

FUZZY LOGIC: A RULE-BASED APPROACH, IN SEARCH OF A JUSTIFIED DECISION-MAKING PROCESS IN URBAN PLANNING

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... In memory of my uncle Maestro Manouchehr Ehterami

... To my mom and dad

Abstract

The decision-making theory and process within planning is involved with people's daily lives and involves many interest groups. In most cases, it determines people's destinies and misfortunes. Any, even small, changes or discretions in a plan may cause big changes and problems in individuals' lives and private sectors' successes. The logic of using a single method, idea, truth, and so on for decision making therefore comes under serious question. Now, some other disciplines, this question is asked in a multiobjective environment and activity like planning and, clearly, the question has greater meanings, implications, and applications for the whole discipline.

This thesis sets out to answer two major questions. With regard to the nature of planning, is the preceding logic of decision making in (urban) planning justified to be applied to the discipline and its subdisciplines? Is it possible and basically necessary to formulate a new logic which is capable of orchestrating a justified decision making theory, and improving performance of decision making process when applied to planning?

To answer the questions, the research begins with reviewing the history and nature of planning and decision making theory. Based on historical analysis, it reveals that three different conceptualizations of planning and decision making have been coined and conceptually advanced since 1945: design-based view, system-based view, and person-based view.

Analytical scrutiny and epistemological studies, along with the study of the logic of decision making show that the theory of decision making suffers from the development of binary, reductionist and iconic models of reality and decide based on these types of models, and illuminate the nature of planning. The study explains that planning is a multidimension, multiobjective, multijudgment, and multiparties activity with which it is necessary to deal accordingly. Otherwise, the process would face serious problems in gaining justification. In other words, the process should follow "justification necessities of the decision-making process," which needs to be formed and developed by a "justified" or "justifiable" method of decision making. With consideration of the decision-making process in such an atmosphere, the current research discusses binary logic (as the logic of the precedent decision-making methods) and its limitations and studies the alternatives. The renowned multivalued logic (infinite-valued logic), namely, fuzzy logic, along with its school of thought (i.e., fuzzy thinking) and its application tool (i.e., the fuzzy set), are explained, and through this window, the decision making aspects are explained. Then a comparison between these two logics is made, their benefits and limitations are highlighted, and the research argues that those theories that are based on or benefit from merely a bivalued evaluation method entail arbitrariness and selectiveness that result in unjustified means of decision making.

Then, the research argues that the three aforementioned conceptualizations of planning are vital to decision-making theory, but each of these aspects acting individually will not be able to resolve the decision-making problems in a justified way, and they should be utilized simultaneously. It deduces that some other conceptualizations should yet be added to these preceding views of planning.

The research concludes that understanding the interactions between fuzzy systems (and fuzziness in systems) and urban planning lays a solid foundation for better applications of the decision-making theory and processes, and that their integration offers a great number of interesting possibilities in their interplay and future developments.

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Preface

Some twenty years ago, it was believed that the world would be exceptionally different, were the Cold War and communism over. Forty years earlier, there was even greater optimism about advancements in sciences and technology, especially about computers and robotics and how those could ease human life at the turn of the millennium or otherwise dominate or overrule the world. Twenty years back, the faith in human intelligence, gentility, enlightenment, and civilization was so profound that the extermination of crime and prevalence of peace as a result were deemed prophecies certain to be fulfilled, and the Dark Ages world would have never been expected to be experienced even partially again. In brief, we deeply longed to reach the era of “perfect human sublimity.” But none of those predictions have come true. And despite many hasty and optimistic yet extreme predictions, we still need to deal with primitive problems.

We live in a strange world extremely full of increasing contradictions that confuse us more than ever before. We queue up at the cinemas to watch the brand-new version of an old movie, such as *Indiana Jones V*, *Transformers IV*, or *Harry Potter VI* -called the top-money-maker movies ‘benefiting from proven stories and franchises!’-, which defines a new meaning for movies, cinemas, and TV series as well as the people’s expectations and behaviors. We pay to see a new adaptation of a TV series on the silver screen not only because the relatively old established definitions are being redefined almost every second but also for the fact that we have such short memories and so much less time at our disposal to remember and to rethink that what is now being introduced to us as innovation was part of a weekly habit of not even our fathers’ but our own but a few years earlier. We purchase the new model of the same car, which is only bigger than the previous version, rather than having anything genuinely novel, and we measure our iphones’ and computers’ memories by the number of music tracks that can be saved on them, instead of their real capacity. We pay more for recycled notebooks than ones just produced to show others how “green” we think and how much we care about nature, and we use so-called hybrid cars to show off our environmentally friendly gesture, while wasting more energy repeatedly altering energy from one type to the other (chemical to electrical and vice versa) when we drive through cities or rev up on freeways. We live in a world where neo-Marxists (whose position is based purely on socialism) and environmental activists (whose position is based purely on green initiatives) dream of the latest models of Mercedes and commute with their personal cars or fly luxury or first class long hauls to attend meetings to discuss socialism and green policies. We live in a world where antiglobalization protestors prefer to use Starbucks to warm themselves up while demonstrating and where environmental scholars, a few days before starting the greatest event on sustainability (the United Nations Climate Change Conference in Copenhagen), secretly circulate emails that fundamentally question the trueness of global warming. We live in a world where even planners would rather live in areas of urban sprawl to avoid the pollution, heavy traffic, and noise of metropolitan areas in order to think more effectively about planning challenges and to be able to find better solutions for the urban disaster they themselves have critically tagged “urban sprawl.” We live where everything seems to have become confusing and complicated enough to be contemplated and rethought. All these actions and many others point out that there is a highly complex and uncertain world out there to be planned and complicated people for whom to plan and to carry out the planning.

Undeniably, this brief preface cannot represent what I think in detail and what has really taken place in the five-year research represented as this thesis in excess of 110,000 words and to me (its author) as the researcher who, during his PhD program, experienced planning issues all around the world—in Europe, North America, and the Middle East. Indeed, this short introduction will never be able to illustrate what aspects of the thesis have changed and what types of fluctuations I have faced, nor does it aim to do so. Thus, by writing this preface, I will draw on only a small part of my long moral and geographical journey in facing the innate reality of such a vast multidisciplinary and demanding task. Nevertheless, I believe that, years after this, the existence of this preface will assist me to understand in new ways the topic with which I was

engaged and also help other researchers to trace the references and attitudes that inspired me to select and build upon particular approaches to the problems under focus in this study.

Planning, in its professional sense, is a wicked semi scientific discipline that is not even as lucky as computer science, in which the wrong premises sometimes can accidentally result in correct answers. In planning, even right premises taken from tested theories will, most of the time, bring unexpected, unwanted, and above all, uninvited outcomes. In other words, there are many wrong factors that can be connected to any plan. The process of narrowing down the framework through which questions are explored usually does not bring a more accurate estimate of the condition and worsens the process of finding solutions. The cumulative effect of literature about human factors and based on freedom, society-based discussions, legal issues, free market laws, democratic principles and values, and scientific achievements as well as globalization with temporal validity is to increase the amount and the extent of unpredicted wrong answers.

Some twenty years ago, the people who celebrated the demise of fundamental Eastern Bloc thoughts were mostly limited to those living in socialistic countries who felt at the time that they were becoming free from the manic control of communist fanatical fantasia, but many others in Western countries also celebrated that historic moment. Though the concept of freedom and its manifestations that followed were divergent, this concept as a whole was one of the most common issues among those who were happy overall with that downfall. In addition, many politicians, economists, and social scientists in the Western Bloc who were the proponents of the Western doctrine of democracy and freedom were among those who were very proud of themselves, their schools of thought, and their theories. Under these circumstances, and based on free-market principles, capitalism was supposed to be a posteriori to any democratic system and was accelerated in its radical way. Some more conservative political systems, such as that of Britain, which even up until then were cautious about the ideas and were wavering in their attitudes, were forced to examine the free market in a more relaxed yet confident way. However, during a large recession, serious questions arose about whether a free market economy is the only reliable way of controlling the market, the structure of society, and planning or whether it needs some control. The history of planning experienced yet another failure caused by a full commitment to black and white values in planning. I would argue that what happened to uncontrolled capitalism and globalization in the 2007 to 2010 global economic crisis was as unexpected as what happened to socialism and communism between 1989 and 1990. It is explained how, during the period of time, the fall of the extreme free market was announced and new tidying-ups were hastily arranged for reframing the economic accounts and planning discretions and regulations. These challenges raised questions not only about current economy and planning practices but about the very enterprise of planning.

President Barak Obama's characterization of "failing to reform health care" as "truly scary" (used as the title of a CNN article of August 12, 2009), the U.S. government's taking control of 60 percent of a corporation like General Motors (GM) on June 1st 2009, after 100 years of private ownership; the bailing out of monetary and financial companies; and many other similar moves and plans took place when the U.S. government seemed still to be profoundly committed to the radical principles of the free-market economy. This will be a big "change" that held an implicit confession to inherent fuzziness circulating in the real world of planning and decision-making concepts, and its contradictory aspects come into existence with no clear-cut boundaries in between.

With a precise review of planning literature from recent years, we can estimate how wrong many planning professionals and, particularly, thinkers have been in supposing that follow free market principles to determine the distribution of resources, and to rule the market, is the only true path for planning and decision making, at least if we look at it through American pragmatism, empiricism. These faulty predispositions (used as conclusions) in planning that were pursued in recent years remind us of the slippery conclusions of planning theory debates in the 1950s and 1960s, in which planning was supposed to have been defined utterly and completely.

These two falls in fewer than 20 years initially brought plenty of information to the surface, but above all (and in a deeper sense), they taught us severely more than any other lessons that pushing people to, or pursuing, any ultimate ideology (and theory of control) cannot work for good and can potentially result in as unsafe a solution in planning as any type of political dictatorship. Therefore, there is no more profound a lesson to be learned than that there is no other way than compromising between fundamental ideas rather than dedicating to absolutism. And the only winner of these two human misadventures is the human circle of experience and knowledge. Everything seems to be more complex than ever, although still many would tend to deal with the current complexity in the simplest possible manner.

For this research, many planning professionals and academics have been interviewed about their empirical and theoretical problems, and many different responses have been experienced, yet the common denominator of all seems to be there is no single denominator. On one hand, those who believe in technical accounts of planning are still concerned with public participation and public rights. On the other hand, it is evident that those who believe in postmodern accounts with emphasis on the people's role would not ignore the ethical and technical aspect of planning. In other words, even those who subscribe to the avoidance of comprehensiveness in planning in order for it to be justified would not like to abandon some points and deal only with some others. An academic joked, "When Le Corbusier was to plan his cities, he had a fun job because he was not as involved with both values and technical issues as we are; and then he knew what right was." When planning professionals were asked how they spend the majority of their time, they replied, "Dealing with people problems, legal and technical issues." We all know that this difficult profession and activity is made even more complicated by the myriad of problems associated with the human dimensions, which probably extend back to the planning of primitive settlements where no well-developed technical possibilities or social values existed. The dilemma is that no one has come up with an effective way, if there is any, to solve these complex problems—at least as of now.

My engagement with fuzzy logic definitely dates back to years before 2004, during which I was planning to examine not only the logic itself but the whole thinking for applying it to planning. I had closely followed successful applications of fuzzy logic in many other specialties and disciplines even where there was no sign of pure linguistic dilemma similar to what prevails in the planning discipline. Then I decided to introduce the fuzzy standpoint to planning and develop the subject within it. Although, in 2004, I contacted Professor Bart Kasko from the University of Southern California (USC), as one of the leading figures in fuzzy thinking, logic, and sets, in order to enquire into his opinion about the subject, I could not have guessed the attention I would turn to the subject. At the time, there was no significant record of research containing the idea of fuzzy logic in planning. Even the most common uses of the word *fuzzy* were limited to the meanings "vague," "cloudy," and "unclear." Then I published the first article on the issue, which I presented at the Urbanism and Urbanization Conference in Barcelona, Spain, in 2005. Two years later, the second publication on the subject of fuzzy in planning came to the market as a book under the title of *Fuzzy Planning*, by a team of academics at TU-Delft. Now, I cannot hide my happiness about the development of the subject by many other scholars, especially because a flourishing of papers on fuzzy in planning that illustrate the growing attention to it was seen a few years after my initiation of the subject.

And last but not least, I would not hide my happiness for the fact that the current research lasted until the world came to experience the recent financial problems and recession that have been extremely significant in challenging clear-cut planning ideas. As a researcher who is neither for nor against any system, however, I believe in general that the problems have supported the trueness of the research's hypothesis, a hypothesis that challenges the extreme binary tendencies towards opposite sides of the work. And evidentially, in human sciences and activities interlinked with them, this black and white observation of phenomena will need to fade to gray; otherwise, it will be doomed to fail. By picking up between the two binary and fuzzy approaches, whereby a paradoxical situation will take shape, I express how and why fuzziness is the true state.

I hope the current research can light up the ways in which our approach should be formed, an approach as complex and sophisticated as the reality itself.

Acknowledgment

It is difficult even to imagine listing all the people who, over the past several years, in more than 50 cities around the world, have contributed to the thinking that I present in this thesis; this includes some who have been very influential and helpful.

I am pretty sure this program has been and will forever be one of the most unforgettable experiences and events in my entire life. Moving to three different countries did, on its own, make this experience unique, and I admit the relocations were hard to tolerate at some points. But there is no doubt that being able to reach this stage and present the work at this level would have been impossible if not especially for the support of my supervisors, Professor Klaus Zillich at the Technical University of Berlin (TU-Berlin) and Professor Ali Modarres from California State University, Los Angeles (CSULA). I was introduced to the current attitude and course of thought because they, with their massive experience in architecture and urban studies and, more importantly, in life, tried hard to make a real PhD program from the current program. Their knowledge cast an astonishing light on this valuable and philosophical journey by making me rethink the entire bases of my argument over and over.

This PhD program to me was more like a journey within philosophy, ontology, and epistemology during which I became familiar with many places, grew to know myself better, and met with a number of great and supportive scholars, including but not limited to Professors Peter Herrle, Fritz Neumeyer, Enrico Gualini, Harald Bodenschatz, Karim Mardomi, Sohrab Mashhoodi, Neil Ravenscroft, Roger Plank, Ali Madanipour, Garuth Chalfont, Mr. Andrew Irving, and Ms. Francis Chaplin. Here I would like to thank them all.

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1

Introduction

- 1.1. Research Background
- 1.2. Research Problem
- 1.3. Research Questions
- 1.4. Research Focus and Scope
- 1.5. Aims and Objectives
- 1.6. Summary of Contents

2

Planning, Planning Sphere
and Planning Theory

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Concentration, Theoretical
Framework, and Methodology

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Analytical Study of Research
Context: Decision-Making
Aspect in Urban Planning

5

Classical and Infinite-Value
Logic: Implications for
Decision Making

6

Analysis

7

Conclusion

1 Introduction

1.1 Research Background

The tradition of classical logic, which generated predicative sets and thinking, has been the most accredited logic for a long time. This logic has affected almost the entire human attitude and has entangled in human activities like seeking the “ultimate truth.” To be able to traverse the uncertainty of nature, mankind has had to hold on to this logic, a logic that suffers from drastic deficiencies in tackling the problems in the matter of prediction (Faludi, 1987, p. 21). Establishing new logics and studying their capabilities has revealed new viewpoints to help cope with the more complex and contemporary problems (Faludi, 1987, p. 104) and with even old paradoxes.

Planning, as an independent profession, has a documented history of 100 years in its modern sense. Peter Hall (2002b) suggests that it is a response to problems that emerged as a consequence of the industrial revolution: “Modern urban and regional planning has arisen in response to specific social and economic problems, which in turn were triggered off by the industrial revolution at the end of the eighteenth century”(Hall, 2002b, p.11).

Urban and regional planning, which he modifies with the adjective “modern,” is an attempt—in the modern era—to solve the problems of 18th-century bureaucratic systems (which on their own are by no means negative assets) and also to handle conflicts caused by changes of ownership patterns that happened prior to, during, and after the industrial revolution. It is evident that this new remedy was instituted to answer the ever-increasing complexity of human societies and the complications of cities and the built environment. James Conrad in *The Secret Agent* (1906) represents the related frustration via one of his character’s eyes:

the enormous town slumbering monstrosly on a carpet of mud under a veil of raw mist. It was seen crossing the streets without life and sound, or diminishing in the interminable straight perspectives of shadowy houses bordering empty roadways lined by strings of gas-lamps. He walked through Squares, Places, Ovals, Commons, through monotonous streets with unknown names where the dust of humanity settles inert and hopeless out of the stream of life. (p. 406)

After the era in which the physical attributes of planning had been the major concern for the profession, planning was reoriented, from building the physical environment to building up the intellectual aspects of planning and to addressing the rights of interest groups and individuals for pursuing their utility. Recently, in the late 20th-century, the process of the magnification of democracy, public policy, and public participation permeated planning debates. The democratic plan and decision making supposedly give rights to the spatial stakeholders to participate in the processes. Consequently, the traditional task of the planner, as well as planning, planning theory, contemporary responsibilities, and the participatory accounts, has shaped a new atmosphere in which the justification of decision-making processes faces new challenges (for further discussion, see Faludi, 1987).

1.2 Research Problem

The modern school of thought was to leave the ramification of disciplines to the profession to develop only through the creation of new branches of the profession—new occupations within the larger professions (as opposed to through deeper development of existing aspects of the profession) The evolution and expansion of such a profession over the last two centuries has drawn a long, ramified list of definitions, duties, and responsibilities, making such a tradition vast. Is the discipline innately as simplistic as it is usually described or as it should be? How can the

various aspects of planning be dealt with in such a fragmented and extensive atmosphere? Are reductionist approaches in such an environment justifiable?

The current turbulence in planning, planning theory, and theories in planning is completely evident. There is no consensus on any specific thing in planning, whether a task, responsibility, definition, or description. Most “theories in planning” act prescriptively to deal with the existing problems single-handedly. Those theories (and planning theory itself) endeavor to influence their relevant fields by identifying the roots of problems and concerns for which they offer specific remedies and prescribe timeframes for correcting. Some, by slight contrast, try to assign planning only to a certain discipline and ignore its interconnections with, and/or conformity to, any other disciplines. Theories mostly accuse the others of being outdated and shortsighted, to take into account some parts of the human societies’ and built environment’s requirements and cast out the others. At the same time, they themselves act in a selective manner. Campbell and Feinstein (2003) offer this overview of the evolution of planning theory:

Over a generation, the most significant advances in planning theory are a changing understanding of power (Brindley et al., ; Flyvbjerg, 2003), of communicative action and the planner’s role in mediating interactions among stakeholders (Healey, ; Baum, ; Fischer, 2003), of modernization/modernism (Beauregard, ; Scott, 2003), and of the complex links between diversity, equity, and community (Young, ; Thomas, ; Sandercock, 2003). (Campbell and Feinstein, 2003, p.10)

The old bivalent discussion of black and white, right and wrong, correct and incorrect has been widely impinging on planning theory ever since late nineteenth century. The bivalent values within the cities, including all types of intellectual and physical “musts” and “mustn’ts,” have been brought to an upper level where the debates on the nature of planning are conducted. As a result, what aspects of human society and planning are the most important ones and which tendency is right and which one is wrong (or useless) are concerns. This type of debate is even permeating planning and decision theories, where the questioning is so developed merely at a pure level of theory that even planning about what can be done (especially wherever it cannot be seen as a whole) is coming into question. The crisp boundaries are flourishing within the extensive planning, causing dichotomies, in the modernist or reductionist sense. The reductionist approach to a notion like the “political nature of planning” as well as the dualist contradistinctions such as postmodern versus modern planning, incremental versus comprehensive, and so forth have been raised, even as it is assumed we live in the postmodern era. How are decisions being made and taken in such an atmosphere? What are the justifications?

