



In Search of Feasible Environmental Policy Making Tools in the United Arab Emirates: The Multi-Goal Approach

Ahmed Mansour*

Department of Political Science, United Arab Emirates University, Alain P.O. Box 15551, UAE

Abstract. Public Policymaking in general and environmental policymaking, in particular, are not conducted in a scientific manner. Public policy makers usually adopt piecemeal and hoc and reactive approaches. Environmental problems are multifaceted and interdependent. This characteristic of interdependence means their impacts affect other public policy issue areas such as health, employment, and productions. Therefore, the impact of policies adopted to address environmental problems is not confined to the environmental issue area. Every public policy in any policy issue area is susceptible to have intended and unintended positive and negative side effects. Intended effects are goals policymakers intend to achieve by adopting specific public policies. Unintended positive and negative side effects result as byproducts of a specific policy being implemented. Hence, alternative policies considered to address any environmental problem should be weighed carefully against multiple sets of criteria and goals. Also, analysts must exert some efforts to look for potential negative side effects of policies. One possible rational policy tool is the Multi-Goal analysis which permits policy analyst to compare several alternatives against several criteria to choose the one that attains the highest scores in these criteria. The Multi-Goal, as part of the rationalistic model of policy analysis, follows certain steps to address public policy problems. These steps are compiled into two main categories: problem analysis and solution analysis.

Keywords. *public policy, environment, multi-goal analysis, intended impacts, unintended impacts*

*Correspondence:
ahmede@uaeu.ac.ae

Introduction

Environmental pollution problems are in fact the most salient public policy problems at both national and international levels. By its very nature, it's a globalized problem because the harmful activities to the environment of one country impose negative externalities on many if not all other countries of the world. This is the price of unlimited economic growth ventures and the consumerism ideology propagated by big business and high-tech technology. Ironically, the debates of whether pollution problems and global warming are consequent of human activity or not are ongoing controversies among different states and policymakers in the world. Not only that, but the existence of global environmental and pollution problems is in itself a topic of hot

political debates and disagreements not only in political arenas but also among scientist and environmental activists.

This is because policies to address the environmental problems have consequences not only for the sustenance of life on planet earth, but because these policies have negative impacts on national economies and industries. They tend to affect the costs of production in many industries rendering them less competitive in national and international markets and sometimes limit the freedom of individuals and groups to live their lives the way they like. Some individuals may even believe that the debate around environmental problems of pollution and global warming are esoteric concerns of some intellectuals

and academicians. These positions and individual attitudes underpin most of the controversies surrounding debates about the environment.

The example of the United States of America (USA), which tops up the community of polluters and therefore, poses serious, dangerous consequences to the global environment, is a good case in point. The present US government has described the environmental problems as a “hoax,” and scientific findings of global warming and the ozone hole are not hard “science.” It has based this view on the assertions of a few environmental scientists who cast doubts about environmental sciences as not being hard sciences. Accordingly, the present US government has repealed most of the environmental regulatory policies enacted by its predecessor and directed toward the sustainability of the environment inside the USA. It also refused to sign the Paris Accord on the environment, and the previous governments in the USA were adamantly reluctant to sign the Kyoto Protocol on the environment because it has negative impacts on its economic growth.

The USA governments have adopted these stands despite the numerous environmental hazards and catastrophes it has suffered in recent times. These controversies reflect and underscore the interests of the business lobbies which have a substantial influence on policymakers and conservative congressmen who spout pro-business political ideologies. With these policies, the USA forsakes its role as the global leader of climate change and environmental problems, and consequently, the European Union (EU) assumes this leadership role at both the EU and global levels. The present US government argues that regulatory policies directed toward sustaining the environment have negative economic impacts by increasing the cost of industrial production and therefore rendering the US-produced goods and services not competitive on the global market economy. Moreover, they partially contribute to the flight of the US capital and factories to countries where environmental regulations are less stringent and provide cheap labor for industrial production. Consequently, the American working classes lose their industrial jobs to other countries.

However, a caveat is in order here; not all US businesses, especially some technology enterprises, who express their opposition to these moves, accepted the new US government policies. It is this confluence of political and economic factors in the environmental policy problems that have led us to adopt in this paper a political economy approach as represented by the Multi-Goal Analysis to guide policymakers in designing public policies taking into account the different negative side effects of environmental policies on the economy and society. Moreover, by incorporating different criteria in the analysis of new proposed public policies, the Multi-Goal Analysis tool enables analysts and policymakers to evaluate the consequences of proposed public policies in all policy areas to the environment.

The Methodology of the Study

The paper uses a qualitative approach. Unlike the quantitative methodology, which admits only numerical variables into the analysis, the qualitative approach “analyzes behavior and attitudes which it is not possible or desirable to quantify” (Harrison, 2001, p. 74). Whereas quantitative methodology opts to use large sets of numerical variables and uses statistical techniques to test hypotheses to develop predictive theories and generalizations, the qualitative approach uses quantifiable and unquantifiable data to explore the problem to achieve depth rather than breadth of analysis. In this qualitative methodology, the researcher utilizes their logic rather than the statistical techniques to interpret data. To perform this task, the researcher has to have a clear analytical and theoretical framework to address the problem at hand. Therefore, the paper uses a political economy approach to address the environmental problems. This qualitative methodology suits also our normative objective in this paper to suggest the use of the Multi-Goal Analysis in the UAE environmental arena to analyze and design policies thereof.

The multi-goal approach belongs to two traditions in policy analysis: rationality and political economy. For this reason, the paper adopts a rationalistic political economy approach as applied to public policy analysis studies. The political economy approach depends on the new trends in

policy analysis and the tenets of the public (or rational) choice movements. The political economy approach to policy analysis bases itself on three outstanding assumptions which analysts utilize to analyze public problems to find solutions for them. These pillars include (1) the purposiveness of human behavior, (2) people respond to incentives and constraints, and (3) people are intelligent and able to find innovative solutions to their problem (Bickers and Williams, 2001). The first assumption tells us that people have preferences for the way they want to live. In their pursuit of realizing their preferences, they are guided by their self-interest. Accordingly, they behave rationally as utility maximizers (making the possible benefit with the least possible costs). The rational maximizing behavior of an individual in pursuing his preferences may conflict with the preferences of other individuals and leads to common public policy problems (Stone, 2012). Thus, environmental problems are byproducts of this individual rational behavior; that is individual behavior is the root of environmental problems.

The second assumption tells us that policies designed to address environmental problems may be effective when it uses incentives or constraints to influence individual behavior. The third assumption of people intelligence to find innovative solutions to their problems doesn't mean that people as individuals alone can find solutions to collective problems like the environmental problems. They do not have enough incentives to do so. It is governments with their eyes on the public interests that can do that.

Definitions of the Term “Public Policy”

Pollution and environmental problems are public policy problems. A public policy problem is an “unrealized need, value or opportunity for improvement which, however, identified, may be attained through public action” (Dunn, 2004, p. 4). This public action is what we call public policy. For the government to solve a public problem, after they've identified it, the government needs first information about the problem such as the evolution and history of the problem (level of pollution and stakeholders). It also needs information about values at stake (or goals) such

as clean environment and a healthy population whose satisfaction will solve the problem (Dunn, 2004).

Researchers use many terms in the literature to refer to the term “public policy.” This phenomenon reflects the existence of two main streams in public policy studies: the political descriptive stream favored by political scientists and the normative-practical rationalistic streams favored by practical-oriented policy analyst. However, the two streams are interconnected and benefit from each other. This conclusion will be explained later. Nevertheless, the terms used to denote public policies include plan, program, project, and activity. As such public policies are embodied in laws, regulations, decisions, and actions of government.

