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## Decision support methodologies in public policy formulation

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## **Decision support methodologies in public policy formulation**

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### **Abstract**

A decision problem is relatively complex and broadly involves two distinct moments, i) information gathering and ii) use of available information and decision-making. In the first case one can discuss the potential of rigorous methods (statistical analysis and modelling) commonly used to enable and improve the collection, analysis and interpretation of the most relevant data. On the second case it is important to note that the existing information may not be enough, it is not always possible to combine and organize (objective and subjective) information and that decisions are highly subject to contexts of high uncertainty.

This paper develops this issue focusing on the regional and local development decision-making process, acknowledging the need to complement objective information based on statistical data and modelling with unstructured and non-rigorous rule of thumb information and opinions generated by experts. In the specific context of regional and local public policies it is reasonable to assume that there is a considerable body of information disseminated by different actors and experts, although distributed in a fragmented and asymmetric manner. This information is insufficient to support the decision-making process when used individually, but can provide better results if experts obtain synergies through an interactive process. Simultaneously their decisions are conditioned by the evolution of exogenous variables that they cannot predict.

If, on the one hand, the application of formal models (supported on quantitative data) may be unsatisfactory because they are conditioned by the available information, and are not able to include subjective (but technically) informed knowledge, nor the volatility and uncertainty of the future, on the other hand, the application of more informal methods (based, for example, in scenario analysis or expert panels) may lead to biased results, as a consequence of opinions being strongly influenced by individual preferences and perceptions.

This paper is based on the assumption that public decision-making needs to be more i) transparent, as it demands prioritization, budgeting and resource allocation; ii) accountable, as it involves alternative choices; iii) participated, as it requires the combination of formal and



informal relationships between different agents and iv) future oriented, as it supports strategic approaches. Therefore it presents and discusses a methodological framework that combines technically informed subjectivity with more rigorous models. In other words, it explores the combination of several decision-making methods, such as foresight techniques, multi-criteria and cost-benefit approaches.

**Keywords:** *decision-making, public policy formulation, foresight, JEL D81*

**General theme:** Regional and urban policy, planning and governance. Best practices

## RESEARCH FOCUS

The exercise of structuring long-term objectives, evaluating alternatives and making informed decisions, faces major challenges. The need to combine multidisciplinary themes and a wide variety of agents, organize information, generate consensus and legitimate collective action becomes crucial in the process of formulating and implementing public policies (Sabatier, 2007). Indeed, decisions tend to be subject to high uncertainty, as well as to the multiplicity of interests and opinions of the agents involved in the various phases (Kruglanski & Ajzen, 1983; Tversky & Kahneman, 1974). Dealing with this complexity will be the central objective of the research, acknowledging that good policy making requires tools which inform decision-making in a rigorously and systematically manner (Sabatier, 2007; Walker, Rahman, & Cave, 2001). Although there are methodologies that seek to improve the effectiveness of the decision-making processes, there is no frame of reference for dealing with the limitations arising from individual preferences and interpretations.

This paper is part of the research investigation developed under an on-going PhD thesis, which focuses on the development of systematic mechanisms able to deal with the complexity of the decision making process. It will develop this issue focusing on the regional and local development decision-making process. In this context, it is expected that the research will contribute with i) a theoretical framework that highlights the challenges of the cognitive process of decision-making under public policy design and ii) the development of a decision support tool, and its empirical application in regional and local policies. To do so, the expected outputs are based on several analysis phases that consist in:

- Understanding the overall picture of the public policy process;



- Exploring the complexity, challenges and requirements of the decision-making process in public policy formulation;
- Articulating the decision-making rules with the cognitive dimension;
- Exploring the rationality and coherence of human reasoning, when formal logic rules are not fulfilled, in order to identify a set of mechanisms that deal with i) the insufficiencies of information processing strategies, ii) individual subjectivity and bias (intrinsic aspects of the social and cultural frameworks in which these individuals make decisions / act);
- Developing of a theoretical and methodological framework that provides a taxonomy, which deals with the multiplicity of agents and long-term decision making crossing different contexts (thematic, territorial, stakeholders ...);
- Exploring methodological guidelines for public policy and land use planning;
- Developing a decision support tool able i) to manage the identification, assessment, and prioritization of alternatives, by introducing strategic thinking methods; ii) to deal with challenges related to asymmetric and insufficient information; iii) to reduce errors and bias of individual evaluation; iv) to measure the impact of each choice.