1.3 Research Questions

The theories concerning decision making are not rule-based in their current sense. They change as the interpretation of planning and the requirements for a certain problem change, whether a change occurs with the planner, as a person who has unique individual and professional dimensions; with the institution (e.g., the planning agency); or with the chronological or geographical specification of the application. Therefore, turbulence within decision-making theories is expected and accepted. Planning theory questions the processes of planning more than it does any other matters with which it is concerned.

With all kinds of uncertainty and complexity involved at different levels—in the flow of planning, within decision theories and processes, and with the main role players or contributors in any decision-making situation (which are not usually very well-systemized)—many questions about the core attributes, mechanisms, and methods within the decision-making domain remain to be answered. Quite evidently, a method is considered legitimized in decision making if it is able to deliver, offer, or envisage democratic values fairly evenly while, at the same time, being capable of effectively handling private sectors’ difficulties and the technical aspects of planning in justifiable ways. “What kind of qualities and specifications should the decision theory have to be justified?” and “How is it achievable?” are two of more fundamental questions for planning theory.

Is the decision making, in the way that it is seen now as a part of planning theory, coherent enough? And is it justified currently? What kind of decision-making action can be justified? Who should be the decision-making process actors, agents, and parties in planning the built environment? How large are their portions or shares in the decision-making processes? Does planning in its current sense concern various aspects of the profession that should play a role in decision-making processes? To answer the above questions belonging to the decision-making theory realm, we need to investigate the questions below first.

Is decision making in planning a multiobjective, multivalued, or multicriteria activity? If the answer is yes, from what kind of logic should it benefit to deal with this diversity? Does a many-value approach to decision making facilitate the justification of decision-making processes in planning, and how? Does it exist? If yes, which theories are benefiting from it, and if not, why not? What possible tool(s) is necessary to achieve the multicriteria decision-making process in a coherent sense? Can the multiobjective decision-making process benefit from fuzzy logic to improve this process? And last but not least, can *fuzzy thinking* with its applications be introduced to planning as an alternative way of thinking for targeting the logic of planning?

The answers to some of these questions are fairly evident. However, there are a few thinkers who persist in distancing from epistemological accounts by an old-fashioned pragmatist response to these questions (such as “There is no need to deal with these questions from this certain point of view”). They typically tend to adhere to traditional bivalent logic as well as the issue of practicality. Trying to overcome the challenges and logical misconceptions briefly addressed here and those that will be addressed in more detail later, the research scrutinizes the subject and attempts analytically to present one of the alternative options through questioning the logic of decision making in planning.

In an effort to overcome the challenges and logical misconceptions briefly addressed here and those that will be addressed in greater detail later, the following analysis presents one of the alternative options by questioning the logic of decision making in planning.

1.4 Research Focus and Scope

The research starts with the study of planning both as a scholarly activity and as a profession in its 20th-century setting. Throughout the existing literature on planning theory, it will be indicated that planning is a multicriteria activity. Hence, as an intrinsic feature of a multiobjective/fuzzy activity, it should engage with an infinite-multivalued method of study. There is no exception to this rule for the process of decision making in planning. Furthermore, the study will introduce the epistemology of fuzzy logic (as a multivalued logic), fuzzy issues, and the human mind's fuzzy-based methods of looking into definitions and problems. Also it will highlight fuzzy logic's contradictions with classical logic wherever appropriate. To do so, the study will examine the bivalent tradition of classical logic, through dualism and reductionism, and its shortcomings in dealing with complex problems. In parallel and to set the main scene for the current study, different notions of planning will be investigated; these will be notions with various origins categorized into different groups with distinct levels of generalizability and applicability, for example, tendency, theory, method, and so on. The theories that have a stake in the decision-making process have been selected for this purpose. For obvious reasons, those theories that have no direct effect on the decision-making process or those in which decision making did not play a substantial role are exempt. Although the main aim was not to be comprehensive, the main theories were classified in order to narrow down the subject area. The selected theories and their components and principles—their maxims, premises, values, and so forth—will be analyzed. The theories and their implications for decision making are studied in general categories of (1) design-based, (2) system-based, and (3) person-centered notions. At the next stage, the methods to tackle the issue of the complexity and uncertainty of decision making will be pursued in order to take into account the problems of the methods used within many-value operations. The final analysis will be conducted to prove that dualism of theories in decision making and the

arbitrariness of established reductionism dominating the decision-making operation cannot be justified for legitimizing this type of process as a reliable decision-making theory. Considering its application in other fields, fuzzy logic will be presented as an alternative way of thinking through which a system can be provided for decision making in planning. This can then be adjusted to include influential actors or parties and agents in decision-making processes. Then a model of multilayer decision making will be introduced for application in its further progressive form. Finally, further research will be suggested to establish the investigated hypothesis that fuzzy logic can be utilized to redefine the planning sphere, where fuzzy logic can be deemed as an alternative path to decision-making theory in urban planning.

1.5 Aims and Objectives

The human mind can comprehend fuzzy situations, evaluate fuzzy problems, analyze their factors and components, and then find an appropriate solution in order to deal with them. This method was nevertheless forgotten for a long time, and the complexity of this method did not let thinkers apply it in nonhuman-based cases. This takes place using human reasoning for making decisions in fuzzy situations in any fuzzy cases. However, this hope was delayed for years. Even after being formulated, fuzzy logic took another 30 years to be accepted by scholars. Progress has been made to some extent due to technological progress in recent years and to the establishment of mathematical concepts by Lotfi Zadeh and others since the 1950s. The first applications were introduced in late 1980s. The idea that truth can carry membership values was only partially accepted and reluctantly acknowledged after a long period of opposition and only with practical applications. After 20 years of the application of fuzzy logic in technology, the time has come for its application in planning, one of the widest and most complicated human activities with many different values (with different epistemological justifications as well as technical, political, economic aspects). Planning is so turbulent that there is no single (yet dynamic and flexible) answer to it.

The current research aims to develop a framework to investigate the fuzziness of decision making in planning and to establish an alternative solution to deal with the complexity inherent in planning in a more justifiable manner.

To improve upon the existing knowledge and to achieve the main aim, the following objectives are to be pursued:

- to examine classical logic as the main underlying thinking framework in planning and the loopholes attributed to it that make this logic subject to criticism;
- to analyze and map out the problems that decision theory is facing as a result of this method of thinking;
- to explore how fuzzy the aspects of decision making in planning are and how unjustifiable the decision theory being committed to non-fuzzy accounts and unstructured defuzzification methods can be;
- to investigate what is already in use as an alternative to a bivalued system, thinking, or logic in other fields of science and technology when dealing with multivalued situations; and
- to outline an alternative logic and way of thinking in decision making to handle complexity in order to integrate the known factors and/or roleplayers in a structured way.

1.6 Summary of Contents

Chapter 1 of this document provides a brief introduction to the research topic, multivalued decision making, the background of the research, its scope, its rationale, and the aim and objectives of the research as well as to the structure of the thesis.

Chapter 2 lays out the context of this research. It includes planning, planning theory (and theories of planning), and the decision-making processes and theories as conceived, comprehended, and conveyed mainly in the 20th century and, more specifically, in the post-WWII era. They will, however, be traced back from time to time to periods before the 20th century, as required.

Once the scene is set, chapter 3 will continue with discussion of the theoretical framework and methodology and by clarifying the general path of the research; the possible criticism that could arise; and the premises, fallibility, and justification for the research.

Chapter 4 will focus, in particular, on decisions and decision making in general. It will consider types of decisions, theories of decision-making, and the influential subjects in this process and will then more closely examine these factors in the context of urban planning. In the second part, central issues, namely, complexity and uncertainty will be examined, and their implications in decision making for planning will be explored. This chapter also deals with possible alternative routes to tackle the problem of decision making and will investigate the advantages and disadvantages of those methods. The *systemic approach* and *operational research* are among those that will be scrutinized to figure out the possible limitations of these binary alternative routes. This part aims to highlight the three general types of decision making and their analyses.

In chapter 5, many-value logic and, specifically, fuzzy logic will be studied, and the question of planning as a multivalued and fuzzy activity will be examined. The epistemological issues of bivalent and many-valued logics, similarities, and differences will also be tested out. Fuzzy thinking will be studied as an alternative logic and way of thinking to decision-making theory with its application in other fields. The chapter will also compare the differences between fuzzy problems in those fields and in planning. The type and number of values and variables in planning and their relationship are the focus of another part of this chapter. Questions the chapter will put forward include whether the decision making in planning, in its current form, is a coherent process and whether decision making in itself should be considered as a multivalued process. The chapter will consider complications of different stages of planning with a focus on plans and decision making and their boundaries. In addition, the nature of *wicked problems* as fuzzy problems will be examined, as will their roots and implications. The *prescriptive planning theory* and *dealing-with-planning theory*, in line with the problems, will be discussed.

Chapter 6 will provide a complete analysis of the entire work, based on the current trends of planning, by summarizing the styles of decision making (namely, design-based, system-based, and person-centered views). By categorization of the problem from each point of view, the research will analyze the entire path of decision making and problems engendered by employing bivalent logic.

Chapter 7 will conclude the research by summarizing its findings, contribution, implications, and outcomes and will also project future research on this topic based on the findings and outcomes of this research. This chapter will also render the whole idea of the alternative roadmap based on fuzzy logic for planning as a whole that is not limited to the decision-making process but applicable to the entire planning sphere.

1 Introduction

2

Planning, Planning Sphere and Planning Theory

- 2.1. Introduction
- 2.2. Problem Definition
- 2.3. Definitions, Expansions, and Relations
- 2.4. Planning Definition: Distinctions and Values
- 2.5. Major Planning Approaches and Milestones;
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3 Concentration, Theoretical
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4 Analytical Study of Research
Context: Decision-Making
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5 Classical and Infinite-Value
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6 Analysis

7 Conclusion

2 Planning, Planning Sphere and Planning Theory

2.1 Introduction

This chapter addresses the feat of planning as it has been envisioned at an erudite level during the last 100 years. The current and prior definitions of planning will be investigated in brief. This will also include definitions of planning theory that have been widely yet indirectly accepted by various groups of thinkers. In this part, the discussion of planning theory is articulated in order to provide the background for pivot points of research and the decision-making process. This chapter will also examine different planning theories (theory *of* planning and planning *in* theory) and their mutual relations with decision making. In this regard, the chapter aims to answer certain questions:

- Is there a widely accepted definition of planning?
- Is there any general planning theory?

Additional questions to be approached at various levels include these: what the alternative definitions of planning and planning theory are, what is seen as a theory, what sorts of patterns of planning theory could be considered, why planning theory needs to be pursued and how it can contribute to the concept of decision making as a whole, and basically, where the position of decision making is in different planning structures developed in different schools of thought. The discussions will outline the possible concerns and bases used for framing decision-making theories.

This part will provide the firm ground for the main theme of the research to be investigated: the issue of logic in planning and decision-making theories as applied to planning. Through studying the planning theories, this work aims either to tackle the problems or to define the possible justified decision theory from different points of view.”

By giving a different standpoint and categorizing the theories of planning in a new arrangement, this chapter will pursue an explanatory approach rather than a descriptive or narrative one. In this sense, no historical account is of any benefit to the current research. Thus, the impartial position of the researcher will be kept as the key factor in this part as well as in the entire research. This will contribute to the concept and concerns of the research as an analytical study of what can be promoted in this specific area of planning theory. It is also worth mentioning that what has been examined in this chapter is based on an either rational or empirical approach but that the reasoning is based on an analytical approach rather than on outcomes of the *toolkit-based* (see the proceeding chapter) theories in planning.

2.2 Problem Definition

Hall (1973), in his inquiry, in the late 1960s and early 1970s, into British urban planning systems and their effects on urban fabrics, wrote,

It certainly was not the intention of the founders that people should live cramped lives in homes destined for premature slumdom, far from urban services or jobs; or that city dwellers should live in blank cliffs of flats, far from the ground, without access to play-space for their children. Somewhere along the way, a great ideal was lost, a system distorted and the great mass of people betrayed. (Hall, 1973, Vol. 2, p. 433)

He referenced some urban issues of the planning system that was not, at the time, well-defined and well-practiced. Perhaps at the time, establishing a theoretical roadmap was deemed essential for the practice of planning; perhaps it seemed necessary to theorize attempts that were to be articulated over a few decades to come.

And 40 or so years later, under an extremely bold title of “Expanding the Scope (of Planning Theory) Too Much,” Archibugi claims that the current turbulence in planning is because of “excessive extension” given to this subject. He also contests J. Friedmann’s vision of planning, presented in the introduction to *Planning in the Public Domain: From Knowledge to Action* (1987). Archibugi argues that Friedmann has not provided a definition of the terrain of planning here (Archibugi, 2007, p. 6):

A comprehensive exploration of the terrain of planning theory must cull from all the relevant disciplines those elements that are central to an understanding of planning in the public domain. The theory of planning is an eclectic field, bounded by political philosophy; epistemology; macro-sociology; neo-classical and institutional economics; public administration; organization development; political sociology; anarchist, Marxist, and utopian literature. (Friedmann, 1987, pp. 39-40)

How have planning, physical planning, and urban planning been distinguished and defined? How have their theories and methods shaped planners’ decisions?

Based on what was assumed to be true or false for each tendency, what are the problems and issues, and what are the reasons and results of those problems? Who is responsible for what, and who under what circumstances is entitled to make the decisions and how? These issues, among many others, are subject to questions that need to be answered (or are merely studied) in the scope of planning theory, either in order to clarify them to be implemented or utilized in a course of action, or simply to justify them in substantial scopes. These all also include discussions about planning, in its recent sense as a whole, and what it probably has in common with the aforementioned terms. This can be examined at the purely theoretical level, at the purely practical level, or through an amalgamation of both. Beyond that, the ways in which they will be pursued will contribute to the understanding of planning as a complex phenomenon.

2.3 Definitions, Expansions, and Relations

To start, outlining the differences between ordinary and technical usages of the word *plan* opens up discussions on the complexity of the subject. However, the technical usage of the word does not merely illustrate the concept’s physical and objective meaning but recently emphasizes the intellectual and subjective aspects of *plan* and *planning*, in turn. Those meanings involve concepts such as forethought; “a process of human forethought and action based upon that forethought” (Chadwick, 1971, p. 63) is suggested by the terms *plan* and *planning*.

When planning is seen as physical planning, it has completely different dimensions compared to when it is deemed an activity carrying legal, ethical, environmental, social, economic, and political concerns on top. Then the expansion of such a relative activity, from one point of view, is an

opportunity for the whole profession to make a better environment in an integrated manner, while from another sense, it is a threat to the ever-increasing complex drivers of the planning sphere that need to be seen in an exhaustive way. It is crucial to find out when the planning definition changes based on the scale from the local through regional levels and then to a global level, as many aspects, attributes, and methods change. Those include duties, tasks, responsibilities, and rights. Therefore, to achieve any definition, studying the scope of planning and the context in which it is taking place has always been crucial even though the dominant mindset may constantly be changing over time.

2.3.1 American Planning Association Definition of Planning

There is no doubt that the roles of academic institutions and, specifically, professional planning associations are crucial in giving a definition of planning. As Schön (1983) asserts, “The institutional context of planning practice is notoriously unstable and there are many contending views of the profession, each of which carries a different image of the planning role and a different picture of the body of useful knowledge”(Schön, 1983, p. 204).

For many obvious reasons, not necessarily all quantitative, the American Planning Association (APA) is an important planning organization worldwide. Located in a country with a free-market economy (which intrinsically brings about many economic challenges), where cities are dense, numerous, and complicated (with 200 metropolitan areas having populations greater than 200,000 persons and a dominant cosmopolitan atmosphere), and where there are also different leading planning institutes, APA has a unique situation and must deal with a long list of interwoven complex tasks. What this organization presents as a definition for planning gives the planners and thinkers a basis for facing such a complicated and vast activity.

APA is the organization that informs and educates American planners and planning students what is defined as planning in the United States. This organization, in its mission statement, says, “The American Planning Association provides leadership in the development of vital communities by advocating excellence in community planning, promoting education and citizen empowerment, and providing the tools and support necessary to meet the challenges of growth and change.” They also claim,

When government officials, business leaders, and citizens come together to build communities that enrich people's lives, that's planning. Planning, also called urban planning or city and regional planning, is a dynamic profession that works to improve the welfare of people and their communities by creating more convenient, equitable, healthful, efficient, and attractive places for present and future generations. Planning enables civic leaders, businesses, and citizens to play a meaningful role in creating communities that enrich people's lives. Good planning helps create communities that offer better choices for where and how people live. Planning helps community members envision the direction their community [sic] grow and will help them find the right balance of new development and essential services, protection of the environment, and innovative change. [“what is planning?”]

Although those definitions seem to be more realistic, compared to most definitions presented in planning theory, they are not failure free or comprehensive enough to be justified. For instance, nothing in this definition relates to nature, the built environment, or foresight for future generations (the expression “future generation” in the first part of the definition is based on a posteriori knowledge of the current generation, and there is no commitment to it visible within the given definition). Among the statements presented by the APA, some seem to be adopted to emphasize creating physical places, in the sense of urban design, rather than carrying general notions of planning. Another point in this definition is that the APA sets planning equal to urban planning or city and regional planning, although each of these forms of planning confine it in some ways. The next concern is that this definition—despite being put forward in a country whose economy is built around the principles of a free market and free economy—offers nothing to clarify the role of planning with regard to this matter. Instead, the only thing that stands out here is to “enrich people's lives,” which is expressed in a very vague way. This point has been

asserted as the final goal of planning, although democratic methods are highlighted (for more details, see the section "Our Vision," which is more focused on planning issues).

Apart from what has just been pointed out, for its multidimensional and updated coverage, the definition can still be used as a proper source for illustrating the institutional approaches to planning.

2.3.2 Extremes of Planning Tasks, Responsibilities, and Definitions

Although it broadly covers the concepts of planning, the APA's restricted definition of planning is not ubiquitously accepted by planning theorists. On the contrary, many claim to have imagined a wider range of tasks and responsibilities for planning. Hence, "There is still confusion over how to think about planning" (Campbell & Fainstein, 2003, p. 143).

Among all definitions of planning, the following two are significant, because they bring the planning sphere to types of expansion within two extremes of "everything," namely, an unbounded activity, and "nothing," in other words, a restrictedly bounded one:

"If Planning Is Everything, Maybe It's Nothing." ⁴(Wildavsky, 1973)

"If Planning Includes Too Much, Maybe It Should Include More." (Lucy, 1994)

These extremes of inclusiveness and exclusiveness affect planning lists of tasks and responsibilities in an extreme manner. Although this kind of discussion about the definition of planning has its own proponents, some have considered that presenting any general definition in this way is by no means imaginable or possible, nor is it practical or even useful in any course of action. However, in practice, it has been seen, sometimes and in some places, that the definitions above are picked up by people to show planners' scopes of operation.

