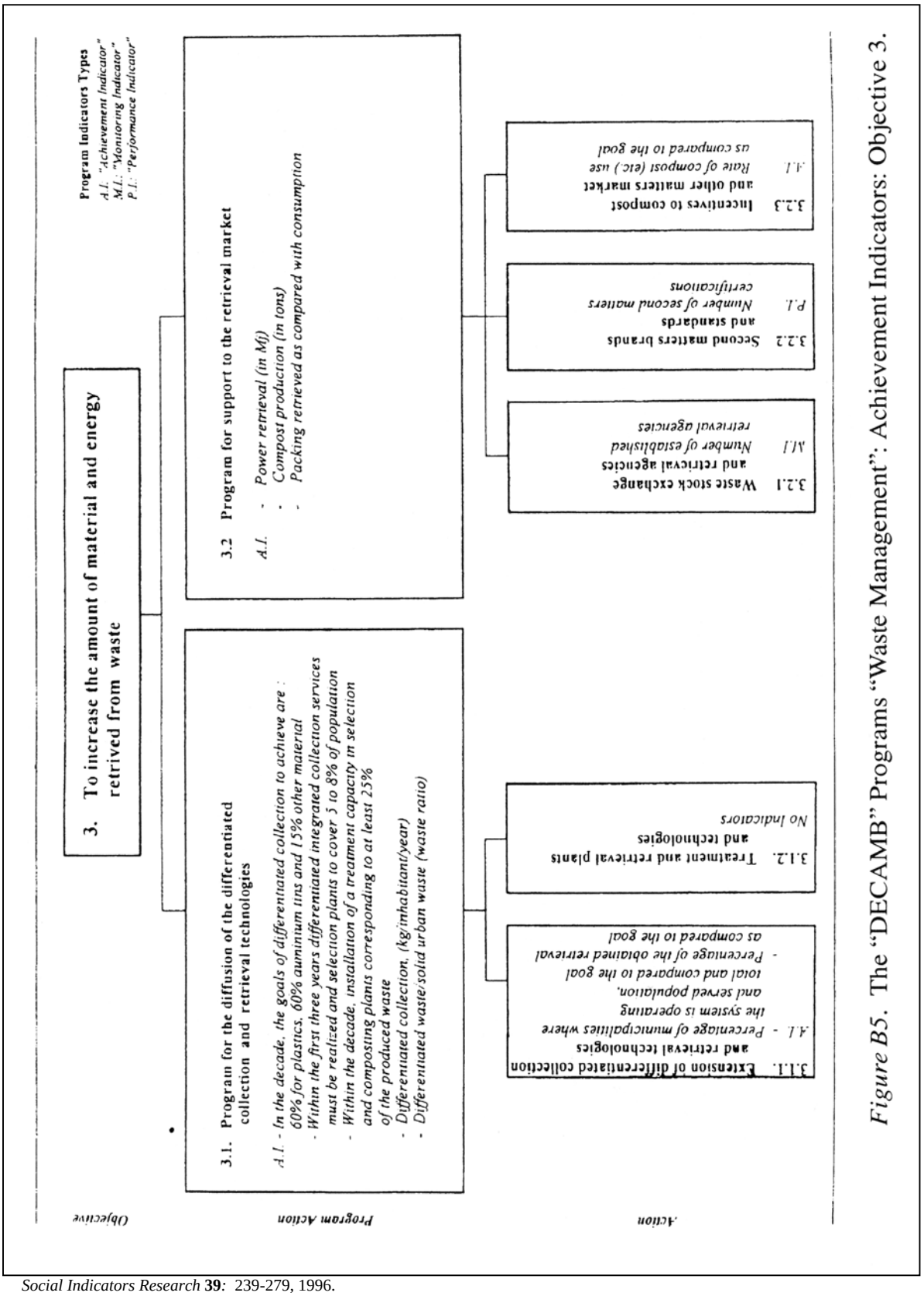

Figure B5. The "DECAMB" Programs "Waste Management": Achievement Indicators: Objective 3.