In the academia, definitions of public policy abound reflecting the multifaceted nature of public policies and the inclination of each researcher to provide a definition relevant to one facet of public policy relevant to his research objective, academic background, and interest. Thus many definitions exist in the literature. For the multiplicity of definitions of public policy see, for example, Cochran et al. (1999), Cochran and Malone (1995), Dye (1992), Peters (1999), and Schneider and Ingram (1997). This phenomenon of a multiplicity of definitions has led Thomas Dye (1992, p. 19) to argue that “the search for a single definition of public policy can degenerate into a word game.” Birkland (2011), reiterates Dye's argument by stating that “there is a lack of a consensus on the definition of public policy.”

Thomas Dye (1992) provides a widely accepted and eloquently succinct definition of the public policy stating that “public policy is what government chooses to do or not do.” This definition captures the nature of public policy and includes not only the positive actions of governments to address public problems but also the conscious decision of a government not to act. The element of choice is important here. For example, if the government chooses not address environmental problems and pollution, this choice is considered public policy. This is because the inaction of government, in this case, will have impacts on society and incur cost and benefits for different groups in society. Although sometimes the best

option to address a problem may be to do nothing about it, this is not a good option for environmental problems because their negative impacts on society exceed all plausible benefit to industry and society.

Dye's definition appears in different forms developed by various authorities in the subject. The importance of this definition is that it directs the attention of public policy researchers to explore and explain the reasons why the government chose to adopt public policies to address certain public problems and sometimes chooses consciously to ignore some other problems. This definition is simultaneously used for analytical, descriptive studies as well as practically oriented ones, since the latter advice policymakers to do nothing about the problem. Birkland (2011, pp. 8–9) argues that “No single definition may ever be developed, but we can discern key attributes of public policy,” and therefore he attempts to summarize these attributes in the following points.

- The policy is made in response to some sort of problem that requires attention
- Policy is made on the public behalf.
- Policy is oriented toward a goal or desired state, such as the solution of a problem
- Policy is ultimately made by governments, even if the ideas come from outside government or through the interaction of government and nongovernmental actors.
- The policy is interpreted and implemented by public and private actors who have different interpretations of problems, solutions, and their motivations.
- The policy is what the government chooses not to do or *not* to do.

Rationalistic practically-oriented approaches (policy analysis) accepts Dye's definition, but most experts in policy analysis have their distinctive sets of definitions that reflect their practical orientation. Most of them are not concerned with producing theoretical definitions of public policy because public policy for them is, in fact, the “solution for public problems” they opt to design. Many of them may take the meaning of public policy for granted. Therefore, they use different terms to denote what they mean by public

policy such as “policy proposal,” “policy alternatives,” “policy options,” and “policy advice.”

It is useful here to distinguish between policy outputs, which refer to the declared goals of public policy, and policy outcomes as indicating the actual policy impacts of policies. This distinction helps us not only to concentrate on policy statements and declared goals but also their implementation and real outcomes. This is because environmental policies in many cases are symbolic nature and lack positive outcomes. It is also useful here to think of public policy as comprising the instruments through which governments influence the behavior of individuals or groups to make them comply with the goals of society. This does not mean that policymakers are always clear about what these goals and values are. The vernacular of public policy may be sometimes confusing in this respect. Kraft and Furlong (2015, p. 4) clarify this aspect by arguing that ...

Public policy scholars and policymakers speak sometimes without much clarity about intentions (the purpose of government action); goals (the stated ends to be achieved); plans, or proposals (the means of achieving goals); programs (the authorized means for pursuing goals, and decisions or choices—that is, specific actions that are taken to set goals, develop plans, and implement programs.

Weimer and Vining (1999; 2017) notice that public policy makers sometimes speak about public goals as if they are synonymous with public policy. For example, “our policy is to provide a clean environment for everyone.” This statement is a goal rather than a public policy.

Literature Review: The Place of Multi-Goal Analysis in Policy Sciences

Public Policy Analysis and Design are relatively new fields in public administration, political, science, economics, and other social sciences that gained tremendous popularity in both academic and professional arenas (Birkland, 2013). In 1974, the USA National Associations of Schools of Public Affairs and Administration (NASPAA) accepted public policy analysis in its *Guidelines and Standards for Professional Master Degrees*

Programs in Public Affairs and Public Administration, as one of the professional fields to be studied and pursued by graduate students (Engelbert, 1977). In his paper presented at a symposium sponsored by Public Administration Review journal, Ukeles (1977, p. 223) noted, that, since the Yehezkel Dror call in September 1967 for the introduction of a new professional job of policy analysts in government, and the identification of NASPAA of the field of policy analysis as an area to be included in all public affairs programs ...

(In) only seven years, policy analysis moved from proposition to reality, from “fringe” idea to a central place in official public administration thinking. This rapid acceptance of the legitimacy of policy analysis is one of the most remarkable developments in modern public affairs.

The job of policy analyst in government, and even in multinational companies and nongovernmental organizations, has been well established in these settings and has witnessed increasing demand from different levels of US government: federal, state, and local governments. This fact explains the proliferation of public policy programs in almost all American universities either as in-house programs in the departments of political science, public administration, economics, and other social science departments, and even professional disciplines such as medicine or engineering or as stand-alone professional schools of public policy in separate entities. The expansion of the discipline has crossed the American borders to Canada and other English-speaking or non-English speaking European countries and even some developing countries (see Furubo, 2007; Mathur and Mathur, 2007; Mayer, 2007; Mo, 2007; Parsons, 2007; Saretzki, 2007).

A huge body of literature on public policy is building up. For example, the University of California’s electronic catalog houses more than 4,586 book titles on the discipline of public policy (Gupta, 2001). Many US and European universities develop graduate programs in public policy processes to meet the rising demands for policy analysts. Many specialized professionals and scientific journals, such as *Policy Studies* and *Journal of Policy Analysis and Management*, have

published thousands of theoretical and empirical papers on the subject. Unfortunately, the discipline is highly underdeveloped in most Arab universities

Since the multi-goal technique is an integral part of the public policy studies and analysis, it may be in order to review the literature in this new field to locate the place of the multi-goal technique in the current literature. A subsidiary goal of this review is to introduce and highlight the importance of this discipline and its practical applications to public policy problems by policymakers, academics, practitioners, and students in Arab countries. However, the discipline is at present highly underdeveloped in Arab universities.

The modern roots of the discipline date back to the 1950s with the call of professor Harold Lasswell of Chicago University to establish a field of policy sciences focusing on policy and opting to provide useful information regarding public policy problems to policymakers. His original venture calls for the integration of all social sciences, and in some cases, physical sciences, in one framework to address public problems. Of course, Lasswell’s call is enticed by his knowledge that the present social sciences—economics, political science, sociology and others—in their fragmented nature do not provide usable knowledge to policymakers. Several modern writers support this conclusion. For example, Dunn (1999 and 2011) argues that the separate independent social sciences have not produced useful information to policymakers. Dunn (1999, p. 3) succinctly argues that ...

Knowledge from multiple disciplines and professions is usually more effective in responding to real-world problems than is knowledge from single disciplines and professions. Real World problems come in complex bundles that are political, social, economic, administrative, legal, ethical and more. They do not arrive in separate packages addressed to political scientists, economists, or public administrators. To name but three of the policy-relevant disciplines and professions. So far, multidisciplinary policy analysis appears to provide the best fit with the complex and many-faceted worlds of public policymaking.

Unfortunately, the ambitious Lasswell's scheme did not materialize as he configured it. The social sciences have not removed the border between them and integrate themselves in one unifying framework. Instead, these sciences have incorporated the idea of public policy within their disciplinary boundaries (Elhussein, 1989). Thus, the field develops into two major streams: public policy as an approach in social science and policy analysis as a field in itself. Consequently, we have public policy focus in political science, public administration, sociology, social works, and psychology—to name a few of the social science disciplines. The emergence of policy analysis as an independent field of inquiry has led to the establishment of separate schools of policy analysis adopting multidisciplinary and interdisciplinary approaches. Both streams have proliferated in most of the US universities and European universities (Gupta, 2001).