2.4 Planning Definition: Distinctions and Values

It is evident that there is a direct relation between what planning is and what it needs to do, as the existence of a phenomenon is closely associated with its purpose. The process that started with defining a city, moved on to study the city structure, and was later expanded to the meanings of *planning* (of whatever) has taken place through a process. The Process involved,

debates as whether planning was best conceived as an exercise in solving problems or achieving goals (see, for example, Faludi, 1971; Gutch, 1972; Needham, 1971). Likewise, much attention was devoted to plan and policy-making (how best to generate and specify alternatives), and to policy and plan evaluation (there was a debate about Morris Hill's goals achievement method of evaluation as compared with cost-benefit analysis or Lichfield's planning balance sheet). (Taylor, 1998, p. 112)

Definitely, planning as an activity has a long history that has lasted ever since urbanization was first formed. However, as a profession, planning is young. In a fairly short but eventful period, a wide range of evolutionary alterations have occurred. But the whole process can be summarized, while recognizing intervening aspects of work, into three distinctive stages: first, planning was considered a continuation of what architects and technicians pursued; second, the first expansion of planning involved taking social factors into account; and finally, the general expansion of planning has involved all bargaining fields and their criteria.

It is evident from a chronological point of view that many other minor shifts have also happened in planning. As mentioned before, planning alterations can be considered and categorized, for instance, from the degree to which planning remains loyal to methodological points in tackling problems. However, the study of the definition of planning changes from the aforementioned point; considering bargaining with subspecialties can reveal the multiobjective nature of planning

this current research. In the next part, some of these different accounts will be briefly introduced and examined.

2.4.1 Bargaining with Other Specializations: Other Values

Planning has been defined many times, from different points of view and through different dimensions and notions. It has been described by imagining the human and societal values (utopian thinkers, ethic of city and society); by observing the nature of cities; by looking at requirements, defects, and deficiencies (technocrats); by considering the shape of city buildings and spaces (artists and architects and today's urban designers and town planners); by defining the relationships within the city (functionalists); by governing the structure of power (practitioners of the politico-economic approach); by defining the gerund form of *planning* in courses of action, including methods of management (rational planners, managerialists [see Taylor, 1998, p.38]), by criticizing whatever exists in planning, such as tasks, responsibilities, and possibilities, and also through discussion of the ethic of planning (planning theorists; ethic of planning); and by advocating people (practitioners of socio-humanistic and behavioral approaches), among other approaches.

As Beauregard (1986) explains, "In the 1960s, planning practice diversified into a multitude of specialties: environmental, manpower, social planning, health planning, transportation, energy planning, and regional planning along with the traditional land use and housing". He further describes the field's evolution:

Being a planner no longer meant regulating the spatial arrangements of land uses and providing housing. A variety of social planners challenged the increasingly specialized physical planners. As a result, planning practice underwent centrifugal disintegration. The common object of interest—the city—that had initially attracted "progressive" reformers was lost. (Beauregard, 2003, p. 110)

Observation of the methodological issues of theories in planning, discussion of the planner's role as the central point in planning, or the study of the nature of the principles within different mindsets of planning are some other methods to pursue the definitions of and distinctions within planning. Although all abovementioned categorizations help the study of planning and the decision-making process, they are not as capable of exhibiting the mindset and mode of planning with its specialties and subspecialties because changes have affected all aspects of planning. Therefore, to start examining the challenges of planning (in theory and practice), it is necessary to consider changes to the field, including the expansion of its principles. This view emphasizes the expansiveness of planning in different senses and studies various schools of thought to integrate whatever has been suggested for the planning sphere.

Therefore, a summary of distinctions will be pursued in this part, based on this view, which brought many other changes to planning. On the one hand, these distinctions (made based on the interventions of other fields in planning) contribute to the entire research. On the other hand, they help the decision making in both theoretical and practical senses to be categorized by planning actors and compartments developed within each field. These compartments have been transformed and redefined over the years and have absorbed various types of approaches to tackle the problems of planning.

Notwithstanding the differences, what is evident is that the subject of planning and decision-making theory and its evolution has a strong interconnection with the history of planning and its chronological developments. The developments have usually been accompanied by changes to the contexts in which knowledge about planning has been illustrated.

2.4.1.1 Town and Physical Planning and the Technicalist/Technocratic Point of View: Scientific Values

The most dominant picture of planning was town planning inherited from the modernist school of thought. Although many attempts related to political development, economic organizations, and social engineering were made before the 20th century, the strongest force in the early 20th century was the artistic (aesthetic) and technicalist sense of urban planning in the way architects (and architect-technicians) were pursuing it but on a larger scale as “the architecture of the city.” Taylor (1998) explains,

As town and country planning was only one form of planning activity, the question naturally arises as to what made town and country planning different from other forms of planning. The prevailing view was that, with the possible exception of regional planning controls over industry, town and country planning was concerned with the “physical” environment and was thus most appropriately described as physical planning, as opposed to “social” and “economic” planning. (p. 5)

Before the methodological and effective engagement of planning with social, political, and economic drivers, the first attempt in the early 20th century to redefine planning in a new sense was to establish distinctions between what was happening in a design-based view of planning and in physical planning. Planning shaped with developing geographical and environmental concerns into the planning domain. This can be considered the first attempt at theorizing planning. This approach to planning, including the concepts of *land-use*, *zoning*, and *physical planning* in a general sense, was later considered the inheritance of the modernists’ view of phenomena and activities such as planning (through rational and positivist methods of thinking); however, it was still far from the physical planning based on the architect-planners’ view of planning, the postwar mindset through which, Taylor (1998) ascertains, town planners “saw town planning as essentially an exercise in the physical planning and design of land-use and built form” (p. 35).

However, in this postwar period, with the dominance of some particular tools or movements, everything in planning would be only defined through those. For example, considering the dominance of planning by land-use Fagin (1959) asserts,

[To] limit the scope of planning to land-use arrangements is a harmful effort to limit the common word *planning* for exclusive use of a narrow segment of the planners’ role in government” (p. 110).

The mindset, however, has been considered as serious tendencies first. Later on, some of the tendencies changed to serious ones in planning, as was seen with land-use, which is now an inseparable aspect of planning, but, after that, this was also proved that those tendencies could serve only as a single tool to tackle specific problems of planning and decision making and they need to be articulated in association with other tools.

This mode of thought caused decision-making methods and theories to be pursued mostly through pragmatic methods and those who were developing methods and theories did so by studying and relying on the pragmatic outcomes witnessed in other branches of planning. In addition, this period, with its emphasis on technical issues, can be considered the era of the development of the *technicalist view and theory of planning* through the managerialist approach to the course of action. Then, in this period, the planner who tried to propose some ideas and “plans” to planning institutions, in a vertical order, was below the city councils and decision-taking institutions. This implies that the decision theories were indirectly imbedded in the hierarchically elitist technocratic view of decision making.

2.4.1.2 Social Dimensions and Community Diversity: Sociological Values

Town and Country Planning might be described as the art and science of ordering the use of land and the character and sitting of buildings and communicative routes Planning, in the sense with which we are concerned, deals primarily with land, and *is not economic, social or political planning*, though it may greatly assist in the realization of the aims of these other kinds of planning (Keeble, 1952, p. 1).

This prevailing view of planning in the first half of the 20th century illustrated a reductionist image and seemed justifiable to many when modernist planners with socialistic optimism emerged. The approach was supposed to justify why modernist architect-planners tried to reorient the social concerns through physical planning, whereby, it was imagined, many social problems would be wiped out. Then planners' only responsibility was envisioned to be organizing the physical environment, without need to legitimize social and economic concerns.

But this type of resistance to other aspects of planning and to the factors that go into decision making, with the intervening social aspects of planning, was soon to expire.

Then, in line with expanding planning, to make it more inclusive and effective, at the next stage, planning theorists' literature on planning was to expand the planning definition and distinguish between planning and "whatever" town planners were dealing with, as a transition from town planning to planning.

However, many notions related to planning were given birth, well before that time. For instance, the idea of planning as an activity improving citizens' quality of life and participation in decision making indicates the progressive nature of planning but was presented by late-19th-century social activists and political theoreticians.

The expansiveness of planners' tasks and responsibilities, and hence, planning as a whole, is one of the key points in discussions conducted since the 1960s and probably the most common idea with which planning thinkers deal. The expansion of planning resulted in connecting planning problems to social issues; therefore, physical planning (from the modernist era) was expanded with social interpretations of problems and somehow replaced with socio-spatial planning. This involved a considerable level of expansion of the planning sphere.

In this period, in Britain and America, the very important aspect of planning, which was seriously taken into account in calculations and formulizing better communities, was *social resultant*. Both social resultant and technicalist view of planning were focused on at the same time but that the technicalist view followed the social resultant in degree of importance. Consequently, planning implied an activity with wider aspects than what was realized in a physical or town planning sense. However, the decision-making picture was still centralized and pursued in a managerialist way, and any related efforts at theorizing were shaped around this general notion. It is also worth mentioning that Europe was struggling with the economic and social shock of WWII in this period, while America was examining different ways of developing urban spaces.

2.4.1.3 Political-Economic Trends, Ethics, and Democratic Values

Davidoff (1965) suggests,

The prospect for future planning is that of a practice openly inviting political and social values to be examined and debated. Acceptance of this position means rejection of prescriptions for planning that would have the planner act solely as a technician. (Davidoff, 1965, p. 331)

And Taylor (1998) states,

In the town planning systems of all western liberal democracies since 1945, public sector town planning has coexisted with a capitalist land market. Implementing public policies and plans therefore requires planners who understand and are prepared to work with the initiators of development, including, obviously, private sector developers. The kind of theory concerned with understanding the political economic context of town planning in which the market's strong role was emphasized, ties in with the issue of implementation. (Taylor, 1998, p. 112)

Introducing some evidence of the political controversy of 1947's British Town and Country Planning Act, Taylor (1998) suggests that the idea of planning as political was not new even in

the 1960s: "The suggestion that town planning was 'political' was not completely new (Taylor, 1998, p. 77).

However, from a rational point of view, it was acknowledged that, even with a physical planning mindset, when planning operated within a political *context*, in which there was a requirement for development plans and decisions controlling development, for the planning to be approved by an elected local authority and/or central government, the practical and technical exercises were still dominant. In this mindset, which is still followed by urban designers, the separation of tasks and responsibilities was exhibited in the distinction between what planning should plan and what political bodies need to have taken into action. This kept the planning course of action constrained to the technical part of planning (however, the term *technical* is used for all principles applied to planning that are not philosophically visual or empirical, such as urban design criteria).

In substantive planning, the proponents of rational planning such as Faludi are accused of downgrading politics as subservient to planning. For instance, Thomas (1979) claims that Faludi "... asserts a positive value to be derived from a commitment to and involvement in rational planning The political process will be substantially replaced by rational planning as the principal means through which people communicate with each other about the society they live in. Politics appears as an adjunct to planning (p. 72; cited in Paris, 1982, p. 21).

The idea has been deemed "contentless planning" and subjected to serious critiques from many, such as Thomas or Camhis:

The policy, according to Faludi, can only be successful if it conforms with the criteria that specify the "right" planning process. Following this line of reasoning the planner is . . . nothing. Too much preoccupation with procedure or method in the abstract tends to push aside the real issues. (Camhis, 1979, pp. 5-6)

The technicalist view of planning, including the rational and system view of planning, tries to overlook the value-laden nature of planning, and hence, the political content (Taylor, 1998, p. 77). But the differences between planning taking place in Western democracies and planning carried out in socialistic centralized systems (like the former USSR) indicates that political accounts intensify the alternative process of plan evaluation decision-making methods and values. Planning is closely related to the political systems determining planning policy making and to the degree to which a system is democratic, and to the form of democracy it takes. Prominent points introduced in this scope include the method of distributing resources and the evaluation of costs and benefits (pleasures and pains denoted by Jeremy Bentham) of plans for each actor or agent of the built environment and portion of citizens and interest groups in making plans.

With all the complicated issues regarding the political and economic systems and their interrelations, it is, therefore, no surprise that one of the first theorists who articulated the political nature of planning comes from the American planning environment, namely, Norton Long (1959). He expressed it in these terms:

Plans are policies and policies, in a democracy at any rate, spell politics. The question is not whether planning will reflect politics but whose politics it will reflect. What values and whose values will planners seek to implement? . . . plans are in reality political programs. In the broadest sense they represent political philosophies, ways of implementing differing conceptions of the good life. No longer can the planner take refuge in the neutrality of the objectivity of the personally uninvolved scientist. (Long, 1959, p. 168)

And before that, in Banfield's literature on housing policy in Chicago (Meyerson and Banfield, 1955), which is mostly known within rational planning (Faludi, 1973b, p. 115; Taylor, 1998, p. 83), the matter of political debates and decision making was pursued. But, later on, in the early 1960s and with Paul Davidoff and Thomas Reiner and others' emphasis on the value-laden nature of planning, the examination of the political aspects of planning was brought to a new phase.

This was before what Jon Gower Davies (1972) and Norman Dennis (1972) in the British planning system claimed about the political nature of planning where the traditional freemarket had been put away for years and the system had been working in combination with socialist and liberal political-economic accounts and did not expect the New Right era of the late 1980s and early 1990s.

Behind all these points made by planning theorists, the epistemological nature of politics and its relationship with economics and ethics has fueled crucial discussions on the political aspects of planning over the past 40 years. It is why Davidoff's and some others' discussions on political issues are considered as important a subject as the expansion dedicated to planning and not merely as an "adjunct" to it.

In fact, the systemic view of planning and subsequently rational planning decision making were responses to the earlier criticism of postwar planning for its lack of understanding of the sense of place. But this view, in the 1960s and 1970s, was heavily criticized for being highly conceptual and abstract, for being far from the reality of what planners were planning. This line of critique helps, first, to expand the scope of planning and, second, in considering actual intervening factors and their relationships in the whole process of planning.

This line of discussion needs to be considered within the framework of emerging postmodern accounts on the one hand and of the grand theory of justice, developed by John Rawls's and Robert Nozick's utilitarian accounts (See Nozick, 1981, 1974), in line with Neo-Marxist and Keynesianism thoughts to control the liberalism in democratic societies, on the other hand. However, many of these discussions have been pursued in highly abstract ways, while, in practice, the political governing regimes could not bring their systems to those extremes.

2.5 Major Planning Approaches and Milestones; Matter of Practicality

Through the study of planning problems, cities and the built environment issues, defects and deficiencies, major planning approaches, whether practical or intellectual, have shaped changes in the quality of planning and societies, as well as ephemeral concerns. Some of the approaches were abandoned at the first stage of development, and some, in light of professional consensus or practical applicability, lasted longer. No one could easily say exactly what kinds of theories and approaches would last and which would vanish. Nevertheless, what is evident is that those that have had better coalition with the whole planning sphere seem to have survived longer than the others. Those that are more adaptable and have more flexible principles have a better chance of remaining longer in use vis-à-vis those trying to manifest all-inclusive environmental agents and values in a justified manner.

2.5.1 Ongoing Process and Comprehensiveness

As Cullingworth (1997) asserts, "In a world where everything is related to everything else, it is impossible to deal with all things at once, and therefore problems have to be broken down into manageable issues" (Cullingworth, 1997, p.2). Yet this fact cannot invalidate the justification of comprehensiveness even though the possibility of keeping all attributes in hand might be unrealistic. The necessity of planning's moving towards comprehensiveness is a prominent discussion, with some for and some against it. In either case, it opens up the question of practicality. As per the analytical approach to the critical literature on planning that is based on pragmatic experience, scholars will question a single-core planning theory to be brought into practice due to the high likelihood of missing criteria. That is the main reason many scholars suggest that planning pursue comprehensiveness (Beauregard, 1989, 1990; in Fainstein et al., 1991).

At the same time, there is no doubt that one of the most significant achievements in the planning process has been to look at planning as an "ongoing process" rather than an "endstate."

Detecting problems with the master plan and blueprints in physical planning in contradiction with the nature of planning created major issues and led planners to consider an ongoing process for plan and decision making. For the first time in Britain “ongoing nature of town planning was acknowledged under the 1947 Act by the requirement of local planning authorities to review their development plans every five years. In this respect at least, town plans were not seen as ‘end-state’ documents” (Taylor, 1998, p. 44).

From a phenomenological point of view, the city—as a context in which decisions, the course of actions, and ultimately planning are supposed to materialize or be utilized to solve a perceived problem or simply to improve the status quo—is an enduring existence that lives its life in time and evolves under the influence of an infinite number of variables. Some of these are perceptible and evident, but most are invisible, indirect, subjective, or even clandestine; yet in any case, there are definitely multidimensional, multilayered and/or multilateral variables.

This can be interpreted as the dynamicity of (1) the variables with which planning is involved, (2) the values which engage planning, and (3) their relationships.

To represent the sensitiveness of planning variables and their relationships Brown (1966) asserts:

“we might see planning in the light of a game of chess, divided into a series of moves each limited and decisive in its own terms but each striving to secure maximum freedom for successful maneuver in the subsequent stages” (Brown, 1966, p. 9).

Perhaps this is one of the main reasons planning distances itself from *planning*, the former being the activity that envelopes the latter, which is the mode of thought about planning.

2.5.2 Justification; Modernism to Postmodernism

The planning changes from being modernist to postmodernist were not pursued merely by moving from a formal approach to planning to a more intellectual one. The distinction between, on the one hand, rational reasoning and justification focusing on utilitarianism and, on the other hand, deontological reasoning and justification shaped the most important controversy in this transition. Bridge (2005) suggests:

[argumentation] does not rely on universal ways of validating claims but on ways that emerge from the resources of the participants in the transaction. Whereas it was condemned as a force of rationalization in modernity, postmodernism sought to banish rationality from the city altogether (p. 8).

Although this controversy first was introduced in formal contradiction, it played a central role in debates on the differences of approaches to planning in further stages of planning expansiveness, even in the most technical sense of planning. Definitely, as far as this research is concerned, there is no crisp distinction between what modern and postmodern thoughts are dealing with (consider the concept of freedom or value-laden planning within these two thoughts and their contradictions), but these types of debates have been followed as prominent points in planning for years. As Bridge, somewhere else asserts, “Planning theory has been vitally implicated in ideas of rationality. Indeed forms of rationality stand at the heart of two of its main approaches—the rational comprehensive planning model and the communicative rationality model” (Bridge, 2005, p. 125).

All these attempts ended up with the expansion of postmodern attitudes in planning; other specialties were introduced to planning, and planning was more radically defined through the other fields with which it is engaged in an incremental way. This means the specialties have been applied to planning cases based on their original priorities and preferences to employ incrementalism. Planning, which was vastly accepted in order to provide master plans and blueprints (in a comprehensive way, early after WWII), turned into an activity with new economic,

political, and social dimensions (in a disjointed manner on account of difference). Planners, instead of providing blueprints using T-squares and pens, were regarded as social activists. The transition of planning (and the planner) from modernism to postmodernism had commenced. Although most of these debates took place in theoretical courses and with normative and analytical approaches, there are still many discussions on the issue, and the justification of planning is still comprehensive. As Campbell and Fainstein (2003) assert, "The justification for planning is often comprehensiveness. Yet the ideal of comprehensiveness has suffered serious criticism" (Campbell and Fainstein, 2003, p. 9).