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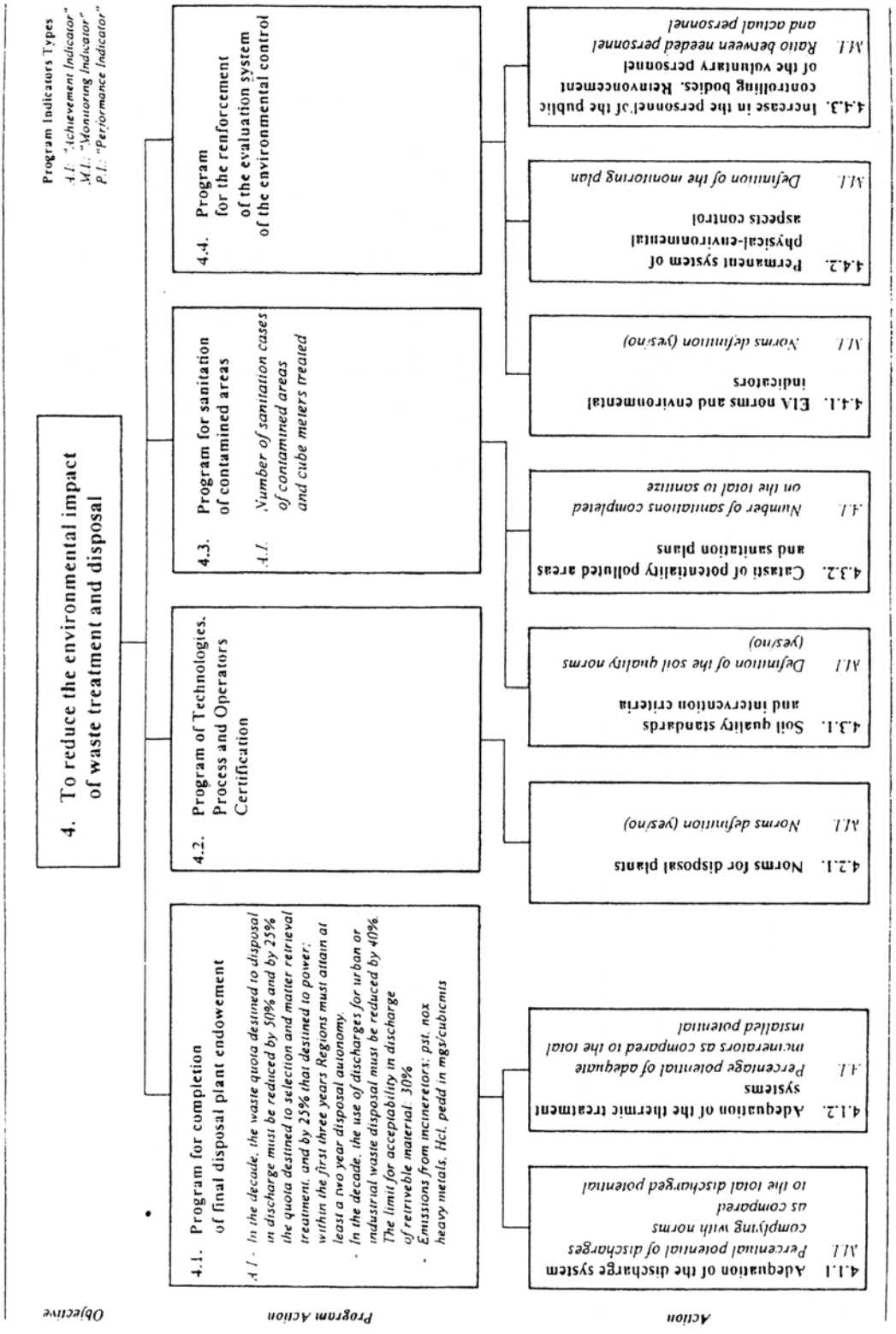

Figure B6. The "DECAMB" Programs "Waste Management": Achievement Indicators: Objective 4.

Social Indicators Research **39***:* 239-279, 1996.