The contribution of this paper is twofold. First it presents a theoretical framework that supports the understanding of the overall picture of the public policy process. Second it focuses on the decision-making complexity, challenges and methodologies that improve this process. Thus, it is structured in three parts: i) theoretical background, including an overview of the policy making process and decision support methodologies; ii) a methodological approach, that which transposes this analysis to the specific case of regional and local policy design; and iii) conclusions.

## **THEORETICAL BACKGROUND**

### **Overview of the public policy as a process**

Sabatier (2007) considers that “in the process of public policymaking, problems are conceptualized and brought to government for solution; governmental institutions formulate alternatives and select policy solutions; and those solutions get implemented, evaluated, and revised”. These are the stages that broadly define the policymaking process. In fact, a set of frameworks have been developed for understanding this process, and commonly show a series of stages that match this description - agenda setting, policy formulation and legitimation,



implementation, and evaluation (Anderson, 2003; Sabatier, 2007). As they share conflicting values and interests, information flows, institutional arrangements, and variation in the socioeconomic environment, the policy process staggering proves to be highly complex (Sabatier, 2007). The analysts find ways of simplifying the approach in order to have any chance of understanding the extremely complex set of elements that interact over time. However, these conceptualizations have simultaneously outlined its usefulness and have been strongly criticized in its theoretical background or empirical validity, which explains the need to replace or to reformulate different theoretical frameworks.

As Jann and Wegrich (2007) state, due to this complexity we are confronted with an almost paradoxical situation: on the one hand, the policy research continues to rely on the stages or cycle perspective; on the other hand, it is linked to one of its stages and research questions.

It could be argued that the real world is so complex that the sequential dimension in the cyclical policy-making understanding is not adequate, because it isn't possible to admit a clear-cut separation between the different stages, nor that the chronological and hierarchical elements are absolutely applicable. Moreover, i) the policy cycle lacks defining elements of a theoretical framework, ii) the stages do not offer causal explanations for the transition and interaction between different stages and actors and iii) the policy process rarely features explicit beginnings and endings, because the stages are constantly meshed and entangled in an on-going process (Jann & Wegrich, 2007).

However, despite its visible limitations, the policy cycle has proved to be the most applied framework, as it organizes, simplifies and systemizes the research on public policy. Yet, the policy cycle approach remains widely generic and somehow ignores the specificity of actors, institutions, and their interactions as key features of analysis.

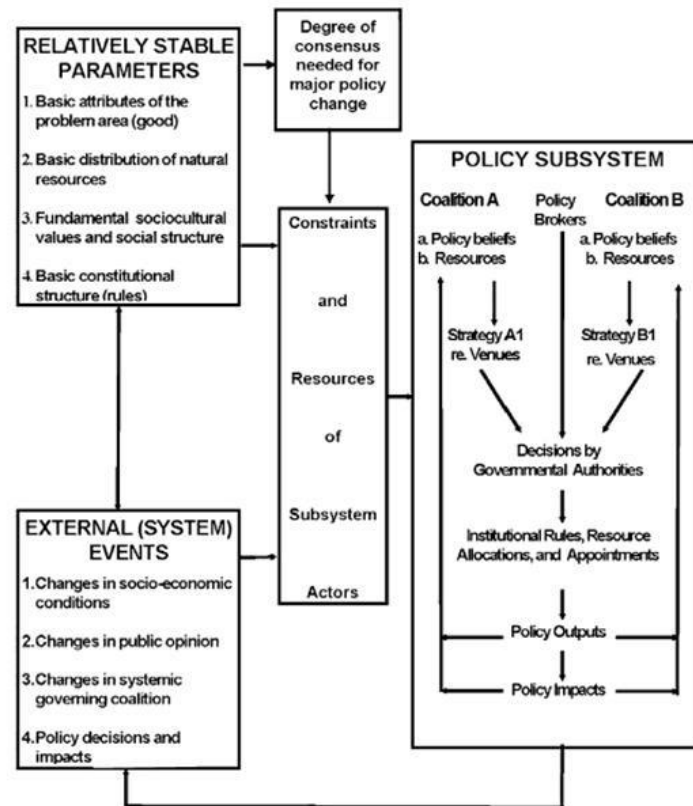
More than acknowledging the limitations or utility of the policy cycle process, this paper intends to understand the challenges behind each stage of the policy cycle, in order to identify a plausible common denominator. The rationale for analysing each stage separately is based on the argument that each stage differs from their specific related objectives, activities, expertise, procedures and, consequently, that it provides different outcomes, which affect other stages in an independent or simultaneous manner. This latter has not been a marked subject of analysis in policy making research, and hence receives more attention in this paper.