However, as a result of dispute between the early theorists (the proponents of rational planning) and the recent generation of planning theory commentators (the proponents of the diversification of voices and accounts), Beauregard (2003) claims that, in the 1960s, "The common object of interest—the city—that had initially attracted 'progressive' reformers was lost" (Beauregard, 2003, p. 110).

2.6 Planning Account

Notwithstanding all the vagueness inherited in the concept and all the failures in initial attempts at defining planning, not only has it shaped and been pursued as a human activity, but it also has been developed into and established as a profession: "planning will continue to be a profession with a lost sense of identity, and purpose, as well as . . . influence and legitimacy in the arena of policy-making and development" (Brooks, 1990, p. 219).

It is evident that there is no agreement on the definition of planning. Furthermore, and rather a posteriori, many other concepts within this phenomenon have never been properly defined. With reference to the issue of relations of power in organizational units Perry (2003) claims, "planning seems to be at once ineffable and ubiquitous . . . it is planners themselves who appear to be the most confused about the role of planning as an agency/instrument of control enmeshed or embedded in the relations of power" (p. 143).

But the utilitarian accounts in defining the planning tasks, scopes, and responsibilities, beyond the meaning of utilitarianism itself and its varieties, are more desirable than other notions among those theorists who are not fundamentally skeptical about the definition of planning:

Urban politics, in an era of increasing government activity in planning and welfare, must balance the demands for ever-increasing central bureaucratic control against the demands for increased concern for the unique requirements of local, specialized interests. The welfare of all and the welfare of minorities are both deserving of support: Planning must be so structured and so practiced as to account for this unavoidable bifurcation of the public interest. (Davidoff, 1965)

Considering utilitarian aspects of decision making is so important that it now shapes the major notions of the ethical principles for planners in many institutional guidelines (for example, see the AICP's "Planning Ethical Principles").

Despite differences, considering as many factors intervening in planning as possible and also bearing in mind the extremist attempts at defining planning, an expanded definition can be envisaged that takes into account the actors of the built environment.

Planning, in ethical sense, is a utilitarian activity: *utilitarian planning*, that aims to process (and calculate if required and possible) different variables of the built environment and their relationships in such a manner that the share of each stakeholder in this process can be secured in a coherent and fair way. Whether this is possible in reality is open to debate (Also planning, in moral sense, is a libertarian activity: *libertarian planning*, that is completely involved in costs and

benefits).¹ Yet more importantly, the general question remains of how to achieve this or how close planning can get to this definition in practice, both in *theory of knowledge* (know-what) and in *practice of action* (know-how). Planning is all about striking a balance between give and gain, both physical and intellectual, in which as few stakeholders (current or future) as possible suffer from the plans implemented and the decisions made and as many stakeholders (current or future) as possible benefit from them. It implies commitment to the reductionist school of thought and to the justification of goals (utilitarian aspects) versus the justification of process (deontological or libertarian). Planning theory has recognized for a long time that, as a result of such an approach, many influences, which could have otherwise been pursued simultaneously, are destined to be ignored. Given the lack of ability to respond to planning requirements, the reductionist idea cannot be justified any more. But the alternative approach keeps the record of the necessity of the justification of both integrated accounts of planning at the same time.

Therefore, the factors that are under debate with regard to planning are utilitarianism, variables of the built environment, relationships between variables, the implementation method(s), plans and decisions and hypotheses (theories) that try to identify these factors. Therefore, the whole literature ensuing and related to these issues is summarized in discourse on “planning theory.”

This definition, which is more clarified regarding the justification issues, presents a coalition among different tendencies (political, economic, technical, and also *ethical* and *moral*). It can be set up to suit different types of approaches to planning by changing the parameters through modifying the degree of effectiveness of each compartment. Therefore, having an impartial position in this definition and avoiding employing any ideological stance (except utilitarianism, which can intrinsically be flexible) bestows a high degree of flexibility to the definition through which planning can be interpreted even in the most diverse ways.

2.7 Planning Theory, Modifications, and Patterns

Different thoughts and expressions about planning, like “planning is the application of scientific method ... to policy-making” (Faludi, 1973a; Jay, 1976), are important to planning and even more important to planning theory. This type of comment on planning and its attributes, processes, and relationships has been modified with the planning mode of thought, yet it is used by some organization units across as a valid approach to decision making (This specific approach may be traced back in Popper’s work on scientific method once planning was to be comprehended as science. That is what Magee (1973, p. 75) puts forward when he writes about Popper in relation to policy: “A policy is a hypothesis which has to be tested against reality and corrected in the light of experience” [p. 75]. This mode of thinking about planning arises from scientific findings of true or false in the fields in which there is no “dealing” or “compromising” with different options.)

The definition of planning theory is as vague and complicated as the definition of planning. The expansion of planning that has been the issue of debate within planning theory has been substituted with expansion of planning theory itself. Now after about five decades of providing the literature about planning theory, the question is what is planning theory? And is planning theory in its own meaning a substantive theory or not? Is there any *general theory of planning*?

Perhaps, what planning should consider at the beginning is the central subject of planning theory. With Jane Jacobs’s methodology of criticizing planning (not to consider the city’s problems), the systemic view of the problem within the city and the systemic view of what the city is were examined. Later on, within rational planning, the technicalist through managerialist views

¹Debates on the terms *utility* and *preference* and their differences have a long history, as discussed by Kathleen Bawn in 2008 in her lectures, named “Political Science: Politics and Strategies”, at University of California in Los Angeles (UCLA). Bawn’s lectures contain a great deal of discussion on the originality of preferences rather than utility. The preferences seem to be more useful where the outcomes should be accrued in the abstract form. However, the concept of utility is still more fitting for discussion in social or human sciences. This issue was highlighted in the session of “Simultaneous Games”, which is supposed to be set up based only on pure preferences.

concentrated on planning theory. More recently, the planning methods for controlling and improving came to the question, yet the issue of planning has not been able to provide enough initiatives to change the actions under consideration for the central issues of planning theories. Planning theory, with its dynamic nature, has been seen in different ways, with temporal changes within various modes of thought, and has been treated in different manners, respectively. Perhaps this is seen as the best reason for rejecting the idea of general planning theory. However, the opponents may reason that any umbrella theory can be inclusive to gather all the theories stemming from various viewpoints.

Perhaps, the separation between rational and empirical approaches to planning is the most important divergence in the history of planning theory. Along with this main divergence, either prior to this deviation or subsequent to it, many other issues have been categorized, including but not limited to definitions, tasks, and attributes.

Supposedly, one of the most considerable efforts at articulating the theorizing literature on planning is Faludi's. It was Faludi who initiated discussion on this matter in the 1960s, and he has been followed by others ever since. This type of discussion was later labeled rational thought on planning. He offers two types of planning theory, the first being "theory *in* planning," and the second "theory *of* planning." The former, in which the practical aspects of planning (*substantive planning*) are highlighted, describes the theories used in planning to achieve whatever the goal of the plan is. The main focus of the latter, which is chiefly characterized as *procedural planning*, is theorizing what planning would be and what it should be—and in many cases, regardless of whether it is useable and applicable. This idea seems to have resulted in some other thinkers' considering planning theory as a useless subject, as mentioned before. It has raised a lot of concerns to return to a more realistic view of planning theory that can help planners instead of confusing them. Between the 1960s and 1980s, significant confrontations between empirical/emancipatory and rational aspects of planning were pursued to legitimize *modernist* rationality and *postmodernist* accounts. However, scrutinizing the literature of both groups shows that even the most radical members of each have been borrowing concepts and principles from their opponents (See Taylor, 1984). To criticize the procedural planning Taylor claims:

First, procedural planning theory was criticized for its abstractness and generality—for offering "merely" an extended definition of planning and not saying anything about how planning in practice operated or what its effects were, etc. It was thus criticized for lacking any "content" or "substance," for being "empty" or "vacuous" (See, e.g. Scott and Roweis, 1977; Camhis, 1979; Thomas, 1979). Secondly, the rational model of planning was criticized (e.g. Friedmann, 1969) for presenting a false "top-down" view of planning which showed little understanding of the "action end" of planning, including how plans and policies were or were not implemented. (Taylor, 1998, p. 96)

This means each view has to be committed to the fundamental reasoning axioms attending what is supposed to be the opposite agenda.

The other important issue in planning theory has been the characteristics of the planner as well as his or her tasks and duties (along with discussions of planning ethics), as formulated and scrutinized from different points of view. In the rational view of planning, the planner carries a central role in the decision process in relationship to the structure of power and is considered in the context of the technicalist view of planning. Therefore, this current research has examined [or "examines"] the literature on this subject. What Faludi, in the early 1970s, stated seeks to understand the concept of planning through planners' eyes: "Planning theory and the practical interests of planners are thus complementary to each other, despite the occasional tension which exists between practitioners and theorists" (Faludi, 1973a, p. 10).

Because of the defects within the meanings and management system, this idea was pursued up until recently. This was needed because it has been assumed the most effective way to tackle problems with a series of principles and criteria. This type of approach to solving planning problems is not limited to those who are called rational planners and Faludi (1973a) asserts:

Davidoff and Reiner (1962) argue similarly that "urban planning education has been excessively directed to substantive areas and has failed to focus on any unique skills and responsibilities of the planner". Ten years later, Robinson (1972) voices the same complaint. However, planners are not alone in depriving themselves of an intellectual basis of their activities. Simon (1969) argues that departments of engineering, business studies and so on, devote too much attention to basic disciplines and too little to design, what he calls the science of the artificial. (p. 8)

And also Taylor (1988), in the introduction to his book *Urban Planning Theory Since 1945*, claims,

students usually take some course in "planning theory." But as I know from my own experience of teaching this subject, students find the subject difficult. Part of this difficulty may be due to the intrinsic nature of the subject-matter, which deals with ideas and arguments rather than the accumulation and transmission of facts about planning. (p. V)

Nevertheless, in more recent approaches, the alternative formulation for the role of planners implies that they are assumed to act as the mediators between different parties and stakeholders. Furthermore, the managerial and organizational obscurities reveal the complications of the practicality of such a perception.

This kind of approach to planning theory is why the gap between planning education and a course of action is becoming evidently wider and is considered the root of most problems. The method to tackle this problem is, then, theorizing new or old, rational or non-rational methods and transferring them to the management bodies. Furthermore, the ways of transfer are a matter of discussion. Therefore, planners and authorities, as the most technocratic elements of planning and the best audience for the planning process, would be targeted for modification in this view. These are all the supports of the school of thought that can be called the *planner-based view* of planning.

From another point of view, planning theory is assumed to be literature about planning, variables, and their relationships at the purest level of theory and incorporating what can be considered either *theory on planning* or *theory about planning*.

There is a widespread acceptance in our *métier* that there are significant differences between theories that are used *in* planning and are specific to its several specializations (land use, transport, urban design, regional development, environmental planning, etc.) (theory 1); and theories that address what is common to all of them, i.e. theories *of* planning *tout court* (theory 2). In addition, I would propose a third category that I shall call theories *about* planning (theory 3). (Friedmann, 2003b, p. 7)

The last category emphasizes more the political side of planning and the role of knowledge and/or people in the process; this tries to distance itself from what is called rational planning. The thinkers who try to establish postmodernism in planning attempt to define the role of people in political decision making and constantly remind the theoreticians of the importance of the relationship between these two through incrementalism. To achieve that, a wide range of premises and notions were employed: from linking "knowledge to action" (Friedmann, Schoen), to "societal accounts" and human factors (Davidoff, Lindblom), to "emancipatory practice" (Sandercock), and even to planning as a "method of learning from people" (communicative approach), which has been pursued in Habermas's and his students' ideas (Flyvbjerg, Forester). The core of discussion in this category is decision-making theory and process as the pivot point of planning. These methods are well known as a *decision-center view* of planning (Faludi, 1987).

Attempts have been made to modify the patterns and models based on these types of thoughts. The modification and clarification include both the variables and their relationships. From an epistemological point of view, the questions related to this matter can be categorized into four parts: How are these variables and their relationships? How could they be? How would they be? And how should they be?

Friedmann's statement, quoted above, raises certain questions that can actually help clarify the issue. What "our *métier*" is and whether this profession has been defined through an experience or intuition are a couple of the questions that followers and supporters of the approaches ask. These epistemological and rational (here, *rational* is used in the sense of rationalism, as opposed to denoting skepticism and idealism) questions are the basis of the *planning sphere* recognition process in different systems.

2.7.1 Types and Categories

2.7.1.1 Major Approaches and Milestones

There are a vast number of theories *in* planning, either generated or employed.

As a result of those theories, many different models have been shaped based on inductive, deductive, and sometimes, intuitive methods. But one of the most important parts of the study of planning, and subsequently the theory of decision making, is the study of tools and approaches of planning (justified by different reasoning methods for different purposes). Those tools or approaches were established, during the period in which planning came into existence in its 20th-century sense, through a series of theories, and these theories typically arose from the requirements within the planning sphere at the time or those intellectual notions to which planning had to be committed.

2.7.1.2 Recent Planning Theories in Practice with the Hierarchy of Planning Theories: Trends, Theories, Methods, and Notions

Among all theories in planning and theories of planning are some that appropriate ideas from other theories without mentioning or acknowledging this. These ways vary from using epistemological notions to employing methodological concepts. Some of these theories have been applied to the fabrics, and some others have affected at least some parts of the planning sphere. This has happened because some thoughts have the capacity of being applied and some require a conjunctive method to be catalyzed and employed. As a matter of fact, the latter can affect the former in a manner that encompasses the values, while the former embodies some of the latter. This can be true of the fully physical theories and also the theories applicable to the intellectual part of planning. For instance, in intellectual form, the idea of Marxism concentrated on social phenomena. Although Marxism was not intended as a planning theory, over the years, planning manifestations have been derived from it and translated into planning guidelines that have been used in relation to sociological and economic factors.

Furthermore, New Marxists have been using the axioms to justify fundamentals of the establishment of the form of planning. Another example addresses the movements with commitment to physical planning. The movements such as New Urbanism borrow a wide range of values, from formal values of old European towns to ethical principles, in order to promote the value of mixing different types of people (within urban contexts) to increase equality within urban fabrics. Although with the expansion of each way of thinking, the contributors have developed some objective and practical aspects of such theories and affected planning in direct ways, they could not be considered the theories holding any inclusive ways of justification for planning.

The following table provides a categorization containing the various planning tendencies existing in the planning sphere. The very first level contains *planning dispositions* carrying some general intellectual notions that can potentially be translated into planning notions by using mediators. The dispositions may proportionately talk about sociological, economic, and political beliefs or values and benefit from analytical philosophical approaches that give some explanations about the targeted notions and concerns. Employing normative statements can be seen as a common feature in such tendencies being used to clarify the justification. They can also act like general ethical guidelines or principles holding a wide range of interpretations to be applied. Being

developed based on other sciences' outcomes at the second level, *planning channels* target various sectors to plan the built environment. The technocratic approach of these channels and the fact that they work individually are significant features of such tendencies. The justification of the decisions made by using the channels, focusing on the specific aspects of the built environment, is vastly in debt to other disciplines' models and knowledge but can still be seen through utilitarianism. *Planning schemes*, which are mostly shaped based on the facts and experimental processes, are usually being used as guidelines for having more viable cities. Those schemes are modified and revised using what the existing urban fabrics have been experiencing. The technicality and practicality of the criteria presented by such schemes become central to the justification, and the physical, or form-based, approach in the methods prevails. *Planning ideas* contain conceptual perceptions of the city and its components. They mostly pursue highly imaginative ideas in both physical and formal architectural and intellectual senses to adopt cutting-edge design and spatial organizations. With their commitment to the avant-garde and their theorization of urban fabrics for the future, they remain at a mostly conceptual level. They also rest on a justification rooted in ideal beliefs, without going beyond intuition.

Type of Planning Tendency	Epistemological Basis	Origination	Mindset	Derivative	Level of Application	Type of Process	Output Type
Disposition	Truth, Beliefs, & Values	Philosophical Impetus/ Sociological, Politico-Economic Approaches	Poststructuralism/ Rationalism/ Utilitarianism/ Deontology	(Mediators Required) Communicative Rationalism, Equity Planning	Various	Normative/ Discursive	Thought/ Ethics/ Intellectual Materials
Channel	Knowledge/ Experience	Sciences/ Technical/ Managerial Fields	Empiricism/ Positivism/ Utilitarianism	Land Use/Spatial Planning, Transportation Planning	Various: Regional/ Built Environment	Positivist/ Experimental/ Technical	Discipline/ Criterion/ Principle
Scheme	Facts/ Experienced Values/	Urban Values and Actions	Empiricism/ Pragmatism	New Urbanism/ Urban Renaissance	City/Town/ Suburbia	Technical/ Formal	Principle/ Instruction
Idea	Ideals/Ideas/ Experimental	Architectural Notions/Physical Spatial Ideas	Formalism/ Idealism	Radiant City, Event Cities, Koolhaas's and Rossi's Ideas on Planning	Architecture and Urban Design	Conceptual/ Formal	Idea/ Construction

Table 2.1. Typology of planning tendencies and their aspects.

Each of the aforementioned planning tendencies benefits from various theories, methods, mechanisms, mediators, and toolkits to manifest its backbone objectives. These tendencies' problems, priorities, solutions, and types, scales, or levels of intervention are vastly different. Even at a managerial and organizational level, each of them appears with a specific amount of strength to be applied and legitimized; some act as conductors for some others.

The aforementioned tendencies have been pursued sometimes alongside with and even simultaneous to their predecessors. And with a few exceptions, they have been institutionalized in a horizontal way rather than being ordered vertically. In addition, some planning channels or schemes, like regional and spatial planning, urban renewal, and even New Urbanism, have been so expanded that they embed some aspects of other tendencies. However, by expanding the scope and adopting trans-disciplinary approaches, the amalgamated criteria have not come to a coherent symbiosis. In other words, due to the expansion of planning, imported specialties and subspecialties to planning, with different premises and values, have raised concerns about

various aspects of work including but not limited to social, political, economic, and psychological aspects. By contrast, although there are some common points, mostly in using ideas that support theoretical criteria, instead of achieving a coalition between those that are practical or those that are theoretical at each level, the more practical approaches have either been born from theoretical ones of the same discourse or have employed the other theoretical tendencies.

2.7.2 Mode of Thoughts and Patterns: Induction, Deduction, and Intuition in Planning Theory

Different notions of planning theory start with the premises or intuition of definitions of planning and its variables. They also consider the relationship between these variables as well as the definition of the planner and his or her tasks at initiative stages. Then, after theorizing the notions of planning, they typically return to the definition of the profession. This moving process from one level with premises to another level in which they try to define the premises as a cycle of knowledge will define different patterns or deductive models of the explanation of planning theory.

It is evident that this process is also based on personal background and experience, meaning that every practitioner, theorist, or academic has, more or less, a particular pattern of planning and specific theories he or she applies to planning. With a review of reasoning in planning theories, the pattern and deductive model of understanding and explanation can be formulated in four clusters: (a) a concept-based theory on planning, (b) a toolkit-based theory in planning, (c) a substantive theory about planning, and (d) an amalgamation of any two or all three of the aforementioned as a theory of planning.