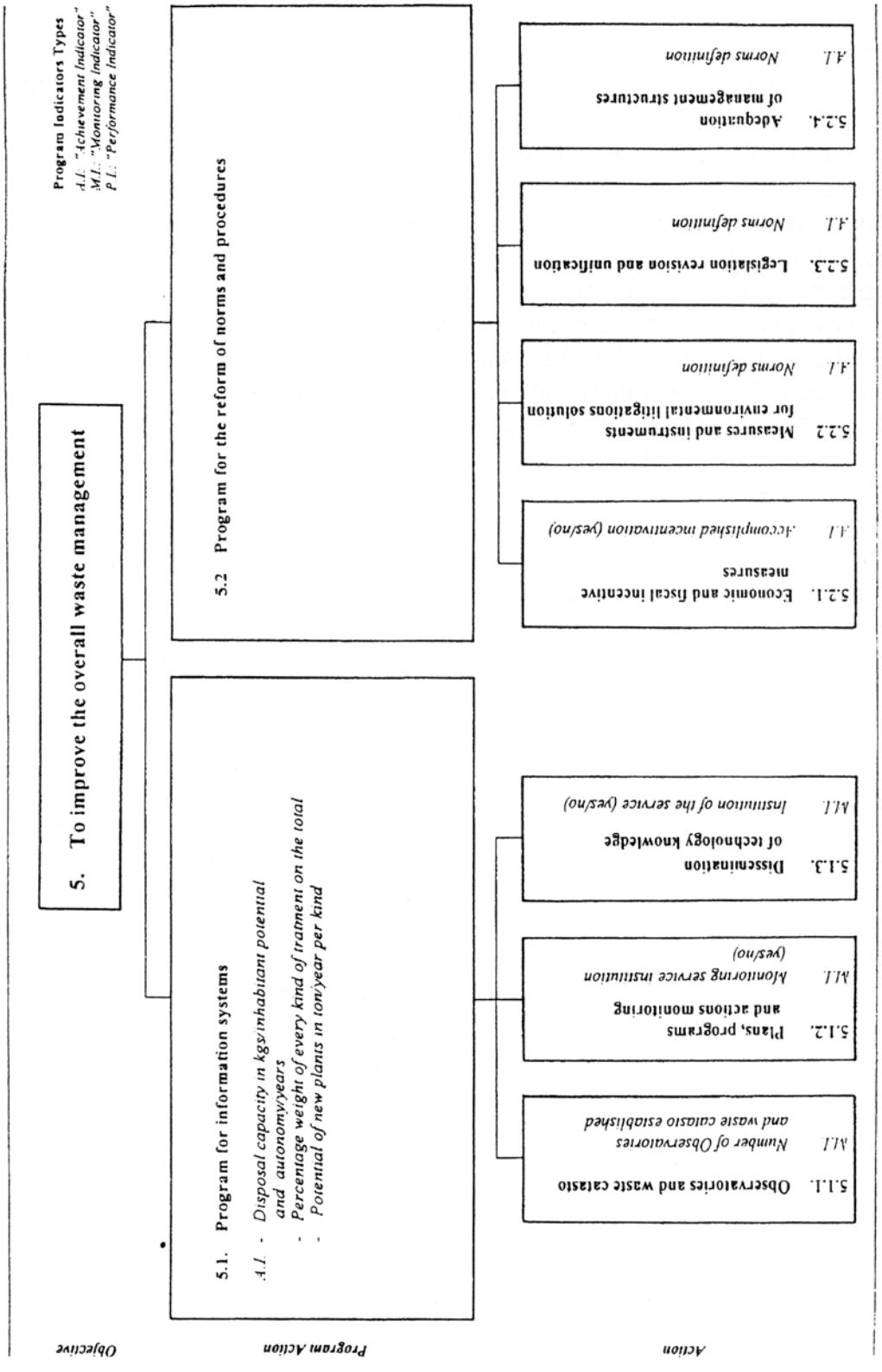

Figure B7. The "DECAMB" Programs "Waste Management": Achievement Indicators: Objective 5.

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