Framing the political process as a continuous process of policy-making should reinforce the cumulative effects of the various actors, forces, and institutions that interact in the policy process and therefore shape its outcome(s) (Jann & Wegrich, 2007). As the authors highlight governments and higher civil servants are not strictly separated from the wider society when formulating policies; instead, they are constantly interacting with social actors and form rather stable patterns of relationships (policy networks). In this context decisions are preceded by more or less informal relations that influence the final outcome. Based on the analysis of multi-agent in decision and clarifying the phases at which actors are involved and interact and share particular interests it is assumed that it is possible to influence the policy results.

Policy networks are, generally, characterized by non-hierarchical, horizontal and power dependency relationships between public and private actors inside the network (Fischer, Miller, & Sidney, 2007; Ostrom, 1998; Sabatier, 2007). However, as Jann and Wegrich (2007) stressed, a policy subsystem frequently consists of more than one network, where the different networks compete for the dominance in the respective policy domain. Recovering the critique to the policy cycle framework regarding its low focus on multi-agent interaction and, thus, the role of knowledge, ideas, preferences and interests in the policy process as influential independent variables affecting all stages of the policy process, it is further assumed that it might have been the basis of Sabatier's proposal for reformulation of these models. Sabatier (2007) suggests a policymaking framework that deals with intense public policy problems involving i) multiple actors from several levels of government, interests groups and research institutions, ii) broader societal context that affects and is affected by the policy subsystems. His proposal offers a better understanding of the policymaking activity because he analysis the interdependence of both components explaining how it structures the nature of policymaking, constrains the resources, establishes the rules, values and procedures for changing policy and reaching collective decisions (Figure 1). This analysis should be complemented with the argument that human behaviour occurs within a wide diversity of rule ordered situations that share structural features (Ostrom, 2007).





**Figure 1:** Policy network | Source: (Sabatier, 2007)

The network analysis implicit in Sabatier’s and Ostrom’s work raises several concerns which require beholding a step backwards and acknowledging the challenge of policy formulation.

As previously referred the different stages express problems, proposals and demands that are transformed into programs. Thus, the formulation and adoption of policies include setting objectives and considering alternative approaches. Some authors distinguish both phases the formulation of alternatives and the decision-making. Not only is it important to consider decision support mechanisms, as it is important to realize that the final decision on a specific policy results from more or less formal interaction between the large number of actors involved. It is then introduced the debate on techniques and more rational decision making tools, in order to clearly define goals and control long-term priorities. This approach supports some of the criticisms of the rational model of decision making. Instead of a rational selection among alternative policies, decision-making results from the negotiation between the various actors within the political subsystem, where the final result is determined by the resources and relationships of power and interest, assuming that different actors assume specific roles in each of the phases (Sabatier, 2007). This perspective is shared by several policy science



researchers. Simplifying this analysis, some authors admit that according to such a rational model, any decision-making should be based on a comprehensive analysis of problems and goals, followed by an inclusive collection and analysis of information and a search for the best alternative to achieve these goals (Jann & Wegrich, 2007). But then again, more than decision support tools, such as ex-ante instruments or implementation and monitoring tools, it is noteworthy that decision-making comprises not only information gathering and processing, but foremost incorporates a component of interaction and sharing of knowledge of various agents, whose preferences and interests diverge.