It is now possible to identify two major streams claiming the title of “public policy”: the policy studies and the rationalistic streams. Whereas the main objective of the former is explanatory, the latter claims to be practical and opting to provide practical advice to policymakers. The political system stream houses two types of models (1) models of how policy is made and (2) models of who makes policy and benefit from them (Dye, 2013; Kraft and Furlong, 2015; Theodoulou and Cahn, 1995). The first group includes among others, political systems theory, structural functionalism, and policy cycle approach. The second group includes corporatism, elite, and groups models. Modern approaches that study one or the other aspect of the policymaking process include incrementalism (Lindblom, 1959; 1992), advocacy coalition framework (ACF) (Sabatier and Weible, 2014), Multiple Stream Approach (MSA) (Kingdon, 1995), Punctuated Equilibrium (Baumgartner and Jones, 2009), Institutional Analysis and Development (Ostrom et al., 2014), Policy Feedback Theory (Mettler and SoRelle, 2014), Social Constructionist Theory (Schneider et al., 2014), the Narrative Policy Framework (McBeth et al., 2014), Innovation and Diffusion Models (Bery and Bery, 2014). Unfortunately, most of these models address policymaking processes in the USA and, to some extent, Western pluralist

democracies and are not relevant to countries outside the orbit of Western countries. Therefore, the paper argues that the rationalistic approach, which the multi-goal belongs to, is more useful to policymakers in developing countries since it provides practical advice to them irrespective of the type of the political system (Stokey and Zeckhauser, 1978). We turn now to discuss the meaning of rationality and the origins of the rational model in policy analysis where the Multi-Goal Analysis is rooted.

The Origin of the Multi-Goal Analysis: The Rationalist Model

The Rational Model of policy analysis contains varied sets of approaches that attempt to use the tools of social sciences and professions to provide practical advice to policymakers. Rationality refers to a major trend in social sciences in general and particularly in policy-making and decision-making models. Rationality as style or model in social sciences studies opts to create and encourage a certain mindset in private sector organization, and public-sector organization, to structure their decision-making processes rationally. Consequently, the model advocates and encourages, through economic sciences in general and development economics in particular, the adoption of scientific planning tools and methods. With the emergence of the new policy sciences, which emerged from the outset as a problem-solving approach, rationality pervades the new policy analysis approach and thereby enhancing its normative orientation. (Weimer and Vining, 1999). In the discipline of policy analysis, the concept of rationality is defined as a logical and structured framework that may be facilitated to “translate policymakers' intentions, goals, and assumptions into suitable policies to achieve targeted goals” (Lawton and Rose, 1994, p. 119).

In the literature, two versions of rationality are customarily identified; i.e. comprehensive (economic or unbounded) rationality and Herbert Simon's bounded rationality. Authors characterize the differences between the two versions regarding the degree of *rationality* sought, the amount of information required to make rational decisions, and the range of policy options to be

considered and evaluated for policymaking. Whereas, comprehensive rationality requires that policy analysts and planners should collect *all* information related to the problem at hand, and to dig up for *all* policy alternatives to address public problem under consideration, calculate *all* the benefits of all alternatives and pick up the most optimum alternative (the buzzwords are *all* and *optimum*), bounded rationality acknowledges the costs of information and the limitation of time and human cognitive abilities to collect and process all information and to dig up all information. Time and resource constraints *bound* policymakers to apply bounded rationality (the buzzword here is *satisficing*). Therefore, bounded rationality uses available information and considers only a limited set of policy solutions to pick up the *satisficing* rather than the most *optimum* solution.

However, both versions of rationality seek to maximize the values of efficiency, effectiveness, and economy to maximize social gains (benefits) from government policies at the least possible costs. In this sense, rationality is seen in terms of policy costs and policy benefits (the costs-benefits ratio). Thus, it is not astonishing at all that the tool favored by economic rationality is the Cost-Benefit Analysis (CBA) tool. As such both versions of rationality underscore the fundamental axiom of the “rational economic man” on whose *rational* behavior the optimal equilibrium of competitive markets is postulated. Moreover, they also both underpins the concept of the “rational administrative man” which permeates all traditional bureaucratic thinking (Max Weber’s ideal-type bureaucracy) as well as modern administrative theories, which views organizations as being goal-oriented and utilize all efficient means to achieve these goals (Jackson, 1983, p. 89). Moreover, both versions of rationality adopt and advocate a similar framework for rational policymaking. Hogwood and Gunn, (1990, p. 47) describe the framework advocated by comprehensive rationality, in term of a sequence of logical steps of policymaking. A rational policy-maker...

(1) identifies a policy problem on which there is sufficient consensus among relevant stakeholders that the decision maker can act on their behalf, (2) defines and ranks consistently all

measurable goals and objectives whose attainment constitutes a solution for the problem, (3) identifies all policy alternatives that may contribute to each goal and objective and forecasts all the consequences of each alternative, (4) compares these consequences in term of criteria or goals, (5) chooses the alternative or combination of alternatives that would maximize the values earlier defined as being most important.

The grand underpinning assumptions of rationality are that all policymakers’ behavior is goal-oriented and that policymakers (and individuals for that matter) always choose the best or optimum policy alternatives, from among competing alternatives, which achieve the best cost/benefit ratio. Critics of comprehensive rationality invariably target its fundamental axioms such as its overemphasis on quantification (Halberstam, 1972, pp. 348–349), its overemphasis on the unlimited provision of information, and its oversimplified and naive assumption about the ever-present consensus among different political actors and stakeholders about definitions of public problems, policy goals. In addition to its unrealistic demand for the consideration of *all* policy alternatives to address a certain problem.

A more damaging criticism questions the validity of the assumption about the availability of unlimited constellations of objective courses of actions whose outcomes are amenable to rigorous and scientific testing in a way that facilitate the choice between them by utilizing a technical measure, usually economic criteria (Cochran and Malone, 1995, p. 52). It is argued that this comprehensive rationalistic framework is not only inapplicable to the complex political environment of modern states, but also undesirable. Some critics even go to the extent of arguing that rationality is unsuitable even for business environments, where there might be some degree of consensus about means and ends. For example, Tisdell (1975) argues that comprehensive rationality adopts stronger assumptions than is needed to obtain the most preferred alternative. In a similar vein, Cyert et al. (1956) and Cyert et al. (1958) argue that rationality is not applicable even in business environments because business decision makers are not always pursuing the assumed behavior of maximizing a set of well-

defined profit-oriented goals or well-defined growth-based functions.

The unrealistic nature of comprehensive rationality assumptions has led to the emergence of Nobel Laureate Herbert Simon's concept of "bounded rationality" to modify the wild assumptions and tenets of comprehensive rationality. Simon contends that all decision-making processes operate in contexts that are shaped and limited by different sets of time constraints and intellectual ability that fall short of comprehending the comprehensiveness of unbounded rationality. Therefore, these limitations lead decision makers to opt to *satisfice* rather than to *maximize* their decision making. Thus, Simon coined the term *satisficing* to accurately describe actual decision situations in which "decision makers seek to identify a course of action that is just "good enough." Simon's "*satisficing*" concept integrates the meaning of the two word: *satisfying* and *sufficing*, which he believes describe the actual behavior of decision makers who seek only sufficient satisfaction. Therefore, *satisficing* denotes a policy-making strategy that subrogates the unrealistic optimality criterion of comprehensive rationality for the criterion of adequacy in choosing between a limited set of alternatives; i.e. adequate and optimal solutions.