2.7.2.1 Normative Planning Theory (Concept Based)

Utopian and Idealist Ideas (how planning sphere would be) and Intuition (from life experience and value-based premises) → Induction (to a pattern) → Deduction → Induction (through pure theoretical or philosophical notions and revision of the utopian ideas)

2.7.2.2 Functional Planning Theory (Toolkit Based)

Functional or Practical Theories and Premises (of experience and course of action) → Deduction → Induction (to a theory) → method to apply to Course of Action

2.7.2.3 Substantive Planning Theory (Process Based)

General Theories and Premises → Deduction → Induction (deduction and induction to redefine the first premises and methods)

2.7.2.4 A Part of Those Models or an Amalgamation of Two or More of Those Models

The definition and concepts will be used, revised, changed, and modified in these systems. It is therefore no surprise if some of the elements such as decision making, are considered a process within the planning or if they are equated by some to the meaning of planning. The process of making one inferior aspect of planning (like decision making) equal to a superior one (such as planning as the whole activity) is a well-known reductionist type of approach that is not well justified or to be easily adopted or utilized.

Therefore, to answer the first question, whether a general planning theory is imaginable, suffice to say that depending on the view of the observer, the answer may vary. From one point, it is imaginable, and from another, it is not. This is because if the level of discussion goes to a higher level, all the discussion considered part of different planning theories would be deemed debates

within a single system. Therefore, the whole idea can be comprehended as general enough to define a general planning theory. On the contrary, if a planning theory remains at the same level of differentiation as other planning theories, regarding it as a general planning theory does not make any sense.

This is exactly what Archibugi (2007, p. 4) claims to be a “useless” (p. 4) planning theory. He asserts that

if planning theory had limited its fields to this concept, to the ‘*method of making decisions which is to some extent common to all fields*’ and to the ‘*logical structure of this method*’, the developments in planning theory could have advanced further, and planning could have rescued itself from its widespread failure.’ (Archibugi, 2007, p. 4)

Two points in the above comments deserve consideration considerable. First, despite Fainstein’s opinion (See the introduction of *Readings in Planning Theory*, Campbell and Fainstein, 2003), the issue of decision making is still a key point in planning (know-how) and in planning theory (know-what), and second, the logic of the structure is yet to be considered. Following this idea, the justification of the structure of decision making and its logic should be carefully considered as well.

2.8 Conclusion

Different modes of planning, including decision-making, planning, managerialist, technicalist, and policy-making activities, have been examined over the last century. In light of the entire discussion that has taken place in planning theory in either a practical or intellectual sense, the practice of planning, with all attempts at theorizing it, is still a crucial part of the planning sphere. This means every attempt pursued in this sphere needs to have a strong justification that contributes to the concept of planning practice, rather than having a purely theoretical stance, to avoid being labeled useless.

As a result of existing different factors intervening in planning and the multiactor nature of the sphere, imagining unique and emergent definitions seems to be out of reach. Although there is no integral agreement on the definition of planning and planning theory (in a general sense) planning as an activity is being pursued in various ways to improve the quality of human life and the built environment. Along this line, the tasks, responsibilities, and duties of planning have been better defined to observe the city and its problems (as a system or phenomenon); to study planning as a preventing, controlling, defining activity or from its initiative role’s perspective; and to define planners’ and planning institutions’ roles effectively. Recently, this is mostly discussed while considering the type of political and economic system in which planning takes place.

There are different patterns of planning sphere and various patterns of reasoning, in each of which the specific time and situation have been followed to make a better contribution to planning. However, the whole idea of planning aims at comprehensiveness to be able to answer the problems in more justified ways. Then, with the expansion of the planning sphere and taking into account the attributes of various intervening fields, planning has changed from a neutral (based on technical or aesthetic outcomes with rational values) to a multivalued, multiobjective and multijudgment discipline with political, social, ethical, and economic values involved. However, these all should add some values to (prior) physical planning, which has recently been transformed to become a subspecialty of the profession.

The idea that planning is science is no longer accepted. It is now largely fragmented and each component belongs to different scope, and articulating planning as a whole in a scientific way, is not as accepted as it used to be. Now the preference is to consider planning a multidisciplinary activity. Therefore, many different reasoning methods (like the rejection of grand theories) are now more desirable and justifiable than ever before. With all the rational, pragmatic, and

empirical reasoning behind gathering the data, preparing plans, and making the policies and decisions, there is still a lack of justified methods to integrate the values of planning. Now it seems that the aforementioned tasks are proponent modes of thought that are severely involved in the matter of temporal selectiveness and arbitrariness. This may imply that the reasoning (based on various patterns of thought) should be integrated into planning for it to be justifiable enough. Alternatively, it may at least imply that the place of each trend needs to be established in contribution with the other fields that contain many other intervening factors in which planning is involved.

Regardless of how conceptual or abstract the planning theory is, and from an epistemological point of view, planning has responsibilities and dimensions to meet, and actions must be taken to legitimize and justify it in order to respond to the users of resources and spaces (individuals and interests groups). But the other point is that these discussions need to be kept as close to a practical state as possible.

1 Introduction

2 Planning, Planning Sphere
and Planning Theory

3

Concentration, Theoretical
Framework, and Methodology

3.1. Introduction
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3 Concentration, Theoretical Framework, and Methodology

3.1 Introduction

The current chapter aims to exhibit different methodologies that are mainly used in planning studies. This chapter also outlines the overall path of this research and the scope of the study. Then, considering the research subject, the scope and framework as well as the most appropriate methodology for this research will be explained.

Chapter 3 aims to explore such questions as the following:

- What type of research methodology is appropriate for the nature of planning?
- Why should this research aim to utilize what are deemed as possible and the most viable research methodologies?
- What are the premises of this research, and how do they affect the theoretical framework?
- Since this research focuses on the logic of the decision-making theory, what type of path needs to be taken?

This section describes the terms and explains general concepts of the methodologies and epistemological accounts in use. By examining the nature of the hypothesis and the research questions, it will argue which methodology will be more cohesive with the current research.

This research is concerned with what has been considered through fuzzy logic in different fields. The idea has been developed through an analytical approach to the atmosphere of planning, which, by its nature as a complex phenomenon, works with a great deal of uncertainty in an unpredictable way. In this chapter, the methodology of the entire path needs to be explained. Here also the premises of the research will be introduced. These premises are needed in order to narrow down both the scope of the study and the methodology utilized.

Since the very first notions of urbanism, in its broadest sense, took shape—when the earlier planners tried to plan the phenomenon of the city through various experiences and trial-and-error decision-making processes—up until recently—when planning theorists attempt to understand and realize the compartments of the planning sphere and to affect components and fields of the planning process or of planning theory—many scholars have theorized, articulated, thought, published, criticized, and scrutinized a number of subjects around and about planning. Among those, decision-making theory has, due to its importance, been reconsidered and revisited myriad times. Scholars and theoreticians have employed various methods to approach the subject. These have been based on the epistemological approaches they would adopt. At the same time, a wide range of proceedings have been adopted that can be categorized into different disciplines and that carry their very own values and premises. These include art, architecture, mathematics, philosophy, politics, economics, and more recently, sociology, psychology, the humanities, and the cognitive sciences.

Therefore, theories in planning have been articulated to serve different purposes, a variety of methodologies have been generated, formulated, and utilized in planning, some of which have been borrowed from other specialties or even some realms of science and imported into planning. These methodologies, along with the complexities of the theory of knowledge, the theory of language, and the epistemology of modality, are therefore to be selected and justified by planning thinkers.

These series of complexities make finding a proper methodology for every research effort (including the current one) a very sensitive and delicate task.

3.2 Methodologies in Planning

3.2.1 About the Term

Generally speaking, methodology can be defined as analysis of the principles of methods, rules, and postulates and their correlations. In other words, it is concerned with a systematic study of what is known to be forming the structures, routines, or ways of doing something or those that have been employed within a particular discipline for a particular procedure or a set of correlated or isolated events or incidents.

The inquiry into the subject itself is carried out in epistemology and the theory of knowledge, the arenas of philosophy devoted to examining the scope and nature of knowledge. Then, for comprehending the methodologies, an inquiry about the types of knowledge that underlie or have been utilized in setting up, defining, or applying those methodologies seems crucial.

3.2.2 Knowledge in Planning: Know-What and Know-How

It is evident that based on personal background and experience, there is a single and distinctive pattern of planning for more or less every practitioner, theorist, and academic. To recognize that a pattern of planning can be personal is neither to reject a general planning theory altogether nor to accept it thoroughly.

Nevertheless, every thinker is faced with four crucial epistemological issues:

- What is planning, and how does it work (a matter of knowledge and facts; concerns, in the course of action, the roles of theories in planning)?
- How could or might it be (a matter of possibilities and probabilities; logic)?
- How should it be (a matter of justification and values; the quality and method; correctness and incorrectness)?
- How would it be (a matter of belief and preferences; this way or that way)?

These four concerns are applicable to every part of planning, including decision-making theory and planning theory that involves the logic of planning at different levels and scales and at various stages of work.

Planning is like a human activity to serve the built environment (in which the human being is the most important concern) in order to improve quality of life by using different aesthetic, technical, political, economic, sociological, and ethical means according to different empirical, rational, and analytical tendencies. However, the concepts of improvement and better actions are utterly controversial.

Complications are inherent in the definitions of know-what and know-how in planning, but a very familiar example of an experience involving both these forms of knowledge will shed light on differences between the two.

Imagine an activity like cycling, in which the required knowledge is basically acquired through know-how. Although some may claim that being introduced to the bicycle (gaining know-what type of knowledge) and its components is a priori to riding rather than that cycling itself is a basic

kind of empirical knowledge, first-time learners do not actually need to know about the dynamics to be able to ride bicycles. This does not, however, defy the idea that one may still learn what the bicycle is and what its parts are and how they work at least to improve an understanding about the cycling, even if he or she does not have any scientific or fully technical information about the bicycle. Evidently, one can improve at this activity through both know-how and know-what: by obtaining more experience through more exercise and/or by knowing more about physics as a science with known rules. The former type of knowledge can lead to better balance and handling ability, while the latter helps the rider improve any known capabilities of cycling by studying the rules of physics. This know-what knowledge can affect and improve someone's acquisition of the know-how knowledge, though it is obvious that no one can learn the entire activity by studying the physics. This means that the know-how type of knowledge or skill is a priori to know-what type of knowledge or awareness in this type of activity.

It can be concluded that the activity is not a science itself; however, it can be improved by scientific inquiries. The know-how knowledge will help the individual achieve the maximum skill of cycling, including perhaps even highly acrobatic abilities. Acquiring this type of knowledge depends directly on the rider's personal concentration and physical (experimental) abilities. On the contrary, the know-what knowledge is achievable by one who studies physics; by inquiring into issues related to the bicycle itself and the related physics, the rider can learn the theoretical basis for achieving the maximum skills. This type of knowledge is separable from the rider's physical abilities or mental state (which itself can be studied by know-what type of knowledge to improve the activity).

All the related factors (gathered from different disciplines) can be put together to improve the activity. This can be seen as a multidisciplinary activity. However, some thinkers, as Cullingworth asserts, still believe in the dichotomy between rational and actual planning: "Rational planning is a theoretical idea. Actual planning is practical exercise of political choice that involves beliefs and values" (Cullingworth, 1997, p. 5).

There are many statements similar to the above describing the nature of planning, especially after the unsuccessful rationality applied to planning in the 1960s and 1970s. This more recent attitude towards planning has been not only practical but also empirical. It rejects planning as a science (in its rational sense); hence, the know-how type of knowledge would subordinate the know-what vision in this view. However, some notions still extend so that the empirical sciences, which are based on pure empiricism or pragmatism, are still traceable in planning.

Although the example diminishes the details and reduces the concept's "generalizability", yet the analogical reasoning helps explaining the types and manifestations of knowledge in planning.

Planning is an activity in which know-how is central to the tasks and responsibilities. The study of different problems in the course of action (such as practical, live problems and theoretical, intellectual controversies) leads to new methods to tackle the problems or frame the solutions. The basic experimental knowledge flourishes when planners both subordinate the other related fields' outcomes and improve the technical side of the work by using know-what type of knowledge. Therefore, it can be claimed that, in planning, live problems stemming from live experiences are answered through two different types of knowledge: practical trial-and-error implementation (based purely on previous experiences) and theoretical notions for providing more profound analysis about the issue. However, due to the multidimensional nature of planning, which is somewhat engaged with pure philosophical issues, and regarding the complexity of a multiattribute atmosphere, which makes the evaluating process difficult to interpret, a single form of knowledge cannot cover the whole sphere.

To provide answers to the four questions given at the beginning of this part requires that crucial discussions be carried out with the use of either empirical accounts or analytical methods. With

reference to the 2010 series of lectures² by John Searle on the philosophy of language (See also Searle, 2009), finding truth, as the goal of different methods of acquiring knowledge, can be achieved by either experiments and scientific observations or by analytical methods. In other words, for scientific or empirical activities, the former means of gaining knowledge can work, whereas the latter approach is the only method for acquiring knowledge in theoretical, epistemological, and analytical investigations.

It is generally agreed that the former notion was practiced for a long time before the establishment of planning theory. Since the provision of theories in planning, the latter notion (know-what) has helped the former (know-how). But it also needs to be taken into consideration that both the former and latter types of knowledge should be somewhat committed to empirical or pragmatic accounts if they are to be practical and to deny radical idealism and utopianism.

It is worth mentioning that most discussions carried out in planning theory benefit from the rationality of analysis dominating philosophy and epistemology in which concepts, notions, principles, and axioms are discussed, conceived, and expanded.

3.2.3 Diversity of Methodologies in Planning

Although some thinkers like Bridge (2005) still tend to magnify the importance of a specific type of knowledge, and thus its methodologies in planning, the methodologies vary from research study to research study and from thinker to thinker. In favor of pragmatism, he asserts that:

Despite differences there are a number of characteristics that broadly define pragmatism. One is the judgment of knowledge by its practical consequences rather than theoretical coherence. This is related to its idea of praxis: that knowledge is something that must be practically acted out. (p. 3)

The subject has a profound interconnection with the envisaged definition of the field. Due to the lack of a widely accepted definition for planning, the methodologies used for planning studies' purposes have been quantified numerous times since the establishment of the field. Additionally, it is evident that the definitions, views, and methods have been both expanded and ramified and have quantified not only planning duties and responsibilities but planning theory at its theoretical level. This view on its own rejects any unified notion of the nature of planning.

On the contrary, the technicalist or technocratic view of planning among the theoreticians who mostly pursued the modernist rationality still follows a necessity of making a science from planning. Birch claims:

Underlying any disciplines involving scientific inquiry is a set of theories that predict behavior and provide a framework for the field's knowledge and, ultimately, practice. Its practitioners develop these theories by articulating hypotheses (expressing causal relationships among different factors or variables) and proving or disproving them through experimentation and empirical observation. (Birch, 2009, p. 96)

Therefore, regardless of how incomplete and unreliable they are, scientific methods of urban studies and theories of decision making have been vastly welcomed and favored, though their death has been announced many times (for further study, see Faludi, 1986). On the contrary, it has been broadly accepted that the recent tendencies of planning and its theories distance themselves from its early scientific and artistic views. As Taylor asserts:

town planning judgments were not so much technical or scientific as political. It was even suggested that it was misleading to describe town planning as a "science"; instead, it would be

² It is accessible through the website of the University of Berkeley at <http://webcast.berkeley.edu/>; under Philosophy 133-0– Philosophy of Language, Lecture No. 4

better described as a form of political action directed at realizing certain values. (Taylor, 1998, p. 77)

In the light of the above comments, finding a certain statement or a set of statements that either defines the nature of planning or assigns it to a specific realm of knowledge seems impossible or far from achievable. Thus, methodologies used in different research projects in planning, as in any other research area, ought to be proportionate to the type of knowledge they aim to acquire.

Now it sounds plausible that the dissimilarities of methodologies (from the past 100 years) applied to planning studies demonstrate that both thinkers and planners have widely rejected the idea that planning benefits from a unified methodology.

3.2.4 Different Paths or a Single Path Morphing

The relativist views of Feyerabend, the rejection of metanarratives and overarching theories by Lyotard (Hickman, 2007), and the role of power and discourse in the formation, interpretation, and application of theory (Allmendinger, 2002, p. 27) have had inevitable influences on the methodology of planning research and related aspects of the field. The late notion contradicts the traditional view of planning: “the neutrality of observation and the givenness of experience; the ideal of unequivocal language and the independence of data from theoretical interpretation; the belief in the universality of conditions of knowledge and criteria for theory choice (Bohman, 1991, p. 2; Flyvbjerg, 2001)”.

These influences have also caused the shift from positivist to post-positivist methodology in planning studies and research, to what Allmendinger describes as a post-positivist recognition of indeterminacy, incommensurability, variance, diversity, complexity, and intentionality of theoretical development. A post-positivist approach requires “shifting from causal reasoning as a basis for plan-making to discovering and confirming meaning”(Moore-Milroy, 1991, p. 182). The pursuing distinct methodologies in different cases, especially at the theoretical level of planning and decision-making theory, the diversification of methodologies has been implicitly welcomed by planning thinkers. Allmendinger also suggests:

Most of the current developments in planning theory (e.g. collaborative, neo-pragmatism, postmodern) [and hence methodology of research in planning] as well as new perspectives upon planning such as feminism are derived from a post-positivist perspective. Post-positivism, as a gross generalization, has a suspicion of ‘closure’ or definition particularly through postmodern social theory. But this does not or should not be used as a reason for rejecting classification as a basis for understanding *per se*. (Allmendinger, 2002, p. 33)

This intrinsically affects the methodologies employed to accomplish planning research. But it also is undeniable that the rational view of planning itself has challenged the traditionally modern notion of determinism by employment of uncertainty. This action has indirectly confirmed the existence of diversity, in its postmodern sense, which flows in the planning sphere. However, the methodology used for tackling the problem, the pathway, and the solutions have outlined dramatic differences from what is advocated by postmodernism.

3.3 Methodology of the Current Research

Regarding the main questions of this research and those about the logic of planning, including which logic should be used for planning and what its implications would be for decision-making theories in planning, the main task of the current research is to enquire into the different modes of logic and their implications when taken into the realm of decision-making theories.

Although some like Bridge (2005) may assert that pursuing knowledge based upon logical propositions should be abandoned in favor of pragmatism, the importance of dealing with the

meaning and justification of the decision-making act in this approach is undermined and even denied unreservedly. He claims,

Despite differences there are a number of characteristics that broadly define pragmatism. One is the judgment of knowledge by its practical consequences rather than theoretical coherence. This is related to its idea of praxis: that knowledge is something that must be practically acted out. It must be tested by its consequences, rather than its a priori logical propositions. Logic is more like a process of inquiry, rather than a set of abstract propositions. "Reality" is seen as unpredictable and emergent. Thus knowledge is fallible and always provisional (p. 3)

He also adds: "Whereas positivism and mechanics were taking social science in the direction of causality and linearity and the borrowing of models from the natural sciences, classical pragmatists stressed the organic web of life as the basis of understanding social relations" (Bridge, 2005, p. 3).