In one way, or the other, the available frameworks and theories on public policy pay attention to the actors involved in the process. The public policy process contains many decision moments that involve identifying a problem, designing a set of policy alternatives and narrowing the solutions that better apply to the final policy decision. On the one hand, it is crucial to identify the actors of the policy sub-system, and understand their beliefs and motivations, their judgments and their perceptions. On the other hand, it remains essential to develop the mechanisms and models that answer these challenges.

These are the two main topics on the next section. The task is to present an exploratory analysis on the rationality (limitations) in policy decision making, and provide the point of departure for deeper critical research in future works.

### **Decision support methodologies**

It is desirable high levels of rationality in deriving policy decisions, but sometimes it is not possible. Yet as Andrews (2007) states every decision has a procedural component: Who makes the decision, and what are the prescribed steps in making the decision? In his perspective optimal processes, which specify “who” and “how” aspects improve decision making and, thus, are legitimate, reasoned, and transparent. In policy formulation these questions include the strategy, the goals and priorities, the options and alternatives, the costs and benefits and the expected externalities. Once again there is a sequential analysis, and it can be argued that decision problems are present in every stage, and that each stage strongly influences the final outcome and very often shape the final policy (Roy, 1996). For this reason, there is a strong debate against the rational model of decision-making, because decision-making is more than rationally selecting alternatives, it also results from the relationship between diverse actors within a policy subsystem (Jann & Wegrich, 2007). As so,





understanding the boundaries of rationality – the context in which the decision makers think, act and choose – plays an important role.

Decision making is usually associated with high degrees of uncertainty and complexity, resulting, for example, from the limited resources, the diversity of actors involved and potential conflicts of interest. It is often at stake the choice of a set of feasible alternatives that depend on multiple evaluation criteria which can conflict. Gowda and Fox (2002) state that many scholars strive to understand how people's choices operate under conditions of high uncertainty and risk and conclude that people do have a systematic way to achieve their judgments and choices. Furthermore, they consider that this systematic pattern does not conform to the rational decision process advocated and used by economists, because people seem to follow certain heuristics or rules of thumb that help them to make judgments under conditions of uncertainty and low levels of information (Kruglanski & Ajzen, 1983; Tversky & Kahneman, 1974). It means that the rational decision theory is somewhat limited. Even though preferences are assumed to be determined by different utilities and probabilities, and one can assume that people choose to maximize expected utilities (Miguens, 2000; Pligt, 1999), individuals do not always have all the information, or have the ability to process, manage and evaluate the consequences that result from their options (Simon & Newell, 1971). Additionally there are cognitive, normative and motivational elements that delimit and characterize the individual and collective behaviour (Kruglanski & Ajzen, 1983; Surel, 2000).

In processing decision making Zahariadis (2007) shares the concept of bounded rationality, where the order in which alternatives and solutions are considered affects the decision outcome. In the specific context of the political system, as mentioned above, there exist multiple sub-systems that focus individually certain elements, but as they operate in a parallel system and interactions are imposed they enable dealing with several issues at the same time. Dealing with this problem includes improving the relations of individuals inside and outside the policy system.

These dimensions of analysis capture two basic elements: i) the actors and their relations and ii) the need of decision support tools able to deal with the complexity related with the patterns of behaviour, rules or structures. Besides the network process, where policymaking often focuses on interest groups and other prominent players, little is said about how we can actually improve their interactions. This dimension sheds light in the decision support tools,



where it is proved necessary to additionally consider mechanisms of interaction between multidisciplinary actors. Roy (1996) refers the comprehensive dimension of decision, as the decision results from the interactions among the stakeholders (individuals, entities, communities) and the conflicts among the preferences of the actors (stakeholders, third parties).