To simplify the complexity of policymaking, Simon's *satisfying* provides for the use of heuristics and rules of thumb to simplify rather than follow strict, rigid rules of optimization. The use of these simplifying techniques of decision-making, save decision-makers from going into computing the expected benefits of unlimited numbers of policy alternatives beyond their cognitive ability even with the help of the most advanced computers. In using these aids to calculations, policymakers avoid the costly deliberations and repetition of the same calculations undertaken for similar activities where similar decision-making calculations are involved, (Simon, 1957). The concept of *satisfying* and the use of heuristics and rules of thumb to simplify decision-making bring Simon's bounded rationality closer to the incremental approach of decision making advocated by Charles Lindblom as an approach to policymaking, and Aaron Wildavsky who uses it to study decision making in public budgeting (Wildavsky, 1979). Lindblom's incrementalism is

congruent with Simon's argument that policymakers' decision-making rarely operates within a framework of comprehensive or economic rationality (Braybrooke and Lindblom, 1970). However, Lindblom contends that his critique of comprehensive rationality as impractical and does not describe the actual world of policymaking is equally relevant to Simon's version of bounded rationality.

Following Simon's seminal work on bounded rationality, which earned him the Nobel Prize, many modifications of his models produce several types of rational models. Elinor Ostrom (1990) propounds forward other more inclusive forms of rationality that incorporate criteria other than efficiency such as institutional transaction costs, and political and social feasibility of policy options as well as organizational and moral costs and benefits (see Dunn, 2004, p. 48). Nevertheless, and despite criticisms, Simon's rational model, aided by the tremendous development in computer technology, underpins the foundation of many modern decision tools in the rational model such as statistical decision theory, operation research, project appraisal, cost-benefit analysis, and economic policy analysis. These tools, although unsuitable to address complex societal problems, are adopted by some rational versions of modern policy analysis (see Stokey and Zeckhauser, 1978; Mood, 1983). The problem of these rational techniques, although useful in addressing low-level well-structured organizational problems such as maintenance, is that they do not invite to analysis other criteria beside efficiency such as political feasibility, administrative ease, and equity criteria. These limitations arise because of their inability to process and consider unquantifiable data about public problems. Hence, the Multi-Goal, which admits the use of economic as well as many noneconomic criteria, is a good substitute for them, especially for ill-structured problems.

The rationalistic approach in policy analysis, which emerged in the 1960s and 1970s, utilizes the methodological framework used in the neopositivist/empiricist tradition dominating in these years. It emphasizes rigorous quantitative methods and attempts to objectively separate facts from values to arrive at generalizations that apply to different political contexts (Fischer,

2007). Two modern approaches currently criticize this approach; these are labeled as the “argumentative turn” in policy analysis (Fischer and Forester, 1993) and “deliberative policy analysis” (Hajer and Wagenaar, 2003). Both the “argumentative turn” and “deliberative policy analysis” seek to address the epistemological and shortcomings of the neo-positivist approach (rationalistic). They criticize it as technocratic and does not describe the actual policy-making process and fails to integrate facts and values in policy decisions. But despite these criticisms, the argumentative turn does not throw away the rationalist approach. Instead, it considers it as one input in the process of policy argumentation rather than the last word in it. Nevertheless, this criticism is not fair because policy analysts usually consider themselves as policy advisors rather than policymakers casting the final word in the policy-making process. Likewise, Deborah Stone’s (2012) critique of rationality which underscores its limited view of public problems as excluding moral and other nonrational behavior can be refuted by the fact that the Multi-Goal approach can accommodate her concerns.

Although the proponents of the rational approach advocate and adopt different types of analytical tools derived from different disciplines, they share the practical orientation and standardized framework of analysis. For example, Stokey and Zeckhauser (1978) develop a five-stage rational framework for policy analysis that is used in one form or another by different analysts. The framework starts by first establishing the context which identifies the underlying problem that the analyst intends to deal with and the specific goals to be achieved by addressing this problem. Second, gathering information and developing alternative policies or courses of actions that are expected to address or solve the problem. Third, predicting the consequences of each alternative and determining the techniques that help in this prediction, and estimate the likelihood of achieving targeted outcomes under uncertainty. Fourth, determine the criteria to facilitate evaluating the level or degree of success of each alternative in relation to desired outcomes, bearing in mind that different alternatives score different values in different criteria. This fact

means that the choice of the preferred policy alternative usually involves painful tradeoffs.

Stokey and Zeckhauser (1978) adopt several nuts and bolts consisting of microeconomic tools as well as operational research tools that include, indifference curves, queuing theory, simulation, Markov models, cost-benefit analysis, linear programming, and decision trees. The problem with these nuts and bolts, especially those derived from operation research, is that they apply to simple well-structured organizational problems and decisions and do not respond to complex ill-structured public problems that involve many stakeholders and decision makers. However, policy analysis practitioners develop other analytic tools that are more appropriate to complex ill-structured public problems. Bardach (2012) outlines eight steps, in keeping with the general framework of rationality, that include a definition of the problem, assembling some evidence, constructing the alternatives, selecting the criteria, projecting the outcomes, confronting tradeoffs, deciding, and finally telling your story. The advantage of Bardach’s scheme lies in its simplicity and straightforward directions about how to conduct policy design for complex public problems in government. He advises the search for smart practices and customization of generic policy alternatives. However, although Bardach’s scheme, unlike Stokey and Zeckhauser, is aware of the complexity of public problems and the different economic and non-economic criteria in policy making, he does not show how the policy analyst deals with defining and diagnosing the public problem. Irwin (2003) presented a more detailed approach and introduced the concept of “Multi-Attributes Analysis” which come close to the concept of “Multi-Goal Analysis,” but again his analysis lack tools for diagnosing public problems.

The Nature of the Environment as a Public Policy Problem

Researchers in public policy analysis classify public problems into three types: well-structured, moderately-structured, and ill-structured-problems (Dunn, 2004). Dunn (2004) uses a set of five elements including decision-makers, available alternative policies, utilities (values),

outcomes, and probabilities of occurrence, to distinguish between these problems. The author adds another three elements which include the nature of the problem, decision tools, and some stakeholders. Table 1 below compares these three types of public policy problems regarding the above-selected elements. Well-structured problems are those that are simple and exists within small organizations such as the problems of machines maintenance. *Bührs and Bartlett (1993) call these problems analycentric problems because they are usually of a technical nature, involve few decision-makers, and they seek efficient solutions in economic terms.* Policy decision tools in well-structured problems include different economic and operation research methods. They also have few stakeholders, a limited set of available policy alternatives and there is a consensus about their goals (utilities), and the outcomes of their policy alternative are certain or risky. Moreover, the probabilities of these outcomes can be statistically calculated.

The moderately-structured problems occupy the middle position between well-structured and ill-structured problems. They coincide with well-structured problems in the first six elements except for the decision tools because it uses economic tools such as cost-benefit analysis and cost-effectiveness. Nevertheless, they differ from well-structured problems in the two elements of outcomes and the calculation of their probabilities. Their outcomes are uncertain, and their probabilities are incalculable. At the end of ill-structured problems, we encounter problems such as terrorism, the arms race, and environmental problems. Their nature is messy and fuzzy; therefore, they are not solvable by simple operation research or economic tools. Their messiness is a fallout of the many stakeholders involved in them, the unlimited and conflicting alternatives available to policy-makers, the unknown nature of their outcomes, and the difficulty involved in calculating the probabilities of their outcomes.

A caveat is important here. The three types of public problems do not constitute independent and separate entities because any problem type may also involve one or the other of the characteristics of the three types. For example, most environmental problems are of the ill-structured

type but may involve some technical components in their composition. Therefore, they may employ some of the economic solutions of the moderately-structured type such as the policy of “internal markets” adopted by the EU and other countries and thereby creating markets for the right to pollute intended to internalize social costs arising from the negative externality of pollution (Buonanno and Nugent, 2013). Nevertheless, the globalized nature of many environmental problems such as pollution involves many internal stakeholders (i.e. industry) and external stakeholders (other states). This fact introduces politics and disagreements in the search for solutions to them. Hence negotiations, aided by technical advice, stand out as the most important tool to figure out possible compromises and solutions for them. Therefore, the role of policy analysts as policy advisors is to provide possible alternatives and information to aid in their clients’ negotiations with other countries.