In other words, inquiry about the logic of fact-gathering (including definitions, tasks, and responsibilities), truth-finding (including truth or falsity of acclaimed propositions, sentences, statements, and entities) or even value-establishing (including discussing the justification of beliefs and common values) processes happens in the realm of meaning. The meanings need to be investigated in an analytical way to be methodologically justified. In such cases, any pragmatic account of knowledge is no more than knowledge about what is being used already. This means that using pragmatic information to model the reality (or simulate it) does not guarantee that there is in fact a meaningful connection between the models and reality. This means that examining logical and epistemological accounts of planning (based on the analytic method) in harmony with the type of the work is a priori to the justification of pragmatic acts, although they may have been assumed to be real. Then, though the unwanted or unexpected results can help us (re)define the problem, the study of this change should be carried out at the theoretical level with consideration of not merely application but also practical complications.

3.3.1 General Vision of the Research's Path: Setting the Scene, Development, and Analysis

As discussed before, the research examines its questions and hypothesis via an analytical approach: first, by studying the underlying principles of the current logic of decision-making theories discussed in planning theory and, second, through what could or should be pursued as a justified alternative logic (fuzzy logic in this research) to be used by such a multiobjective profession in the delivery of the decision-making theory.

In a wider perspective, the research examines the definitions of planning (as a whole) and decision-making theories in planning (as a part of a general picture) through its logic. In this part, it investigates whether planning and decision making are multiobjective and multivalued activities. Then, the infinite-value logic (fuzzy logic) as a relatively new logic is described. Based on previous experiences, in different fields, decision making based on binary and multivalued logic is presented. The concept of fuzziness and fuzzy notions of decision making will be studied next. That the cases of decision-making in planning are intrinsically fuzzy will be discussed. For the (rational) necessity of coherence between the character of decision making and its logic, the binary logic will be investigated and the epistemological inappropriateness will be explained. Fuzzy logic, which can be considered as a possible alternative logic to orchestrate a justified rule-based approach in decision-making theory, will then be examined. The analysis of decision-making theories demonstrates that no justified logic to tackle the decision-making theories has been introduced. Finally, the benefits of using fuzzy logic in establishing an alternative logic for decision-making theory will be pursued, and the implications of the application of such an alternative logic will be explained (see Figure 2.1).

According to Allmendinger (2002), "The critical realist perspective [of planning] also helps us comprehend the relative autonomy of individual planners and the way they use, interpret and develop theory for their jobs" (p. 17).

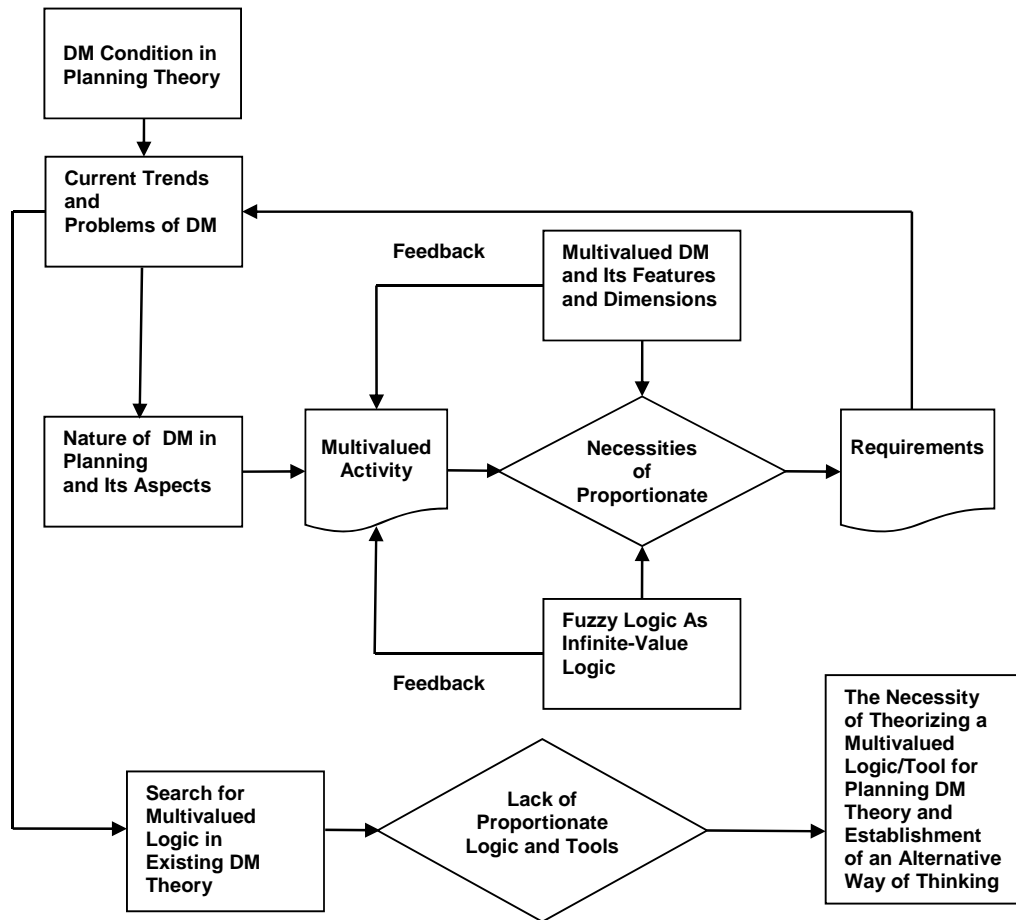


Figure 2.1. General methodological path of the current work.

3.3.2 Type of Framework: Theoretical and/or Practical

Moving exclusively towards the highest level of abstraction has the danger of producing what are called useless and impractical theories empty of reality. Yet, amusingly, on the opposite side, pursuing only practical notions with a strong commitment to empirical accounts (based on what planning people need) leads planning and theories to the extreme at which there are no considerable improvements or steps forward. This may result in engagement with the existing facts and dealing with issues mainly on a day-by-day basis. Therefore, keeping both concerns simultaneously in mind helps the profession to be creative, innovative, and practical.

Although the researcher supposes that there are no crisp fractions between substantive planning theory (See Faludi, 1973a) and the theories that take into account the course of action, in its reductionist sense, he has committed himself to the traditional way of research. The current research has, therefore, been brought to the highest level of abstraction. In other words, the research has been pursued in a theoretical framework. Thus, the theoretical discussions of the research contain potential contributions to the implementation and practical part of work by critiquing the existing theories and developing a new alternative theory of planning. In the light of above comments, the current research and its results provide a platform. Although it can

simplistically be considered theoretical, it advances practical sequences to be used by planners later on as an alternative way.

3.4 Possible Criticism

It is very hard, and controversial, and perhaps it might seem even paradoxical to some extent, to carry out a study on the rejection of a specific notion by using the methodology proposed by it. But what if this proved the fairest and most reasonable way to do it and the most robust method of critique? The consequence would amplify the power of the notion to criticize even itself. It would be harder where the opponent (or opposing) notion is present to replace it.

The very first step of this research may seem to represent precisely what is described above. It may be presumed that the research, in choosing the methodology from classical logic to tackle a problem occurring within the same logic, is to replace classical logic with an alternative logic. Therefore, here, the relationship between classical logic and fuzzy logic should be clarified in order to avoid any further doubt about the paradoxical choice of methodology for the current research.

Classical predicative logic is a logic in which the value of truth is constrained to only two values: true or false. Basically, this logic could be used to determine the trueness of the statements made in different situations. In a binary situation, there is no doubt that a binary logic can be a proper solution to decide between two options that are present. Yet a problem arises in two different situations. The first is when there are more than two options. In such a situation, it is necessary to weigh the options and then make the final decision. Second, and perhaps more importantly, is the situation in which classical logic faces vague values, for instance, where the notion of justice is discussed. Looking for definite values has long been attempted in order to determine the truth between the two values of true and false. Although most thinkers throughout history have been familiar with the idea that in some situations there is no final answer, they have tried to assign this issue to vagueness. Then, as the long history of epistemology shows, philosophers have challenged this notion and set out to clarify the notions of true and false by formulating new methods to recognize them. This has been pursued to duplicate the binary decision making (for inherently binary sets) for the concept of “belief,” which is a non-binary set with human dimensions seriously involved.

Almost all human-based sets (if they are not restricted to two decisions by definition) are intrinsically engaged with the vagueness that cannot be tackled using classical binary logic. In recent years, with the development of many-value logics in different technical and linguistic disciplines, the truth of the notion “true or false” (*either ... or*) has been seriously challenged from many possible angles. With the application of infinite-value logic (known as fuzzy logic) in decision making, traditional doubts about many-value logics have gradually come to an end. It is now evident that classical logic is merely a specific condition of fuzzy logic. Therefore, whatever is being pursued using classical logic sets can be expanded to be followed in the logic of fuzzy sets.

The nature of the ordinary decision and what particularly was targeted by this study have proven to bear a high degree of complexity and a great number of involving factors, with utterly different natures and complicated interrelationships. To handle such a complicated situation, it was decided to keep the situation as linear as possible, although this seems to be in contradiction with the basic idea of the research.

3.4.1 Study of Logics

Metalogic is the study of the metatheory of logic. While logic is the study of the manner in which logical systems can be used to decide the correctness of arguments, metalogic studies the properties of the logical systems themselves (Gensler, 2002, p. 253). According to Hunter, while

logic concerns itself with the "truths of logic," metalogic concerns itself with the theory of "sentences used to express truths of logic" (Hunter, 1971).

Perhaps, in this chapter that sets out to explain the methodology of the current research, some would expect the study of metalogic to be necessary because of the nature of the topic of this research and its possible interlinks with many-value logics, but it is rather based on what has been already pursued in fuzzy logic and classical predicative logic.

The concentration of the current research is on, first, a non-classical logic (and sometimes alternative logic) and, second, how to attribute this specific type of logic to an activity. In other words, the inquiry is into what type of logic should be applied to what type of activity (and to a specific activity) rather than what represents metalogic; formal language, formal grammar, formal system, formal proof, formal semantics, to (re)organize the relationships between lingual statements and trueness of statements.

Thus, the study of logical propositions and their relationships is the scope, where their traditional form is examined (merely in the sense of classical predicative logic). Whether the statements are true will be examined through the form of the binary study of classical logic. Therefore, how true the statements are is the subject of inquiry of such studies.

3.5 The Necessity of the Research and Its Contribution to the Knowledge Pool

The necessity of this research relates to two existing perspectives on planning; one is a consequentialist view of planning that has a predicative view towards what can happen if a major shift is aimed at in the planning discipline; the other is what talks about the justification of process, namely, the procedural view. The former view and its related studies consider the consequences of planning: the concerns about who benefits from planning and how much. The latter, by contrast, asks the questions related to the process of decision making (for a detailed discussion, see chapter 4). Cullingworth suggests that

it often seems that it is . . . interrelationship of problems which is the central problem of government. The issue is neatly highlighted in Donna Shalala's lecture on urban policy: 'Every time Treasury changes the Tax Code, every time Congress alters a welfare program, every time the Defense Department awards a military contract, urban policy is being made.' (Cullingworth, 1997, p. 1)

He also adds that

the limited amount of discretion which the constitutional framework allows to local governments. Discretion implies differential treatment of similar cases, and therefore runs foul of the equal protection clause of the constitution. The Bill of Rights guarantees that individuals are to be free from arbitrary government decisions. This is a major constraint on planning in the US. (Cullingworth, 1997, p. 17)

There is much evidence that, even in democratic systems with commitments to the free market, governments are intervening in planning without people's approval. In one such society alone, the United States, the so-called war on poverty, the HOPE VI³ program, presidents Clinton's and Obama's health-care proposals, and financial bailout plans were among those plans that were either unsuccessful at the decision or planning level or that passed this stage and were approved but not successfully pursued and implemented. The plan for California's high-speed train and the partial financing of General Motors by the U.S. government are explicit examples of

³ The program began in 1992 with formal recognition in law in 1998. Its philosophy is largely affected by New Urbanism and it is meant to revitalize the worst public housing projects in the United States into mixed-income developments (BETTER CITIES AND TOWNS (2002) Hope VI funds new urban neighborhoods. *News and Opinion*.

governmental intervention in planning in such an acclaimed free-market atmosphere. There is more or less discretion in a disjointed (as opposed to unified) decision-making system, even though it is stated that one of the crucial features of the U.S. planning system is its commitment to the free market and the decentralized decision process as the pillars of a democratic society.

All the above discussions are concentrated on the justification of the procedure of decision making. However, it should be noted that any discretion as such cannot be scrutinized independently of its context and regardless of the situation in which it has been shaped. With this in mind yet keeping an eye on what was said in this section, the current research investigates the theoretical accounts of planning decision making.

In fact, the research discusses right and wrong accounts of decision making that are embedded in planning thoughts and presents an alternative way to deal with them. This contributes to push the knowledge and epistemological notions of planning a step forward with emphasis on decision-making theories.

At the same time, the study of different types of logics, beyond what classical logic introduces, opens the vision towards what this research aims to achieve through the study of the possibly proper logic for an activity like planning decision-making theory.

3.5.1 Current Contradictions and Needs

Planning and its decision-making theories have had more failure than success over the last century. Banfield (1961) explains the problem of city planning in America as:

American cities seldom make and never carry out comprehensive plans. Plan making is with us an idle exercise, for we neither agree upon the content of a 'public interest' that ought to override private ones nor permit the centralization of authority needed to carry a plan into effect if one were made. (p. 263)

But this issue is not limited only to American cities. Decentralization of planning is a concept pursued by many committed to democratic decision making. The controversy between intellectual accounts and practical aspects of work lies in inherent contradictions and conflicts that they have with each other. Therefore, to tackle the problems, some have proposed a stronger planning agenda with a more fixed framework, and some, by contrast, would vote for a more restricted planning in action, in other words, a more open-ended planning with higher public control. The key members of the latter group also see actual planning and decision making as activities that should be in the hands of people and interest groups. They strongly believe that, otherwise, we should most likely expect some limits on freedom in a society within a democratic system. According to Goldsmith (1980),

planning in its broadest sense often seems to promise solutions to modern urban problems, but at the apparent expense of threatening the democratic nature of Western society. In essence, this suggests that the problems of the city can be solved, but must the solution be at the expense of the individual's basic freedoms and rights? (p. 15)

In such a system, the main issue then is "not whether there should or should not be planning, but how much of it there should be and how it should operate" (Cullingworth, 1997, p. 8).

But no actual democratic exemplar has yet been formed in which planning processes could be completely transferred to the people, in which the public could gain full control of decision making and decision taking (we are not talking about the philosophical discussion of this issue here, meaning that if we do not reject this idea at the moment, we cannot achieve it later). Therefore, at the moment, there is a need to attempt the most convenient of compromising systems. This means the governmental bodies and institutions, along with technical measurements to control the managerial and rational side of the work, are still needed. However, some others may believe that transferring the control from central to local governmental levels will result in smaller sized

communities and interest groups behind the gates of gated communities and that these communities, after getting expanded to a certain degree, will themselves need to be regulated by larger scale planning institutions.

Notwithstanding two decades of theorizing bottom-up approaches (versus top-down ones), prioritizing the tasks and legal issues, and studying rational planning (versus post modern accounts), there is still a need to get to the level of practicality of theories that is closer to implementation and a course of action rather than standing alone in “planning utopia,” with myriad theories in planning, far from reality or the need for day-to-day action and with nothing in hand. The theory or a set of theories can be justified. But apparently, theorizing attempts (committed to meaning) should not be seized in favor of those linear causal and single-headed practical accounts that are generated by dual propositional predicative logic.

3.6 Premises

3.6.1 Geographical Premises and Politico-Economic Atmosphere

There is no geographical location in which the current research is carried out or to which it is assigned. Based on the underlying philosophy of the research, many of the notions amalgamated do coexist with other aspects in reality; however, these notions have not received any appropriate weight within the decision-making equations through a structured method. Thus, any theorizing for decision making cannot be limited to a specific geographical region.

Therefore, instead of, for example, supposing an atmosphere committed to a fully pluralist or to an elitist political system and the planning necessities of either (what and where it should be), it has been supposed that a combination of pluralism and elitism thoughts always exists. But what changes from time to time, from person to person, and from case to case is the portion of each characteristic of planning models to be used for making the decisions.

With regards to this diversity Cullingworth suggests: “there has to be a sufficiently sound basis of agreement for planning to be possible. In democratic societies, large numbers of diverse interests not only have to be considered but also have to be involved in the planning process” (Cullingworth, 1997, p. 6).

This research has taken place in a planning atmosphere where the variety of voices can be heard (or at least the voices are supposed to be valuable and effectively contributing, to some degree), private sectors can protect and follow their own interests, and governmental organizations are obligated to respond to people and to facilitate the people’s collaboration in planning processes. He also claims

Previous generations have battled with questions of how to make planning effective in a democratic society: their experience is of relevance to the contemporary scene. Issues highlighted in this account include the pervasiveness of privatism, the reform movement, the City Beautiful movement, and the growth of planning. (Cullingworth, 1997, p. 5)

3.6.2 Lacks and Faults (Data, Time, Corruption, Institutions’ Structure and Relation)

With regards to the nature of planning explained by Almendinger as: “Planners do not operate in a vacuum devoid of structural influences. There are rules, existing processes and norms” (Almendinger, 2002, p. 17), the framework of this research willingly welcomes any types of defects or indefiniteness, human faults and managerial problems, and contradictions in the planner’s role (e.g., though planners still portray themselves as apolitical and technically expert, roughly 80 percent of them are employed in the public sector, through which they are charged with carrying

out the preferred policies of central and local governments[see, for example, (Reade, 1987; Thornley, 1993; Blowers and Evans, 1997; Evans, 1995, 1993). Some research projects tend to ignore actual planning contradictions (such as contradictions from, among other sources, these three potential categories: the researcher's personal and professional feelings, his or her employer's objectives, and the code and ethics of the researcher's professional institute [see Allmendinger, 2002, p. 23]). Because ignoring such contradictions can take research to the highest level of unreal abstraction, the current research applied to the logic of planning examines the actual atmosphere. In this research, these problems are seen as part of the reality flowing in planning, in general, and in decision making, in particular. These types of problems have been taken into account as either known or unknown uncertainties of the work. Therefore, introducing a tool that is able to deal with these types of uncertainties is an implicit part of the research. However, as is apparent, this is the theoretical basis of the method of tackling the problems laid out before taking it into the course of action.

3.6.3 Philosophical Premises

3.6.3.1 Fallibility

From one sense, the issue of the fallibility of the theories in planning with the emergence of the postmodern accounts seems to be a matter with no legitimacy or significance to be discussed. This means that where an account (here postmodernist) talks about fallibility as an inseparable notion of planning (and rational planning was not successful at tackling the related problems), pointing out the fallibility of postmodernist accounts is not necessary. But on the contrary, the issue comes up where these accounts attempt to theorize some concepts, principles, criteria, or disciplines in which fallibility needs to be examined. In other words, up to the point that negation is pursued by postmodernism, there is no need to reason about fallible cases. In other situations, however, it needs to be proved in any assertion. Krueckeberg (1983) expresses fallibility in planning as:

In an editorial in the journal of *City Planning* in 1926, a reply was given to claims by architects for the sole responsibility for designing cities, towns and villages and other groups of buildings. The answer was that city planning "is cooperation-cooperation of fallible humans each contributing what he can." (Quoted after Krueckeberg, 1983, p. 23 cited in ; Faludi, 1987, p. 17)

Therefore, after about three decades of theorizing the primary notions of postmodernism in planning, many thinkers who had committed themselves to this school of thought tried to present substitutions. These substituting theories need to be fallible (but not to have universal fallibility) in what they assert in order to be justified in usage.