While upholding the contributions of the literature on theories of decision-making (for example, rational comprehensive theory, the incremental theory, prospect theory, game theory and mixed scanning theory), the focus will be on the criteria individuals use in making choices, and on the major actors and the role of models. Broadly analysing a decision problem is it reasonable to assume that it involves two distinct moments, i) information gathering and ii) use of available information and decision-making. Concerning the first moment one can discuss the potential of rigorous methods (statistical analysis and modelling) commonly used to enable and improve the collection, analysis and interpretation of data. Concerning the second one it is important to note that the existing information may not be enough, that it is not always possible to combine and organize (objective and subjective) information and that decisions are subject to contexts of high uncertainty.

Decision theorists have introduced concepts of risk preference and multi-criteria trade-offs and acknowledge the role of communication and perception, of rules and access to information (Andrews, 2007). Gamper e Turcanu (2007) identify the criteria analysis as a technique to overcome the limitations of decision support tools traditionally applied, as it allows dealing with qualitative criteria, as well as with the uncertainties about the current or future impacts. Multi-criteria analysis is critical in evaluating a set of alternatives, in collecting and systematizing decision-makers opinions, and in the development of strategies and programs. However, it is considered that the potential of multi-criteria analysis in situations involving multiple systems of values and goals cannot be easily quantified because of its intangible nature - eg, social, cultural or psychological issues - (Gamper & Turcanu, 2007).

Before setting the modelling specifications let us first problematize a set of assumptions related to the decision process. In structuring the decision problem Roy (1996) points out several considerations that should be encountered to improve this objective:

- The frontier between what is and what is not feasible is not clear;



- In many real-world problems, there might not exist a "decision maker", but several people (actors or stakeholders) that take part in the decision process;
- Preferences are rarely well-formed and there is the concern of solving conflicts, transforming contradictions and destabilizing certain convictions;
- Data such as the numerical values of evaluations or performance measures, the characteristics and analytical forms of probabilistic distributions are often imprecise, uncertain, or ill-determined;
- It is impossible to say that a decision is a good or a bad one by referring solely to a mathematical model.

The following considerations undertake the previous assumptions and present a body of knowledge that works as guidelines for future decision aiding. Any decision can be analysed according to a set of measures or criteria, so accept in this paper we resort to a multi-criteria approach. The point of departure, shared with any decision problem, lies in the questions of how should the decision be modelled, and how can the alternative actions be differentiated. At stake is the capacity to structure a preference model and analyse the multiple consequences of the decisions. Roy (1996) suggests a set of interdependent levels that define the overall structure of a comprehensive decision model:

- Defining the object of the decision;
- Analysing consequences and developing criteria and performance measures of the action: the decision is modelled in such a way that in encounters with the potential influence over the evolution of the process, as well as with the criteria that recognize the particularities of the options and solutions and the consequences of uncertainty, and inaccurate determination in the process;
- Modeling preferences and aggregating performances: it requires evaluating and comparing a large range of possibilities and, if necessary, generating an acceptable and responsive dialogue among the various actors;
- Investigating and developing the recommendation: formal procedures designed to acquire and process information lead to solutions and proposal adjusted to specific problems, the preferences are transformed in priorities and choices.

In sum, it is fair to assume that an ideal decision support methodology should integrate three elements: multi-criteria methods (as preferences and choices are determined by different



criteria evaluation); agent based models (as networks are implicit in every policymaking stage); and foresight analysis (to deal with exogenous dimensions and high levels of uncertainty and to distinguish between flexible and irreversible actions).

This analysis is applied in the context of regional and local development decision-making, where these challenges remain as central topics.

## **REGIONAL AND LOCAL DEVELOPMENT DECISION-MAKING**

Resembling the research on policymaking and decision aiding issues previously mentioned, territorial decisions are also concerned with different behaviours, knowledge, priorities, goals, interests and various agents that interfere along the decision process. The main objective consists in developing a systematic procedure able to deal with the complexity of decision making. In general, these procedures consist in the division of the problem into smaller parts, in studying and logically integrating each stage in order to produce a meaningful and usable solution (Karnatak, Saran, Bhatia, & Roy, 2007).