Table 1

Classification of public problems

Elements	Type of policy		
	Well-Struc-tured (Maintenance)	Moderately-Structured (OPEC Nego-tiations)	Ill-Structured (Terrorism)
Nature of the problem	Technical	Partly Technical	Messy-Fuzzy
Decision-Makers	One or Few	One or Few	Many
Decision Tools	Operation Research	Economic Tools (Cost-Benefit Analysis)	Politics and Policy Analysis
Stakeholders	Very Few	Few	Many
Alternative Policies	Limited	Limited	Unlimited
Utilities (values)	Consensus	Consensus	Conflict
Outcomes	Certain and Risky	Uncertain	Unknown
Probabilities	Calculable	Incalculable	Incalculable

The Environmental Problem in the United Arab Emirates

Three-fourths of United Arab Emirates land is predominantly arid land sustaining habitats and

communities that can survive in a natural context of “small amounts of infrequent precipitation and extremes of heat with consequent high evaporative losses” (Aspinall, 2001, 277). Since we are not interested in the natural composition of the UAE, a detailed picture of the UAE environment and its problems is accessible from Aspinall (2001). What concerns us here is presenting the Multi-Goal Analysis as a possible tool to analyze and find solutions for the man-made environmental problems and especially pollution. The UAE started to suffer different types of threats to its environment, (which had not been witnessed in the premodern era), after the emergence of the new modern state of the UAE on December 2, 1971.

The pollution problem in the UAE is a product of massive economic growth and industrialization policies which started in the post-independence era and the consequent urbanization and high standards of living brought about by these policies (Ghanem, 2001; Shihab, 2001). Since these policies and the economic prosperity they sustain are dependent on the production and consumption of oil products (Butt, 2001), as evident from research on the economic performance of the country in the first three decades (see Al Sadik, 2001), the UAE became one of the world polluters. The high style of living, which depends on the oil-generated and massive use of oil consuming automobiles, air conditioning, and electronic devices bring the UAE to occupy high ranks among the polluters in the world, especially in highly congested urban centers. Since pollution problems involve a problem of public good and negative externalities whose negative impacts do not stay within the confinement of the borders of the polluting city or country, they affect the whole world. And specifically, because of this nature of the pollution problem, it involves a free rider problem in which cities and states free ride on each other. Hence, they cannot be solved by one country alone and need global cooperation.

Thus globally, environmental problems generally, and pollution problems specifically, arise in recent years to occupy a high priority status in the national and the international policy agenda. The United Arab Emirates is not an exception to

that. Although it is possible to justify the solutions of pollution problems regarding the positive benefits to society, such as clean air, pure water, undisturbed fauna and flora, these issues usually involve moral crusades and emotions. Consequently, they lead to the formation of advocacy groups which utilize the vernacular of moral imperatives to seek policies to mitigate these problems. The proposal to use Multi-Goal Analysis in designing environmental and pollution policies in the UAE is intended to help the UAE negotiate its position in the international dialogue about the environment and the policies it adopts to combat these problems.

Multi-Goal Analysis and Environment Problems

Multi-Goal Analysis appears in the literature with different names such as Multi-Goal Analysis, the rationalistic approach (Weimer and Vining, 1999) multi attributes, and multi-criteria tools (Mendoza and Martins, 2006). Under all these names it virtually boils down to the same thing. Policy analysts utilize the Multi-Goal Analysis approach to analyze economic, political, social, as well as foreign policy problems. Researchers from other fields also use it to analyze technical problems. For example, Mendoza and Martins (2006), applies it to forest resource management. The choice of the Multi-Goal Analysis approach to analyzing public problems stems from the fact that, unlike other rational schemes, it admits other criteria of concern to policymakers beside the economic criteria. In this paper, we will mainly depend on Weimer and Vining's version of the Multi-Goal analysis, but we supplement it with ideas from other similar approaches like that of Bardach (2012).

Generally, the model of rational decision-making in policy making is performed within an acceptable framework that contains certain logical steps. These include identification of a problem, specification and ranking of the policy goals and objectives the attainment of which will contribute to the problem solving, specification of policy alternatives which analysts think will contribute to solving the problem, and achieve goals and objectives, forecast of the possible outcomes related to each alternative if

implemented, compare these alternatives according to the contribution of each alternative to goals and objectives, choose the best alternative that maximizes the achievement of goals and objectives, and monitoring of implementing the chosen alternative and make necessary changes (see Dunn, 2004). Different rational policy analysis research uses different versions of this rational framework with different labels for each step. For example, Bardach, (2012, pp. 1-59), “develops a set of eight steps policy analysis which includes defining the problem, assemble some evidence, construct alternatives, project outcomes, confront the tradeoffs, decide, (and) tell your story. For more on similar versions of the rationalistic approach, see Bickers and Williams (2001), Dye (2013), Guess and Farnham (2000), Hogwood and Gunn, (1984), Irwin (2003), and Knoepfel et al. (2007). However, Weimer and Vining (1999) provide the most articulate scheme that utilizes and embodies the rational model of policymaking.

Weimer and Vining (1999) divide the analysis of public problems into two main parts: problem analysis and solution analysis. The first part of problem analysis includes firstly “understanding the problem which includes several tasks to perform by policy analysts. These include receiving the problem, framing the problem, and modeling the problem. Secondly, choosing and explaining relevant goals and constraints and finally selecting a solution method. The solution part involves the choice of evaluation criteria, looking for policy alternatives, predicting the possible impacts of the chosen policy alternative and valuing them regarding the chosen criteria. Finally, recommending actions” (Weimer and Vining, 1999, p. 257).

Understanding the Environmental Problems

This first stage of the Multi-Goal Analysis instructs analysts to go beyond the simple requirement of most applications of the model. Researchers usually start with defining the problem. For example, Bardach (2012) suggests the use of defining the problem regarding what he calls “excess and deficit” technique. This technique defines policy problems regarding excess

in some phenomenon or deficit in it. For, example, “the demand for water in the United Arab Emirates is growing faster than the supply of it.” Quantitative magnitudes should qualify the amount of excess or deficit. This simple approach to understanding the environmental problems, although partially useful, is not very helpful in capturing the different dimensions and complexities of the problem. The benefits of environmental regulation such as clean air, purer water, and unlitteed seashores, are diffused and go to the general public. However, automobile makers, utility companies, manufacturers, bottlers, and packagers bear the heavy costs of these policies. (Bickers and Williams, 2001). It is therefore important to understand the concerns and problem definitions of different stakeholders without necessarily accepting these definitions on their face value.

Framing the Problem of Environment

It is not enough to assess symptoms and definite the environmental problem. The analyst also needs to frame or diagnose the problem. This activity requires an effort to frame the problem in a way that specifies causal relationships that explains how the symptoms are associated with factors that can be targeted by public policy to mitigate the problem. For this purpose, any predictive economic or social science model or theory may be helpful in framing the environmental problem. This is the most important component of the Multi-Goal Analysis. Framing the problem entails the diagnosing of public problems as arising of market failures or government failure or both. Policy analysts use certain attributes to diagnose public problems and their nature. Some attributes of public good problems make it impossible to produce a beneficial good or service to society through market mechanisms and hence call for the intervention of government by public policy to produce the good or address the anomaly thereof. These attributes include rivalrousness, excludability, and congestability. The latter is not an inherent nature of the public good problem per se, but provides some light on why the market fails to produce certain public goods. A rivalrous good is a good which if consumed by one individual will not be available for others to

consume. The right of property ownership of the good is established. These goods are usually called private goods, and because they are divisible into units, they can be provided by the market. By contrast, clean air is not rivalrous because everybody can enjoy it once provided. Private goods are characterized as being excludable. This fact means a private good can be owned by one person and the price mechanism in the market exclude those who don't pay its price for consuming it, so ownership is easily defined. By contrast, the clean environment is not excludable.