Therefore, the issue of fallibility in this research is the pivotal point used to criticize the logic of planning thoughts and to examine and give the proof to the hypothesis.

3.6.3.2 Justification

It is evident that both the concepts of justification and falsification are relatively related to the concept of truth. Moreover, the concepts of "justification," "truth," "belief," "fact," and so forth epistemologically as well as the concept of knowledge itself are related to the relativity of truth.

Those all are the basis for the justification of action in planning and decision making. Moreover, justification and falsification of knowledge and action are two interrelated courses that can also be separate in another sense. This is because the knowledge through which the provision of a plan takes place differs from the justification of the need for such a plan and also from the justification of decision making about the plan.

In the current research, the matter of justification is pursued in two different senses: first, in the sense that a statement literally needs to be (mostly, likely to be, unlikely to be, etc.) justified to

build up the knowledge bases and, second, in the sense that an action should be taken based on justified reasons.

3.7 Conclusion

The aim of this chapter was to explain the methodologies in use in planning and, more importantly, the methodology and premises of the current research. Being utterly different in what it set out to achieve, the current research employs a unique and extremely exclusive methodology. Unlike typical research projects, whether they are qualitative, quantitative, or a combination of both to a degree, this research uses a new type of methodology whose aims are very much like those of a purely qualitative one. Nonetheless, the most important distinction is that the current research builds upon what the informal logic of the everyday reasoning system grasps, what human beings are using in their everyday lives in a great deal. The fact of the matter is that the current research uses some established methodologies, but the main difference remains how it fluctuates between and combines the inductive and deductive methods. As explained above, there are two main reasons for this. First of all, it is because none of those methodologies that claim to have used only one of these methods epistemologically have actually been able to confine themselves to one and only one. The second reason is that, revealing this failure according to the classical definitions of formal logic, the current research has tried to devise a methodology that knowingly and subtly combines the two to best benefit from them and achieve what it has resolved to achieve. The main point to bear in mind is that all the envisaged goals have been aimed at through an analytical approach.

Therefore, it is more than obvious that the current chapter requires the least amount of literature about the direct conclusion because it comprises a set of methods and premises that need to be clarified in detail. But here a succinct description of the methods used and premises supposed, which were explained before, is given:

There exist a number of taxonomies of the ways in which humans approach problem solving tasks. One particularly useful taxonomy, according to Rasmussen (1983, 1986), conceptualizes three distinct types of problem solving, or reasoning which we describe as:

Formal knowledge-based behavior
Rule-based behavior
Skill-based behavior

The choice of which type of reasoning to be employed is made by the problem solver on the basis of experiential familiarity with the task at hand, and the environment in which this task is imbedded.

Often, there is a mismatch between the problem solving behavior that a particular human will use in a given situation, and the behavior that a machine might be programmed to emulate. (Bouchon-Meunier and Yager, 1987, p.11)

What has been used in this research is, in fact, a combination of the above three. However, because of what Bouchon-Meunier and Yager point out, the potential inconsistency between human and machine behavioral patterns in a given situation, the research has put its main emphasis on and effort into rule-based human behavior in the process of decision making.

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2 Planning, Planning Sphere
and Planning Theory

3 Analytical Study of Research
Context: Decision-Making
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4

Concentration, Theoretical Framework, and Methodology

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4 Analytical Study of Research Context: Decision-Making Aspect in Urban Planning

4.1 Introduction

This chapter will aim to deal with the issue of decision—the related theories, the risks, and the uncertainty in the key process of decision making. In this chapter, the concept of decision making and the methods employed by different technical and scientific fields, in single-goal and single-objective activity, will be examined, and the similarities and differences with decision making in planning will be studied. These questions will be pursued in the chapter:

- Is there any unified definition of decision making?
- Are decision making and decision taking central tasks to planning?
- Is there is a common understanding among theories in planning on decision making?
- Is the planner a decision maker and decision taker (and where and where not)?

This subject is very prominent to the research for two reasons: first, to avoid distancing from the reality of decision making and, second, to keep the discussion at the theoretical level.

Traditionally, decision making under uncertainty (DMU) relies on a probabilistic framework (Dubois and Fargier, 2003, p. 3). But recent needs have necessitated a call for alternative planning decision theories. Admittedly, this is a rather conservative call for what has already been pursued in other disciplines.

By using the qualitative approach, decision making, as Doyle and Thomason (1999) claims, turned into a new paradigm: “Artificial Intelligence has witnessed the emergence of a new decision paradigm called qualitative decision theory, where rationale for choosing among decisions no longer relies on probability theory nor numerical utility” (p. 55).

This chapter will provide an overview of how the process of decision making has been represented in planning, how it has evolved, and how it has witnessed major shifts. It will address how major problems emerged, how attempts were made to respond to these problems by alterations or conversions made knowingly or imposed unwillingly on the decision mechanisms in planning, and where the process started to go wrong. It will then highlight, in parallel, how alternatives arose mostly from outside the discipline and how they managed to target similar problems in other disciplines. This will be done through an analytical and comparative study rather than in a chronological order, as the current research aims to take an explanatory approach to the subject matter rather than giving a narrative account. This will provide a firm ground for proposing an alternative logic of decision making in urban planning and public policy to be relied on and used down to the most practical levels to improve the existing situation of planning by increasing the level of contribution of those parties for whom the decisions are supposed to be made:

Besides promoting democratic decision making by increasing opportunities for participation by citizens (Council of Europe, 1995), the creation of stronger local democratic institutions is increasingly being seen as a supply-side policy in the form of national capacity-building and institutional strengthening.(Bailey, 2001, p. 339)

Decision making is a complex process. In not only planning but also in other scientific and technical fields it is subject to long and controversial debates. Basically, one of the most outstanding features of humans (compared to machines) is the ability to process data to achieve

the proper answers to make decisions benefiting from multivalued logic. This success causes the pursuit of studies in the development of artificial intelligence (AI), a field inspired by the human brain's abilities and the mind's logic. The application of this logic, so-called fuzzy logic, has been expanded during the last 50 years. This is the logic for facing complexity and uncertainty (see the next chapter for details). These are two pivotal questions to be answered in this part:

- What are the similarities between the (nature of) planning decision-making logic and this logic?
- Has this logic been used by theories in planning yet?

4.2 Decision and the Necessity of Decision Making

4.2.1 Etymology

Decision, a noun, literally means

1. a conclusion or resolution reached after consideration.
2. the action or process of deciding.
3. the quality of being decisive." ((Soanes and Stevenson, 2005)

It can also mean

1. a choice or judgment that you make after a period of discussion or thought.
2. the quality someone has that makes them able to make choices or judgments quickly and confidently.
3. the act of deciding something.(Summers, 2003, "decision" entry)

The latter set of definition sheds more light on decision making: the process of making important decisions.

In the first definition given above, a decision is equated to a "conclusion" or "resolution" but needs to be carried out after "consideration." This consideration implies that a decision cannot be made without a process, which is mentioned in the second definition. And also the general word "consideration" exhibits that there is no limited or methodic approach supposed to be applied to this process. This means it can come out of every type of process, but need to be logically proportionate to the decision. In the third definition of the first series, *decision* is described as a "quality" that can show the subject's decisiveness in the act. This means that the whole process needs to be narrowed down to a decisive condition in which something determinedly is suggested. The same reference suggests "resolve" and "determine", as synonyms to *decide*.

The latter reference adds another keyword to the definition: "judgment." This action that can be described as "judging between some competing conditions to choose one or some against the other(s)" points out the final part of "consideration."

Hopkins (2001) suggests "A decision is a commitment to action (or inaction) and is made by some individual or entity with the capability to act" (p. 26). But it is important that judgment, a word relating to ethical accounts, needs to meet some points to be justified. In the second definition in the same reference, "confidently" also emphasizes the need for justification in the judgment, or decision, of whether a plan needs to be carried out or not. That is why the whole process of this "important" "consideration" can be seen as decision making.

4.2.2 Decision-Making Situations

Decisions are an unavoidable part of everyday life. A decision comes into play either when there is more than one option from which to choose or when there is a single choice and a decision must be made to do or not do a certain thing. This will be discussed later in chapter 6, where the issue of decision is addressed with regard to defuzzification in fuzzy logic along with reductionism, which assists in regulating or restricting the choice, in bivalence classical logic.

Decision making happens literally every day, from early in the morning, while, for example, one is choosing a suit to wear, to the end of the day, when a decision is to be made about the table menu at a restaurant. One is also familiar with tougher decisions, such as selecting from jobs offered or, when there are problems at work, deciding whether there is a need to talk about them with the manager.

Obviously, decisions have all different levels of significance. The importance of a decision is determined by how and to what extent it will affect its context. Quite evidently, the bigger the number of factors or stakeholders it involves, the more complex and more important it will become. Its importance also varies well with the areas it targets, tends to change, or affects. Choosing the color of a suit for a company meeting is definitely not as important as, for instance, an ambulance driver's decision to run a red light while transporting a critically injured person. The ways in which decisions are practiced also varies widely. The more important the decision, the more it will be subject to scrutiny; hence, an important decision needs to be based on more rigorous principles. This will also give the decision a good ground for justification later on when it already decided, taken, or left aside.

4.3 Decision Making and Urban Planning

Urban planning and planning as a whole are no exception. There are many situations in which decisions come up, and the decision makers, who both have granted authority to decide and must decide (as a part of their jobs), have to make decisions. As Hopkins asserts: "Decision situations are choices about actions we have the capacity, authority, and opportunity to take" (Hopkins, 2001, p.30). But obviously, the situations are identified by the "issues [that] are things we care about" (Hopkins, 2001, p.30).

Other than that part of planning that is involved with the physical data gathering and quantitative or statistical analysis of data, planning is rigorously engaged with decisions; thus, the activities or actions such as concluding, judging, resolving, and qualitative analyzing are carried out eventually to meet the decision-making stages as well as post-action evaluating.

4.3.1 Decisions

There are two different types of decisions in planning: first, decisions about things that need to be done and, second, decisions about things that should not be done (See Taylor, 1998). The latter are decisions that typically are omitted from the list of decisions, except in some crucial cases. Therefore, they are rarely taken into account as decisions but are added to the list of prohibitions. These are those types of decisions that are mostly taken by government or the public sector in the absence of users and actors. These decisions can be attributed to the *preventive decisions* category, and the regulations related to them are known as *preventive regulations*. The former type of decisions can be seen as decisions about control, initiation, or cure. However, logically, the preventive regulations also have influential roles in control and, hence, on initiation or cure but in indirect and reverse ways.

4.3.2 The Relation

Dahl (1963) cites that

I understand planning to be a method for reaching decisions, not a body of specific substantive goals . . . planning is a rather special way of deciding which specific goals are to be pursued and which specific actions are to be taken . . . the method is largely independent of the phenomena to be planned.(Webber, 1963; cited in Duhl, 1963, p. 320)

This depicts a dominant image of decision making in its highest level of abstraction given in the 1960s (and 1970s). On the contrary, some have advocated as Taylor (1998) does here:

The process of planning does not end when a decision has been made, for the chosen policy or plan then needs to be implemented. It is thus more accurate to describe the rational process of planning as a theory or model of rational action, rather than "decision-making"(Taylor, 1998, p. 68).

The relation(s) between decision making and planning, as was mentioned, has been the subject of many discussions and papers. Up until the 1980s, and still in some contemporary works, the dominant typology of planning theory, which was provided by rationalists such as Faludi(1973a), who based his approach on the distinction between substantive and procedural theory (Allmendinger, 2002, p. 30), had deep influences on the issue of decision making. Yiftackel(1989) suggests, "Procedural theories define and justify methods of decision making whereas substantive theories pertain to interdisciplinary knowledge relevant to the content of planning: that is urban land use"(Yiftachel, 1989, p. 24).

This substantive-procedural (dual) distinction, without considering its systemic base and apolitical accounts, highlighted the epistemological differentiations of *theoretical planning* and *practical courses* and underpinned the idea that decision making was a merely theoretical concept.

The above crucial discussion, along with the large amount of literature on decision making, which is central to planning theory, demonstrates the importance of the issues of decision making itself and of decision-making methods and processes. For a long time (See Faludi, 1987), this also caused decision making to be looked at as and equated to planning (at least from a theoretical point of view). This idea resulted in distancing the decision-making methods from reality and the processes from an acceptable method and even from what had been traditionally pursued.

The categorization of decision making in planning and its related discussions support the idea that there was an unintentional thickening of the theoretical aspects of planning in the literature, a change that deepened the gap between theoretical planning and practical courses. As will be discussed, this modernist bivalent logic (rooted in the Western philosophy of reductionism and dualism) has been pursued in different forms and ways, even in postmodern accounts that still benefit from this type of reductionism.

A number of practitioners, theorists, or planners, like Campbell and Fainstein (2003), still emphasize the bivalued axes, such as physical versus intellectual, differentiations in which decision making carries the intellectual extreme of planning: "the field of planning is divided among those who define it according to its object (land use patterns of the built and natural environments) and those who do so by its method (the process of decision making)" (Campbell and Fainstein, 2003, p. 2).

Therefore, the definitions that either identify planning as equivalent to decision making or divide planning into practical and theoretical accounts then equate decision making to one of the notions and attempt to downgrade the homogenous sphere of planning into successive islands of tasks by using reductionism. The activity contains many other crucial processes like policy making, plan making, implementation, action, evaluation, and so on. These, if reduced to "decision making," will prevent the other vital processes from being vanished, but traditionally there has been an effort to magnify the importance of decision making in an unreasonable and artificial way.

Thus, the most logically accepted definition of this relation is the one that describes decision making as a part of the planning sphere and a process among many others. Those can envelop each other in some ways and have conflict in some other ways.

4.3.3 The Root of Importance

Since there are diverse groups involved in planning cases, some, like Allmendinger, identify a competition between the groups to make the final decisions: "Very large numbers of decisions are being made by multitudes of individuals and groups sometimes in response to the consequences of decisions made by others" (Allmendinger, 2002, p. 44).

Considering even the traditional role of planners, the decision-making process as a part of the profession has been important to them. The task of decision making has been expanded and modified from the decisions on architectural applications with requests to build, to introducing the regulations for construction, and most recently, to everything in the built environment. However, private citizens (in the systems committed to individual freedom and democracy) have been encouraged by thinkers, sociologists, philosophers, pluralist politicians, and others to make and take the decisions on their own. To return the basic rights the citizens in decision making Davidoff (1965) asserts

The planning process . . . must operate so as to include rather than exclude citizens from participating in the process. "Inclusion" means not only permitting the citizen to be heard. It also means that he be able to become well informed about the underlying reasons for planning proposals, and be able to respond to them in the technical language of professional planners. (p. 332)

This is because it has been supposed that the value of freedom (the right of selecting and deciding) is a universal value and should be achieved through the decentralization of decision making (in the sense of planning).

Although this idea has been mostly translated into the political accounts of planning directly, it seems not to be completely correct. The main value behind this idea is an ethical (moral or intellectual) value that needs to be engaged with political accounts to be achieved.

Notwithstanding what was said, this attribution of the idea to certain values cannot decrease the importance of the issue. This has not only been a challenge for the professional planners, but it also has raised serious disputes in the entire profession with respect to "discretion" and "control" on the one hand and "freewill" on the other (See Cullingworth, 1997, pp 3-11). This challenge is the central point to the decision-making discussion.

It can be seen from rational accounts that describe decision making with only word, "best," that the idea of decision making has been modified to mean the "right" and "best" decisions and decision making. Since this subject (in both subjective or objective notions) has changed from a merely technical issue to a value-laden one, the irreversible expansion and unavoidable contradictions of different involved fields come about and need to be scrutinized.

Also for the importance of the discussion, it is notable that the related terms and notions including decision taker, decision taking, policy making, and plan making need to be discussed, and their dimensions to be examined as well.

4.3.4 Where Do the Planning Decisions Happen?

Like any other categorization, this can be organized in different ways and from various points of view. But what will suit the purpose of the current research is a categorization that demonstrates where the decision-making processes are taking place. However, within this classification, we encounter different types of fuzziness, which will be discursively discussed in the next chapter. The most important types of decision(-making) can be categorized as follows:

- Decision making about plans (including blueprints, for example) provided by professionals from various sectors.
 1. Which one is better? Which has lower costs and more benefits and is procedurally justified?
 2. Which one should be taken into action? What is the feasibility of implementation?
- Decision making about the meaning of policy making and public policy; setting the general goals, objectives, and targets (See Hall, 2002a, p. 214).
- Decision making in the sense of plan making, as a pervasive action of various groups, including political bodies, planners and technicians, and citizens to make the decisions about the built environment.

A pivotal point to this discussion is that the decisions from any types *ought to be* methodologically justified. Evidentially, the justification for every plan from each type can be different both methodologically and epistemologically. However, notions coming from common points can be classified into the sets with common factors that need to be justified; hence, a common justification is required.

4.4 Major Milestones for Decision-Making Theories Based on Objectives

After planning switched mode to “planning for place” and shortly afterwards to “planning for people” (Campbell and Fainstein, 2003, p.12), it was predictable that the decision-making theories in planning would need to deal with the concern that was about to take shape and choose a new and slightly different route: *planning with people*, the idea of *public-centered planning*, which ultimately caused the person-centered view of decision making to be seen as the prevailing mode of planning. The idea, in which the concept of democratic control and decision making is to be pursued, and the power will be transferred to people and local communities. This pushes a step forward the definition of the people’s role in electing their representatives to control and improve the political-economic activities. Thus, it will shape and bring to attention the matter of the legitimacy of private citizens’ participation in the decision-making process. This notion will attempt to distribute the power among people and give them the ability of decision making as much as possible. This, apparently, will deal with how to distribute the power, with what kind of power structure can be imagined to distribute the ability, and also with the proportion of each participant in this process. There still are some questions concerned with this notion, such as how this is applicable (this is the matter of applicability), who has legitimacy or rights in this process and how much, and even why this should be done (the matter of how to handle the procedure by weighing different perspectives). However, this idea can be misplaced by the ideas like *decision taking by people* or even by *learning from people*. Although there is a vast literature on “transactive planning,” what is described by Faludi as “the style of planning is the one which is conducive to this mutual learning, based on the strength of the argument” (Faludi, 1987, pp. 102-114) or what is advocated as *planning-as-learning* model, it is not yet elucidated or clearly defined. Although the decision-making theories have recently focused on the aforementioned concerns, the newer wave of theories should be seen as the approach promising to bring various aspects of planning into coalition with spatial users’ values.

4.4.1 Transferring the Decision Making to Citizens; Arnstein’s Citizens’ Control

There are two major issues in achieving different groups’ interests through people’s decision making. First of all, it is evident that individuals are not able to analyze the planning phenomena as much as the professional organizations are—which does not negate assertions that planners too, for many reasons, cannot analyze effectively enough and cannot propose solutions whose success is fully guaranteed. Second, different groups’ interests are involved with those of the

others'. For instance, local people may have particular interests regarding a site that may and usually will differ from those of the developers' of the same site (or they may have some common interests with other developers). But some of these interests are in full contradiction. Then achieving one group's interests will cause the others to lose. In addition, dealing with some interests according to the people's vote can have unpleasant effects on their lives and the other groups' interests at the same time. This could result in worse effects on further opportunities for both groups (decision makers and *decision acceptors*). In this circumstance, the planner's role, in between, can be changed to that of a moderator of the panel of stakeholders who have a conflict of interest. However, in the end, some analyses from existing contradictions and a final judgment need to be taken.