Territorial decisions are taken as an example in this paper. In this context, there are several drivers that can be considered, such as natural, social and economic resources. The territorial analysis corresponds to a specific subclass of decision analysis in which the decision maker has to choose the best set of geographically defined alternatives, subject to multiple and conflicting criteria (for example, in projects evaluation, strategic priorities definition, etc.) (Karnatak et al., 2007). The evaluation and ranking of the alternatives are based on values assigned to specific goals, criteria and preferences of multiple decision makers. As Roy (1996) defends, in these problems, the decisions possess an important political component, and cover a relatively long period of time (usually subject to successive revisions). In his perspective, “the difficulties are principally due to ignorance of or uncertainty surrounding the consequences of the possible decisions and to the sensitivity of compromise solutions to the value systems that come into play”.

In order to assess government innovation and networks Berry and Berry (2007) propose two models commonly used in the literature: the national interaction model and the regional diffusion model. Their study focuses on how nations develop new programs and on how such programs have diffused across countries, and assume that there are two principal forms of explanation for the adoption of a new program by a state. One centred in internal



determinants, where the factors leading a jurisdiction (political, economic, or social characteristics) are internal to the state. The other suggests that diffusion models are inherently intergovernmental.

Berry and Berry (2007) present the national interaction model which assumes a national communication network, based on formal institutional arrangements, among state officials regarding public-sector programs in which officials learn about programs from their peers in other states. Here, they say, the actors are totally undifferentiated and randomly interact with each other. But it is not absolutely accurate, as there are institutional arrangements that encourage and frame these relationships and, consequently, the policy adoption and outcome. The other model, instead of assuming a national basis interaction, hypothesizes that states are mostly influenced by states geographically proximate and for this reason the level of influence of one state over another is proportional to the distance between them. Here one can assume greater levels of competition among regionally focused proposals.

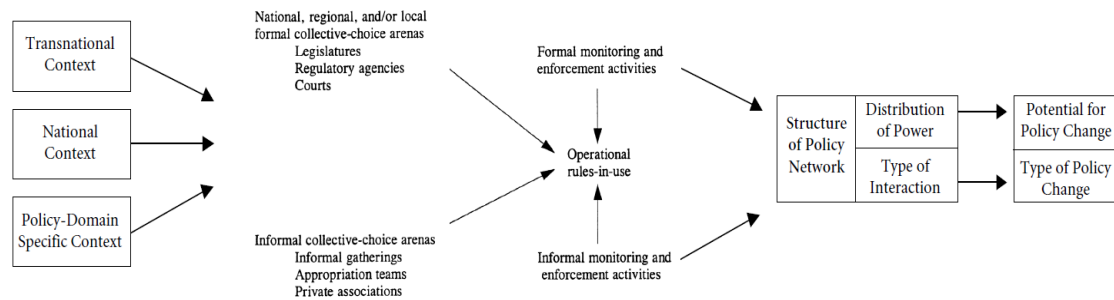
There are a set of determinants that define the context in which states adopt a new program or policy. Berry and Berry (2007) models are particularly important because they rely on the need of integration of different actors, policy instruments and funding streams, where multiple agencies, policy instruments and funding sources targeting specific thematic domains have to be balanced and endless trade-offs have to be made.

As a matter of fact, this analysis moves towards the network approach previously presented. Additionally, one has to encounter that the relevant factors (socioeconomic, political, etc.) vary with the territorial and functional specificities of the policy network under study (Adam & Kriesi, 2007). Accordingly, the authors state that networks exist at different territorial levels (transnational, European, national, regional, and local) and can be distinguished according to their macro-political or domain-specific scope.

But how to combine these entire dimensions in the decision making process? On the one hand, a policy subsystem is defined by its territorial boundaries and by the policy participants from all levels of government, multiple interest groups, and institutional arrangements; on the other hand, the fulfilment of their objectives over time requires high level of specialization in policy subsystems and continuous participation (Weible & Sabatier, 2007).