Other extreme public goods such as national defense and clean air are neither rivalrous nor excludable because their property rights are not definable nor subject to divisibility that allows the market to divide into units and supply it for a price. Thus, the market fails to provide them in sufficient quantities if it provides them at all. Therefore, the examples of public good mentioned above are referred to as pure public goods. Congestible goods are not pure public good per se and therefore do not constitute market failure. Examples include public parks, toll roads, and wildlife scenery. But at certain levels of use, they become congested and require a market mechanism to address them. These public good constitute market failure when the numbers of individual using them increase beyond their capacity. The *Salik* program in Dubai is a good example of the use of market mechanisms to address the congestion of some roads. When property rights are not assigned to a public utility where the goods are nonexcludable, rivalrous and congestible are called common pool resources. These goods are related to the famous concept of the tragedy of the commons.

To sum up, goods are not always characterized as either rivalrous or excludable. If we crisscross these properties of the goods, we get varieties of combinations of public problems. If we crisscross the characteristics of rivalrousness, excludability, nonexcludability, and nonrivalrousness we get a more concrete typology of public goods that allow us to identify the type of market failure involved. The combination of rivalrousness and excludability produces pure private goods such as food and clothes that are effi-

ciently produced by the market. The combination of excludability and rivalrousness with contestability results in private goods with negative externality. In this case, the market fails because it over produces goods with increased negative externality. Examples of the latter include pollution from cars and factories. The third category combines excludability and nonrivalrousness to produce what is known as toll goods. It also produces toll goods with congestion. The obvious example of this category is *Salik* in Dubai. In this case, the market encourages overconsumption of this good. The fifth category of common pool goods results from the combination of nonexcludability and rivalrousness. Common pool goods, involving the tragedy of the common, are overconsumed leading to the destruction of the pool. These problems include for example grazing areas, fishing, and hunting. Finally, nonexcludability and rivalrousness result in the problem of pure public goods which, if left to the market, will not be produced at all, although needed by society. It is here that we meet most environmental problems.

It is possible to diagnose the problem of environmental pollution as a private good with negative externalities (i.e. excludable and nonrivalrous) if we think of it as a problem arising from individual behaviors such as automobile drivers or factory owners. We can also diagnose it as a pure public good problem because treating the environment if left to the market will not be produced at all. For example, clean air is a public good the absence of which may have an outcome of the use of private property such as steel production and high consumption of oil that polluted the air. The problem may one of the fallouts of driving cars by individuals. This framing of the problem as a public problem emanating from the private individual decisions of production and consumption and production may lead to certain types of policies. Thus, in trying to make these polluters stop polluting the environment, we compel them to pay for the provision of the public good of clean air. Alternatively, we could diagnose the problem of pollution as a problem of pure public good that will not be produced by the market because it involves the problem of the free rider.

The framing of environmental as either private good with negative externalities or a pure public good points to the type of public policy solution sought for the problem. The first framing points to the use of market solutions that are designed to internalize the costs of the negative externality into the calculations of producers and consumers of their private decisions of consumption or production. In the European Union countries, policy analysts usually frame this problem as one of private goods with negative externalities on society. This fact explains the facilitating of internal markets for pollution. The second framing of the problem as a pure public good problem put the burden of solving environmental problems on government policy. In this case, the government uses its monopoly of coercion in the form of laws and regulations to prohibit certain behavior harmful to the environment. The possible solution available for government public policy to address the environmental problems will be discussed later. However, it is important to note here that as markets fail, there are also serious government failures which stem mostly from bureaucratic failures to implement public policies and government monopoly.

When the analyst frames the problem as being caused by market failures or government failures, the underlying assumption is that efficiency, which means allocating resources to achieve maximum benefits with least costs, is the only goal of the analysis. This fact also implies that only the economic tools of cost-benefit analysis and its different versions, as well as cost-effectiveness, are the only tools available for analysis. In reality, policymakers have seldom hold efficiency as their sole criterion. In a political setting, policymakers have other criteria such as equity, political feasibility, administrative feasibility, and many other unmonetizable or unquantifiable as required by the aforementioned economic tools. It is for this reason that the Multi-Goal Analysis is recommended to admit these other types of unmonetizable or unquantifiable goals in the analysis and comparison of different alternative policies. Moreover, economic policy analysis assumes that the market is a better allocator of resources than government. Therefore, it looks a priori to public policies that provide market solutions to public problems

wherever possible; that is creating a market around the problem and allow market forces to discipline the behavior of individuals and corporations in the preferred ways. This logic underpins the policy of creating internal markets for rights to pollute as practiced by many industrial countries. In this context, government policy is necessary only if there is a market failure that cannot address the problem. However, policymakers usually have other political and social goals besides efficiency, such as equity, political feasibility, legality, and other goals that we will consider later.

The first step in Weimer and Vining to frame the problem is to decide whether there is a market failure or not. This step requires that the analyst decides whether there is an operating market around the problem or not. The possibilities here range from the existence of perfect free competitive markets to complete absence of markets. The test for the existence of an operating market is the existence of a legal price that regulates the trade between buyers and sellers. For example, in the case of pollution in the United Arab Emirates, the question is, is there an operating internal market with a legal price regulating through the mechanisms of supply and demand, the rights to pollute and thereby discipline the behavior of polluters and force them to internalize the costs of negative externalities resulting from their decisions to consume or produce? The guiding rule here is that in the presence of a legal price for the service, the analyst may treat the situation as if it has an operational market and their advice may be to leave the market operating. Where prices are not legally permitted, as in the case of black markets for illicit drug transactions, the analyst concludes that the market is not operational. In the case of a black market operating, making this market legal may create an operational market.

In case of the existence of an inefficient operational market, the analyst may use the theory of market failure and government failures to see if the inefficiency of the market is a result of government failure; that is the government disrupts the operation of the market by an interventionist policy. The solution here is to remove the government interventionist policy. However, if available evidence suggests that the market is

working efficiently, the reasonable advice is to keep the status quo because the existing market allocates scarce resources in the most efficient way. However, it is important to note that government interventionist policy that distorts market operation may be intended to achieve other social or political goals such as equity that the market cannot uphold. It is interesting to note here that the reluctance of different US governments to sign the Kyoto protocol on the environment and the present government withdrawal from the Paris Accord and abolishing all regulatory policies of environmental malpractices means that the government upholds market efficiency as the sole goal of policymakers.

In cases where the theory and evidence suggest the existence of a market failure in an operational market, there is a *prima facie* case for government intervention by public policy to correct the anomaly. In this case, market failure may be a result of the existence of monopoly, negative or positive externalities arising from private individuals' decisions in production or consumption processes, or the existence of information asymmetry (imperfect information). In this case, the analysts may argue that the market failure is a result of government failure; the failure to correct the market failure which may be considered as a passive failure. This government failure may stem from the government inability to diagnose the problem correctly or the pressure of a strong stakeholder to preserve the status quo. For example, the government may fail because it does not diagnose problems of pollution as involving serious negative externalities or the polluting group's block government policies to apply sanctions such as taxes to force the polluting groups to internalize the costs of the negative externalities into their costs of production of production and consumption.

In some cases, the analyst may find a nonoperational market around a certain problem, such as congestion in the parking areas or main streets. In such cases, the analyst may consider establishing a market by imposing a price for the use of a facility or service and examines the possibility of efficient operation of this market within an appropriate framework. This means the theory of market failure is useful even in the

absence of an operational market. In this case, direct evidence to substantiate the analyst finding concerning the nonexistence of operational markets may not be available, and the analyst can utilize evidence available for the problem from other contexts in different localities, cities, or even other countries. If the analyst concludes that this market could operate efficiently, though it is not at present, then he may deduce that the inefficiency of this market result from existing interventionist public policy and therefore can advise the removal of this policy provided that the policy does not involve other important social or political goals. Hence, the absence of evidence of market failures in an operational market provides strong evidence for the existence of government failure and leads to the adoption of policies such as deregulation, privatization, or legalization.