Considering these both dimensions only allows understanding the overall extent to which the policy process has to deal with, and it structures only one part of the problem (Figure 2).





**Figure 2:** Relationships of formal and informal collective-choice | Source: adapted from (Adam & Kriesi, 2007; Ostrom, 2007)

Regardless of the level we are deciding, driving long-term risks and opportunities and setting priorities are always present. Borrowing Ostrom's (1986) structure of action situations it is assumed that following the participants (actors) selection are the i) set of actions that participants can take at different nodes in a decision tree; ii) amount of information available at a decision node and iii) benefits and costs to be assigned to actions and outcomes. The main challenge remains in capturing the complex context and combining all its elements in decision analytic techniques as support for the decision process. As stated before, this complexity is related scarce resources to be allocated and the conflicting interests coupled with a high degree of uncertainty (Gamper & Turcanu, 2007; Sabatier, 2007).

Good decisions on territorial planning depends not only on recognizing the importance of multilevel governance on pursuing micro level goals, and structuring integrated programs grounded in external strategic frameworks (European or National levels, for example), but also in considering the possible evolution of the factors mostly related with the phenomena under study. The first two are related with policy coordination and territorial governance. The latter, in turn, integrates an important dimension in decision support tools – this will receive greater relevance.

The predictive capability can be achieved through the use of statistical methods, but these methods prove to be limited. There are analytical models that describe the evolution of a given reality over time, conditional to a number of factors. These models, involve the application of a rigorous formalism, but its feasibility depends on the availability of information about the past and the realism of the assumption that this evolution follows a trend that can be extrapolated into the future. To simplify, to these formal models can be divided into two groups: i) models for time series extrapolation, and ii) dynamic models. The first one assumes that the





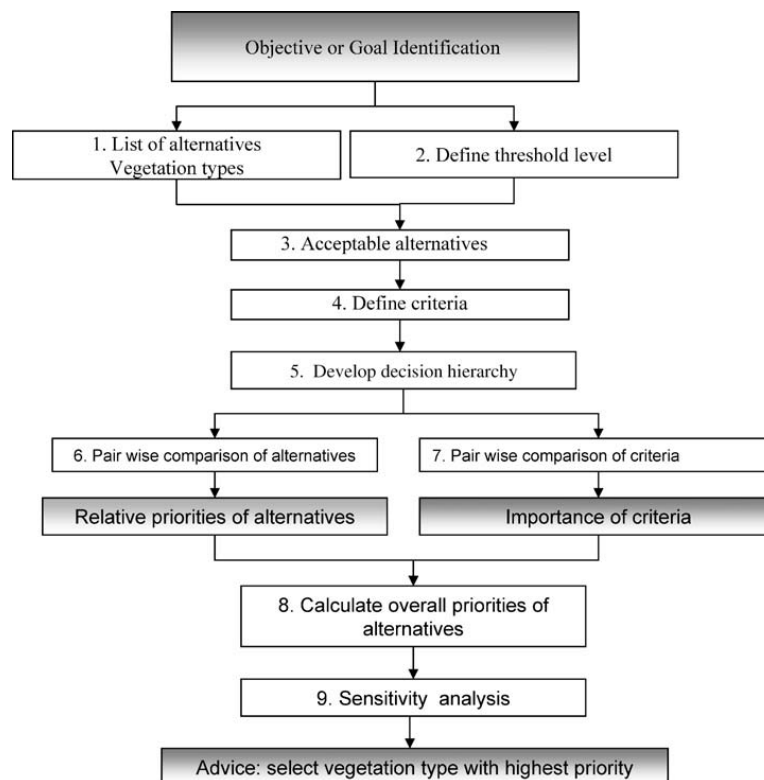
parameters of time series which generate the time series process are constant or have a steady evolutionary trend which implies that there is no capacity for exogenous variables, in the forecast horizon, to significantly alter the series. The second one analyse the causal relationships between factors, and so it is necessary to know the parameters that generate the dynamic process. In these models the fundamental factors for the description of process dynamics are endogenous and known, and the behaviour and influence on exogenous variables are not included.