Sometimes the creation of a market in the absence of one may lead to the conclusion that market failure will result from this action. This market failure happens in cases of public goods, information asymmetry, externalities, and monopoly. In these cases, the analyst should consider the probability of an appropriate government policy to correct the anomaly efficiently. If the government policy is not successful to address the problem because of poor implementation and management, then the problem may be framed as involving both market and government failure. In this case, the analyst invests some efforts to explain the reasons for government failure and dig up for more effective policy alternatives to solve the problem. The analysis of public policy problems, such as pollution problems is a prerequisite for the consideration of other goals besides efficiency in our Multi-Goal Analysis. A vast variety of environmental public problems can be diagnosed in this way. For example, traffic noise is an externality; pollution is a public good involving negative externality, preserving wildlife and fauna and flora becomes a public good involving negative externality, greening the arid land is a positive externality, environmental research yields public goods.

The framing of public government as arising from market failure or government failure leads directly to developing a model for the problem that links the problem (dependent variables) to

factors (independent variables that influence the problem). These factors will be the target for a public policy using market solutions or government solution. For example, consider the problem of pollution. The problem can be diagnosed as a public good or externality problem in which polluters decide to consume or produce something considering only the private costs they pay for their consumption or production without considering the social cost of their polluting actions. Hence, the most important factor in this problem is the difference between private costs and social cost (technically social costs include private costs plus private costs). Hence the model of pollution problems points to the difference between private costs and social costs of pollution as one of the causes of pollution. Social costs are the costs incurred by society in term of health problems, lack of clean air, depletion of social resources, and many others.

The solution for the problem involves public policies forcing polluters to consider social costs as part of the cost of production or consumption by taxing them. Taxing, in this case, introduces market discipline in the way producers, and consumers decide to consume or produce. Simply fining polluters may work to internalize the externality but perhaps it may involve high administrative costs. European countries and the UAE logically use this method by creating internal markets for pollution or other types of monetary fines that punish, for example, smokers in public places. It should be reiterated here again that policymakers are not always concerned only with efficiency goals (criterion) which the previous discussion the framing public problems in term of market and government failure may imply. They, in most cases, have other goals, the achievement of which involves tradeoffs between these other goals and the goal of efficiency. This fact calls for the facilitation of Multi-Goal Analysis to include the nonefficiency criteria with efficiency. Policy analysts assume that the latter is always achieved by the free competitive market.

Choosing a Solution Method

The problem of market solutions to environmental pollution, such as the use of internal markets,

is that they uphold only the criterion of efficiency. In this case, the only solution methods sought by policy analysis is cost-benefit analysis (CBA). Weimer and Vining (1999) suggest that the choice of solution methods depends on the number of criteria of concern to the policymaker. In cases where efficiency is the sole criterion of the policymakers, then CBA is the most suitable tools provided that all impacts of the policy alternative are susceptible monetization. If the policymaker is interested in efficiency with another quantifiable (but not in monetary terms) goal, such as the number of students at the schooling age, then the tool of cost-effectiveness is a preferred choice. However, it is seldom that policymakers are interested in only one or two goals. In this case, the Multi-Goal Analysis, especially when one or more goals are not susceptible to any quantification or can only be measured by ordinal values only then the Multi-Goal Analysis should be the preferred solution method because it admits multiple different criteria with different levels of measurements and valuations. Table 2 shows the possible shape of the goal policy matrix in a Multi-Goal Approach.

Table 2

Goal/policy matrix

Policy	Criteria			
	Net Benefit (CBA)	Political Feasibility	Equity	Technical Feasibility
A	Score	Score	Score	Score
B	Score	Score	Score	Score
C	Score	Score	Score	Score
D	Score	Score	Score	Score

Solutions Analysis for the Pollution Problem

Solution analysis involves the performance of four activities: selecting the relevant criteria to compare alternative policy alternatives, developing feasible alternative policies to address the problem, forecasting the impacts (scores) of different criteria on the selected policy alternatives and display the results of forecasted scores in a goal policy matrix that shows the scores of each alternative on each criteria, and

finally choosing the best policy alternative that scores high in different criteria or the majority of them.

The Selection of Criteria

The process of selecting criteria involves a movement from the generality and sometimes ambiguity of general goals down to more concrete objectives, criteria, and specific measures. Objectives, or even the initial general goal itself, if susceptible to measurement in any manner, may be used as criteria. Criteria may be specified in the form of constraints. For example, policymakers may put a limit to the budget allocations for the policy problem under consideration.

The number of criteria of concern to policymakers abounds. Here, we consider some of them that are relevant to the pollution problem. To begin with, we can talk about general criteria that are applicable and specific criteria that are related to the policy problem at hand as derived from the general criteria. General criteria include cost, net benefit, effectiveness, efficiency, equity, administrative ease, legality, and political acceptability or feasibility. Specific criteria must be derived from the general criteria to address the problem at hand. It is formed in a question form to be answered by the analysis to determine the score of each policy alternative in each criterion. For example, most policy analysts advise the inclusion of net benefit (cost-benefit ratio) to society. The net benefit is a general criterion and must always be considered in evaluating the policy. The specific criteria for the net benefit criterion may be formed in many different question forms such as "how the policy alternative will harm or benefit particular stakeholders?" This question must be researched for all policy alternatives to arrive at specific scores for each alternative. For the sake of answering the question embedded in certain criteria, we need to specify the measure we will use to gauge the criteria for each alternative. Measures are the actual measurements of the criteria for a specific policy alternative. The measure is the actual score of each proposed policy alternative in each specific criterion. For example, measures such as the following might be employed for the case of a polluted river.

- Effectiveness (general criterion): how much will each policy alternative decrease the rates of pollution below current levels? (Specific criterion) how many milligrams of pollutants per liter of water will this alternative clean up? (measure)
- Cost (general criterion): how many dollars will be required to implement this alternative? (Specific criterion) how many dollars are required to clean milligrams of pollutants per liter of water? (measure)
- Technical feasibility (general criterion), is this alternative technically feasible? (Specific criterion) are the necessary equipment available for this alternative and are people trained to use it? (measure)
- Political feasibility (general criterion). Is this alternative politically feasible? (Specific criterion) what percentage of policymakers, or population at the voting-age will favor this alternative in a statewide poll? (measure)

Development of Feasible Policy Alternatives

Public policy problems are a consequence of individual decisions to satisfy their desires and preferences which may lead to collective policy problems to society at large. Therefore, policy analysts design most public policy proposals to influence individual or group behavior in the direction of the desired end states. Hence, there are at least five major steps the analyst should perform in this regard. Bickers and Williams (2001, p. 243) summarize these steps as follows:

(1) the characteristics of the policy good at stake, (2) the relative merits of bottom-up versus top-down approach, (3) the strength and weakness of utilizing market incentives for addressing the problem, (4) the type and amount of government coercion that may be necessary, and (5) the likelihood of bureaucratic failures.

The first step has already been addressed in the "understanding the problem" section.

Now, the question is: where do analysts find solutions for environmental problems? One method involves a deep evaluation of solutions that are already being utilized locally, regionally, and internationally. The wide diversity of multiple,

overlapping, proximate localities, neighboring countries, and the world at large made accessible by the widespread of the internet provide a huge reservoir of the possible policy solutions. In these places and regions, there are always similar environmental problems from which policy analysts can customize possible solutions to their particular setting. It is pertinent to note here that there are no readymade answers to guide policy analysts to conduct policy analysis and find the best solution. Any public problem involves too many variables, plenty of assumptions, and policymakers and individuals' preferences. Therefore, there is no one-size-fits-all tool to select the best policy solution. Hence, it is important for analysts before starting their analysis of the pollution problem to build a mental image of how a certain policy solution might fit within the institutional context within which individuals and groups, as well as policymakers, seek to act on their preferences and understandings of the problem (Bickers and Williams, 2001).