There are alternative methods that deal with this limitation. In this paper we enhance foresight analysis contribution, as a strategic tool that fosters the construction of future visions, in order to inform decision making and assemble action, mainly based in the discussion of exploratory scenario analysis. The contribution of this component is related with the identification of i) contingent or flexible actions, which implementation is related with the particularities of each scenario; and ii) robust actions that are considered to be determinant for pursuing the objectives and so are a relatively irreversible part of the future.

But there again, this is only one part of the complex decision support tool. The following consideration lie on multi-criteria analysis, based on the assumption that it allow to overcome the shortcomings of traditional decision-support tools, due to its ability of dealing with qualitative criteria as well as with uncertainties about current or future impacts (Gamper & Turcanu, 2007). These methods involve criteria selection, criteria weighting, evaluation, and final aggregation. Wang et. al. (2009) suggest three categories of weighting methods i) subjective weighting, ii) objective weighting and iii) combination weighting methods and point several methods based on weighted sum, priority setting, outranking, fuzzy set methodology.

After comparing each method the authors present the Analytical Hierarchy Process (AHP) method as the more prevalent rank order weighting method due to its understandability in theory and the simplicity of its application. This method was developed by Saaty (1977), which decomposition principle requires the comparison of pairs of the various elements that structure the decision process, allowing ranking the various elements, evaluating the relative importance of alternatives and clarifying prioritization. Saaty (2008) identifies four key steps for the implementation of an AHP: 1) identify the problem and determine the type of information needed; 2) define the hierarchical structure of the decision, since the objective of the decision, the intermediate levels (criteria on which subsequent elements depend) to the

lowest level (usually corresponds to a set of alternatives); 3) build a set of matrices of paired comparisons, where each level corresponds to a separate matrix; 4) determine the weight of each factor. Based on his description Karnatak et al. (2007) illustrates, in more detail, the steps previously presented (Figure 3).



**Figure 3:** AHP structure | Source: Karnatak et al., (2007)

When applied to the specific context of regional and local development, it might be at stake the definition of strategic intervention areas that best suit micro-level objectives and match with the various territorial scales (macro-level) that frame the problem. The results might be important inputs for subsequent stages, for example, to guide and evaluate the projects and actions. In order to guaranty consistency of the results it should combine foresight and participatory components.

The decision model proposed in this paper holds in these assumptions. The choices here displayed are based on the assumption that public decision-making needs to be more i) transparent, as it demands prioritization, budgeting and resource allocation; ii) accountable, as it involves alternative choices; iii) participated, as it requires the combination of formal and informal relationships between different agents and iv) future oriented, as it supports strategic



approaches. Therefore it presents and discusses a methodological framework that combines technically informed subjectivity with more rigorous models.

## CONCLUSION

This paper focuses on the validation of the importance of decision-making tools that combine foresight techniques, and multi-criteria methods, and on the discussion of their application. There is an on-going PhD thesis regarding the implementation of the principles set out in this paper, applied to the regional and local development context. This implies the transformation of the guidelines previously presented into a concrete methodological framework. This is certainly an opportunity for future papers.

Regarding the complexity of the policymaking process, this paper assumes three central concerns i) network analysis as a framework for policy understanding, to explain how different actors participate in each stage; ii) multi-criteria as the basis of the problems encountered in real-life that guide different preferences and prioritization; iii) foresight techniques to deal with the high uncertainty that involves the strategic perspective required in regional and local decisions.

To support this perspective it provides a selective review of the literature on policymaking as a process, focusing on the general contribution of well-established stages to understand the policy cycle framework. It is the point of departure to link this framework with the regional and local decision-making challenges, where multidisciplinary actors and different territorial scales operate towards common objectives and priorities. Although not focused in this paper, the cognitive dimension of human reasoning plays an important role in defining the methods and techniques of decision aiding. For all these reasons, central research questions concerning the policy process, its stages, particularly regarding the impacts of particular interventions, preferences, interests, choice criteria, and evaluation and monitoring remain important ones.



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