In designing policies for pollution, it is important to define the public targeted by the policy or in other words the stakeholders who have a stake in the problem. In the case of pollution, we must define this public not as a single public because different stakeholders have different interests in the problem. Bickers and Williams (2001, p. 2) defines the public of a public problem as "the set of individuals who are likely to be affected by the consequences of a particular policy." In the case of pollution, the public is not only multiple but have different perspectives, and significant parts of it exist beyond the borders of the specific country. This fact is what makes environmental and pollution problems global ones. Its public is all humanity. A letter published in *Journal BioScience* addressed to all humanity by 1,600 scientists from 184 countries, urges the world to "fix environmental problems before it's too late." They warn that if humanity is not ready to make significant changes in the way we behave, the earth may suffer "substantial and irreversible" damage. The letter then enumerates the normal damages which include climate change, "dead zones" in the oceans, threats to freshwater and forests, the extinction of some animals and unsustainable population growth. (CNN, p. 2–

17). The main culprit behind some, if not all, of these problems, is environmental pollution.

The policy analyst has a wide spectrum of policies to choose from. These can be summarized under three main groups: government coercion, market solutions, and a mixture of market solutions and government coercion. The latter can be branched out into two extremes which range from noncoercive measures to highly coercive measures. Many options exist between these two extremes that differ only in term of the levels of government coercion. These include hortatory campaigns which involve appeals to comply with certain government directives concerning pollution, information provision policies that provide information regarding dangerous hazards posed by pollution, positive incentives that provide for example tax preferences, provision of the public goods that involve government efforts to oversee air quality over urban areas, and finally negative sanctions which include laws that criminalize and prohibit certain anti-environmental behavior (Bickers and Williams, 2001).

The strengths and weaknesses of these possible policies are easily observable. Whereas, hortatory policy is not expensive, but its efficacy is doubtful because the average individual is not aware of the dangers imposed by environmental hazards on them. The problem appears to average individuals as arcane and academic. And even if they are aware, they prefer to free ride on others. Information provision suffers from the same weaknesses of hortatory ones. Positive incentives may have some impact on individual behaviors if these incentives are directly provided. However, they involve more administrative costs to government. The provision of clean air as a public good by the government is difficult to manage and involves high administrative costs. This is also true to negative sanctions. Nevertheless, their efficacy is higher than the other alternative although it involves higher administrative expenses. It is for this reason that most economists and policymakers in Western countries prefer market solutions and thereby ignore other important criteria and goals.

Forecasting the Impacts of Policy Alternatives on Different Criteria

Forecasting is the technical process by which the policy analyst tries to forecast the probable impacts or scores of different policy alternatives in the selected set of criteria to fill the slots in the goal/policy matrix shown above. Nevertheless, this is not a simple task nor a straightforward one. Forecasting is about predicting the future outcomes which are surrounded all over by the factor of uncertainty imposed by the unknown outcome of future events (Hogwood and Gunn, 1990; Morgan and Small, 2004). However, analysts perforce have to conduct forecasting operations to provide policymakers with information about possible outcomes highlighting the most probable outcomes; that it is better to take policy decisions in unstructured problems on probabilistic bases than naught. It is not our purpose in this short space of the paper to detail the forecasting techniques but to provide a summary of them.

In the policy analysis literature, forecasting techniques are classified into two major groups: extrapolation and judgmental techniques. The first includes the use of sophisticated statistical techniques, such as different types of regression analysis, to predict the future events within certain probabilistic margins, from past and present data. The underlining assumption is that the trend of the future events will continue along the same track of past and present events. If no significant political or social change that influences drastically trajectory of future events, then this method may produce some reliable probabilistic information. The dependability of results of regression analysis depends largely on the time span and the spatial scene covered by the study. In short-term periods (e.g. 1 year), and limited geographical areas, the results may be reasonably acceptable. In longer time spans (5 years and above) and wide geographical areas, uncertainty looms large.

The second groups of judgmental techniques include the Delphi technique, brainstorming, scenario writing, and many others. These techniques are less precise than the extrapolation

technique, although they may be of some utility if combined with the latter. The Delphi tool involves the selection of anonymous experts (not known to each other) to remove the influence of extroverts or high status of some members over other participants. The Delphi manager distributes a questionnaire to participant asking about a certain outcome and its probability of occurrence. Then the manager summarizes the results of the questionnaire and redistributes it again to allow experts to modify their original responses accordingly. After several such rounds, the manager may aggregate results and compute them to see their probability of occurrence. Brainstorming works similarly, only the identity of participants is not anonymous. The analyst gives the group the freedom to express their views regarding the possibility of certain outcome without any criticisms or filtering. Then the views expressed by the group are subjected to filtering, modifications, or discarding in an open discussion among the participants (See Bingham and Ethridge, 1982; Hogwood and Gunn, 1990).

Scenario writing is a hypothetical method which attempts to gauge the probability of occurrence or non-occurrence of certain policy outcomes. Bingham and Ethridge (1982, p. 73) argue that:

Scenario writing is simply a method for sorting out possibilities where a given state of affair or policy decisions may have many conceivable consequences. Although the occurrence of these consequences or outcomes is uncertain, the analyst may have some knowledge of how factors under control by policymakers or administrative agencies are related to the desired outcome of the alternative policy.

Scenario writing uses this knowledge to build computer simulations of best case and worst cases scenario. However, this knowledge may not be well developed to enable the analyst to build a useful computer simulation. It is advisable that the policy analyst build up a worst-case scenario and a best-case scenario for each alternative to give the policy makers different possibilities associated with each alternative to aid the process of policy decision-making.

Choosing the Best Policy Alternative Using the Goal/Policy Matrix

After filling all slots in the goal/policy matrix, sometimes the choice of the best policy alternatives is easy if there is only one criterion such as efficiency or there is a policy alternative that dominates on all selected criteria in the goal/policy matrix which is a rare occurrence in practice. Analysts develop many methods to choose among policy alternatives. One simple method is called paired comparisons methods. For example, "if there are five different alternatives then the analyst can compare alternative 1 with alternative 2 and determine which is superior. The better of the two is then compared with method 3, and again one of them is determined to be superior. The winner of each contest is then compared with another of the remaining alternatives until all have been evaluated and the winner of the last contest is the overall winner." This method presents a simple, step-by-step comparison that is relatively easy to follow, if somewhat tedious. The problem with this method is that the outcome may be influenced by the order in which the alternatives were considered" (PPA 670 Policy Analysis, 2017). Dunn (2004) proposed a similar method of choosing the best alternative which ranks high in all criteria. Of course, in cases where efficiency is the sole criteria, which apply CBA analysis to the problem, the choice is straightforward: choose the alternative

that achieves the highest positive net benefit, that is the cost/benefit ratio.

Conclusion

There is nothing much to say in the conclusion of this paper that has not been addressed in the main text. It may be beneficial here to summarize the main issues discussed in the paper. The paper starts by introducing the controversy surrounding the environmental pollution and global warming. It seems that the very existence of these problems is denied by some politicians to safeguard their economies since all solutions to pollution problems impact the operations of the industrial economies. To introduce the Multi-Goal Analysis, the paper provides definitions of public policy, distinguishing between political approaches and rational approaches to policy analysis as well as the orientations of both approaches and their practical, or lack of, regarding helping policymakers. The paper also discusses the rational approach in social sciences and policy analysis as a prologue to the discussion of the Multi-Goal Analysis as one version of that approach. The paper also introduces a classification of public policy problems to locate environmental problems within that classification and briefly analyzes pollution problems in the UAE. Finally, the paper provides a detailed account of the different phases of the Multi-Goal Analysis and what is involved in these phases.

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