But the question is who the judge would be. If the judge is the planner, then he or she is engaged with legal issues that may change his or her position to that of a lawyer. On one hand, only a deterministic yet very optimistic belief can envisage the simultaneous benefit of all groups related to a certain problem through a single solution. And only an ill-defined decision-making process can give the full authority to either prohumanistic or proscientific participants of this complex process to take over. On the other hand, because of the uncertainty of the data gathering, the problem's definition, and the knowledge of the environment in which planners work, understanding the management issues in implementation and also reading and rereading the former plans implemented are crucial.

It is evident that planners need the people's contribution at least on the local scale; these contributions are not necessary in the framework of traditional surveys, but the people's input on everyday job descriptions is constantly needed, and private citizens can participate through cyber space (Campbell and Fainstein, 2003, p.11). In addition, planners should trust that people know more than themselves in some matters. However, there is still a need to clarify whether the public's knowledge of their local problems, which relates to their values, tastes, and benefits, can be extended in a sense that can become a kind of overall knowledge. This problem of a public decision-centered view of planning may lead planners and theoreticians in this field to the dead end of planning tasks. This means that from one side, we know at a global level that, if it is supposed that everyone has free access to data (although it is not possible for many reasons, like the price of some data provided by different institutions), the question is whether the knowledge possessed by the people, who are engaged with their own everyday lives' problems, can increase as much as the knowledge of a full-time professional working in planning. If the answer is no, going to the extremes of the people's and groups' contributions as the only participating factors in decision making in the built environment—relying solely on democratic concepts, on democratic planning—would not be legitimized.

And the second issue would be that the level of comfort people are seeking for their everyday lives (the comfort shaping people's everyday activities, requirements, and wants) can cause waste and harm the built and natural environments if there is no reasonable control on it and if the waste progresses. This means that, with the people's general knowledge of environmental concerns, it is not possible to hand over these kinds of responsibilities to people and rely on their pure common sense and consensus fully and completely.

Even if the technical issues of handing over the power to people get resolved or disregarded, there still remain some other, nontechnical issues that are hardly likely to be solvable. In addressing these issues, then, the "control by planning" can be legitimized. There are at least three reasons for this. First, practically, free information flow is partially restricted for financial reasons, causing ordinary citizens to have problems reaching the information. Second, planning is to be pursued as a job in normal weekly work hours, rather than as a part-time activity. It should be a full-time activity that cannot be handled by merely nonprofessionals. It should be pursued to serve the built environment and at least be used to gather and analyze the information (or handle the discussions in its postmodern sense). Finally, people's benefits, tastes, and interests can be opposed to a stable future for the city (built environment) as phenomena inherited from past generations that will be passed to the next.

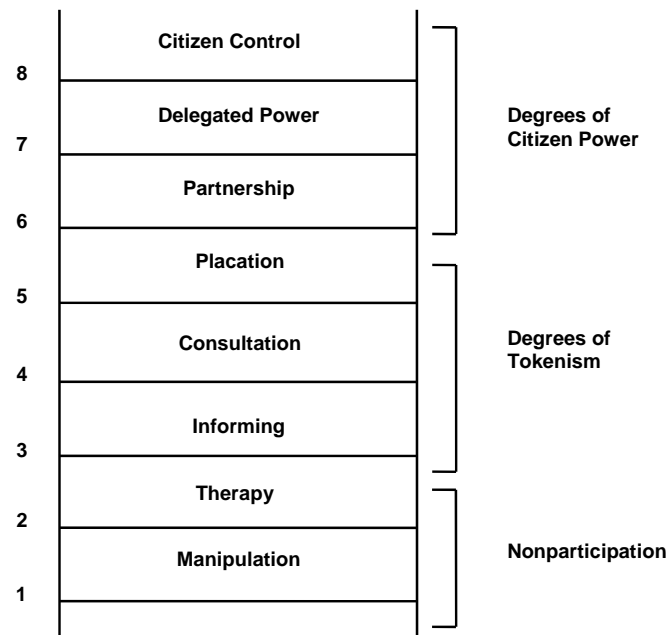


Figure 4.1. Sherry Arnstein's ladder of citizen participation. (Arnstein, 1969)

Still, planning with people is still under serious and considerable critique because the average citizen is ignorant of technical aspects of planning. In addition, at the national scale, being selected as the politico-economic representatives and holding some specific values may cause some controversial situations at the local level, where people may have values different from those of their representatives. The controversy produces a paradoxical situation. Therefore, in the next chapter, what can encompass the solutions to tackle the above problems shall be considered as an alternative way of decision making in planning.

4.5 Decisions in Planning

Many times the issue of making decision in planning was supposed to be solved. Klosterman (2003) claims

By the 1950s the debate had apparently been resolved: the grand issues of the desirability and feasibility of planning had been replaced by more concrete questions concerning particular planning techniques and alternative institutional structures for achieving society's objectives. Planning's status in modern society seemed secure: the only remaining questions appeared to be, Who shall plan, for what purposes, in what conditions, and by what devices. (Klosterman, 2003, p. 86)

But, later and with new challenges of the postmodern era, the questions seemed to turn to the process of decision making. Questions arose about justification and legitimization, for example, about who shall decide, for what groups and purposes, in what condition, by what devices, and how.

Typically, the tasks and responsibilities of planners and planning authorities (as traditional executive bodies in the process) in decision making and in planning as a whole are not as simple as, for instance, what Allmendinger tends to illustrate: "Planners and others must find ways in

which they can classify and predict . . . decisions in order to be able to manage . . . [the] change. This is not as difficult as it might sound. Decisions and actions are not made anew each time”(Allmendinger, 2002, p. 44).

The difficulties are of different types: both those that involve planners from legal, ethical points of view and those that arise from the lack of effective tools to judge or make the decisions (see the discussions of the limitations of decision making due to our knowledge deficiencies under “Complexity,” 4.6, and “Uncertainty,” 4.7).

Faludi (1973a, p. 50) argues that there is no better way for any decision taker to satisfy himself that he will attain his ends then to present his choices as if he had arrived at them by a rational planning process. Along with the Faludi’s aforementioned suggestion, quite unexpectedly and out of the norm there exists a relationship between value-laden planning and intuition. On the contrary, for example, Davidoff and Reiner (1963) believe that “intuition or experiences unsupported by reason are weak reeds on which to rest”.

As was discussed, as opposed to with a decision, there is a *nondecision* where there is no clear opportunity to choose freely from a range of available choices. Bachrach and Baratz(1970) declare a decision to be “a choice among alternative courses of action,” whereas they define a nondecision as “a decision that results in suppression or thwarting of a . . . challenge to the values or interests of the decision-maker” (Bachrach and Baratz, 1970).

When it comes particularly to planning, it is crucially important to notice how the two are amalgamated with each other. Faludi (1973a) explains that

it is not uncommon to talk about planning as the deduction of programs. For instance, Braybrooke and Lindblom (1963) identify the “rational-deductive” method as one of the “concepts and ideals of evaluative method” in decision-making. Likewise, Dimitriou (1972) describes the “logic of planning” as deductive.(Faludi, 1973a, p. 89).

The decision and its existence require some context in which to be validated. Respecting this White (2006) suggests “An essential pre-requisite of an occurrence of decision is the existence of a motivating state of ambiguity” (p. 1).

Although it might be considered an easy task and a straightforward concept, some confusions or mix-ups may always happen when the term *decision* is used when what is actually meant is *choice*. Needless to mention that there can be choice without decision; but there cannot be decision without choice.

(Friedmann, 1966c) addresses an issue he calls “environment for decision,” which

refers to characteristic conditions of choice behavior such as the relative ignorance of the deciders, the extent of their uncertainty about the future, the number of relevant interests and the need for recognizing them, and the ability of the deciders to influence the decisions (and actions) of others. At an appropriate level of generality, these conditions describe the social context of decisions. (p. 13)

As the work of McDowell, the National Youth Agency, and the Joseph Rowntree Foundation (2001) indicates, the issue of decision seems to have opened very specific detailed disputes even on gender:

This recognition of the fragmentation or diversity of interests among women and the acceptance that decisions and even knowledge often is context-dependent or ‘situated’ has, however, been the main change of emphasis in theoretical work on gender issues undertaken over the past two decades (McDowell et al., 2001, p. 209).

Wherever decisions are made, they find different and, to some degree, multilevel dimensions. For instance, in visual arts and, to some degree, in architecture (and urban planning), typological studies perform as the firmest possible ground for decision making. Similarly, morphological analysis, as a method of generating all alternative strategies, has been developed in engineering design. Its best publicized application is the generating of all conceivable forms of jet engines (Bayliss, 1968). It is also widely referred to in the literature on planning and design (For instance Chadwick, 1971). Faludi (1973a, p. 268) believes that morphological analysis, in its logic, is similar to another method advocated by the Institute for Operational Research, the analysis of interconnected decision areas, or AIDA (Luckman, 1967; Friend and Jessop, 1969; Center for Environmental Studies, 1970; Carter and Hickling, 1971). Both methods break a problem down into parameters (or decision areas), investigate alternative states that these parameters can take (or alternative decisions made in specific decision areas), and arrive at all conceivable alternatives through permutation.

However, the issue of the effectiveness of decision strategies very much rests on how the objectives are aimed at, where those objectives themselves remain subject to careful inspection to find out whether they are achievable through the suggested course of action. Ackoff (1962) explains,

One effective technique for uncovering these objectives consists of confronting the decision-maker with each of the possible solutions to a problem and asking him whether he would follow that course of action . . . Where he says, "No," further probing will usually reveal objectives which are not served by the course of action. (Ackoff, 1962)

By definition, decisions can be classified into different categories and from various vantage points, depending on the aspect of study. For instance, in management, one of the possible classifications can be perceived as follows:

There are parallels in many fields where hierarchical structures occur. Thus, management science classifies decisions into three groups: policy decisions, administrative decisions and executive decisions:

Policy decisions start with the formation of business. To begin with, there must be an idea or set of ideas . . . and someone or some group must decide that the business based on it has a good chance of success. Then decisions must be made on bye-laws and membership, on the board of directors, on key executives . . .

Below this level is another series of decisions, less important but still very far-reaching in effect: the administrative decisions. If policy states for example that the company will produce a product of a given quality, administrative decisions must then be made on the ways in which this will be achieved.

Finally, there are executive decisions made at the point where work is carried out. . . (Dale, 1965)

However, once it was supposed that the "best" decision is always a feasible decision" (Simon, 1956).

Apart from the necessity of the decision-making process, how decisions will happen to impact their immediate or remote context is very important but definitely easy to work out. Docent (2002) asserts "Decisions or actions taken in one area may have a significant impact on spatial development in other, sometimes distant, areas" (Doucet, 2002, p. 59). It remains subject to mere prediction.

At the same time, and in the real world, every decision from conception to completion entails some costs and is very bound to cost. It must be cost-effective and financially viable, for, as Benz (2002) asserts, "If the costs of decision making get too high, the whole adjustment process may be deadlocked" (Benz, 2002, p. 147).

The selectiveness embedded in decision making is widely acknowledged, rather openly by those who are actively involved in planning. Faludi (1973a) claims

In considering any given course of action, the decision-maker usually eliminates those consequences which are uninteresting to him. He furthermore omits the remote, the imponderable, the intangible and the poorly understood consequences, no matter how important they are. The strategy is then to perform evaluation in the light of only a few well-understood ends. (p. 153)

In light of the above comments and other than the key role of the planner or the decision taker as a general notion, two common points are derivable in regard to issues related to decisions to be made. First, and quite evidently, decision making (in planning) is engaged with complexity, regardless of the approach that is applied by different theories or methods. Second, because of this complexity and the direct relation of decision making and the future, uncertainty is an inevitable trait of any decision, including a planning decision. Therefore, these two traits (or issues) of decision making need to be studied in more detail to realize the nature of decisions and the decision-making process. What seem to be negligently forgotten in quotations such as the one above are the issue of uncertainty and, subsequently, the issue of complexity and how they may constructively inform the decision process. The term “constructively” has been used purposefully. It may look a bit too pretentiously overstated, but it is used to magnify the fact that reductionism’s common practice of reducing (or neglecting) uncertainty in order to keep complexity at a manageable level and to handle it accordingly, based on the classical method, is not always a constructive way to deal with it.

These two metatheories can demonstrate the nature and related traits of the atmosphere in which we are working. Although these two are attributed to different fields and specialties in planning, both methodologically and phenomenologically, the roles of the theories are diverse. The divergence will be revealed where the number and type of actors and objectives are increased. This means that the levels of uncertainty and complexity themselves can be increased or their type can be changed from technical to human-based approaches. Then, the quality of the atmosphere along with its variables and relations affects the entire process.

4.6 Complexity

In this section, it is not intended to give an integrated overview of complexity, its underlying causes, or its resultants. Quite to the contrary, it is only of interest to this project to pinpoint one of the most crucial factors that contribute to (if not causes) the inefficiency of the current methods of decision making.

Complexity is one of the inherent characteristics of the 20th century that has proceeded into the 21st. Complexity may occur as a result of a wide range of causes. Normally, it happens as a result of facing unknown situations. When the input variables in a system outnumber the equations or rules, they will not be governable using the ordinary methods; thus, some secondary submethods should be employed to help solve the problem.

In 2000 Stacey et al. suggest “There is now a growing literature by management thinkers who appeal for insight to developments in the natural sciences of complexity, felt by many to be relevant because they model complex, turbulent systems”(Stacey et al., 2000, p. 1).

This has become so apparent that even some thinkers in different disciplines have started to talk about “new sciences” addressing the issue of complexity more independently. Stacey, Griffin, and Shaw (2000), for example, state that

there are differences within the natural sciences on what these “new” sciences of complexity mean. Some talk of a new dialogue with nature and the end of certainty, or they call for a science of qualities and point to the importance of a participative approach to understanding nature.(Stacey et al., 2000, p. 1)

What is definite is that the notion of complexity, despite being argued and worked around in different disciplines for quite a while, is still very open to debate and further research. Complexity is a matter of outline (or framing), the level of details investigated, and the result of perception through observation. A tree leaf, for instance, when observed in terms of its physicochemical photosynthetic role, is a very complex system, whereas the same tree leaf, when studied within a picture of the whole tree to which it belongs, which casts a shadow on the path beside which it stands, might contain a very small degree of complexity, if any at all.

The formal definitions of complexity, as Stewart (2005) suggests, fit into two main groups: algorithmic and organizational: “definitions of algorithmic complexity, deriving largely from computer mathematics; and organizational complexity, deriving from the new biology and a revived systems theory” (Stewart, 2005).

To define the roots of complexity, some tend to take a teleological approach to the causality and go on to how different major philosophies on the nature of causality (i.e., those of Kant, Hegel, and Darwin) contrast with each other and how the nature of complexity is definable from each major point of view (for further reading, please refer to (Stacey et al., 2000).

Some others such as Casti suggest that a systematic theory of complexity would have to proceed through a theory of models, relating the observer to the observed (for further reading see, Casti, 1994). They take a more detailed approach to pragmatic problem solving, focusing entirely on how the remedies were prescribed to tackle the problem regardless of how it was created.

Some other definitions within apparently irrelevant disciplines can be significantly helpful in casting light onto the notion of complexity for specific purposes of the current research. An example is this definition by (La Porte, 1975): “the degree of complexity in organized social systems . . . is a function of the number of system components..., the relative differentiation or variety of these components..., and the degree of interdependence among these components”(La Porte, 1975).

Back to the subject of the current research, complexity has posed serious challenges to planning, in general, and to decision making, in particular:

The changes in the city (including the changes in the functions, types and boundaries of local government, as well as changes at the center itself and also changes in the numbers and kinds of decision-makers, both public and private) have contributed to the complexity of the problems with which city governments must deal, and as a consequence the process of decision-making in the city itself has become more complex.(Goldsmith, 1980, pp. 83-84)

How the decisions get more and more complex due to the growing degree in complexity of the context is also a matter of importance, as it signifies the proportionality of the solution to the problem. “Indeed,” Faludi (1973a)states, “as society becomes more and more complex, the decisions fundamentally affecting our lives become more and more inscrutable”(Faludi, 1973a, p. 173).

Or as Catherine Bull (p. 228) asserts, “The context of contemporary urban design practice is characterized by increasingly complex relationships between global phenomena . . . local conditions . . . and increasingly complex and rapid decision making, delivery and urban management processes” (p. 228).

It is quite evident that the ever-growing complexity should be dealt with in an active manner, but whether such assertive and authoritative approaches as Bull’s shall work is either a matter of careful contemplation or subject to a pricy and lengthy trial and error process. Bull (2007) insists that “this complex reality must be confronted and worked with. The focus must be on involving and guiding stakeholders and project champions and on harnessing their power and influence via robust decision-making systems” (p. 222).

Before concluding on what Bull asserts, it is important to notice that not all the planners work with the same ethos. Their priorities, subjugated methods, justified values, and work ethics very much depend on where they are working. In one straightforward account, those planners who work for the private sector normally advocate for their employers' good, as opposed to those who work for public (governmental) bodies, who tend to campaign for the public right or better consequences. Bearing in mind the fact that planners can be utterly different, depending upon their affiliations, criticizing Bull's approach does not necessarily mean that planners should succumb to an anarchic disorder where their roles as decision makers (or even as the facilitator agents for decision takers) comes under a serious question due to the high degree of complexity. As Margueritte (2007) states, "The complexity of the contemporary planning, design and delivery process can be even more destabilizing for decision makers, suggesting why urban professionals are increasingly needed and why their roles are expanding" (p. 118).

4.7 Uncertainty

Theories provide explanations. Explanations are responses to states of tension resulting from observing unexpected events (Toulmin, 1960; cited in Faludi, 1973a; Harvey, 1969). Theories pursuing this notion can be considered as deterministic theories or theories working in a deterministic atmosphere or to develop the deterministic model of events. Such theory and its supporters, supposing that everything (or at least the majority of things) is controllable through the predictable future, have tried to be prescriptive about all the possibilities of the future. Then the control of the variables and their relationships will be supposed to be achievable in an integrated way (refer to Laplace's demon, causal determinism). Respecting this Laplace, in his famous work, asserts

We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes (Laplace et al., 1951, p. 4).

However, in the early 20th-century, with the introduction of the *uncertainty principle* (see also the terms *inaccuracy relations* [*Ungenauigkeitsrelationen*] or *indeterminacy relations* [*Unbestimmtheitsrelationen*] in Heisenberg's notions), formulated because there are some uncertain factors that cannot be determined, the theory, in general, arrived at this conclusion that phenomena and their relations are not as deterministic as had been imagined. The future, it was recognized, is not predictable. Here there is a controversy between the definition of theory (as a fully defined statement) and the uncertainty principle as a theory. In another sense, these sorts of theories are theories that talk about the determinism of the *principle of indeterminacy* (see Gifford Lecture at the University of Glasgow for 1928 in Haldane, 1929). These two senses from theory have direct effects on understanding the nature of the decision-making process in operation and the type of justification for the process of decision making. They deeply influence, or should influence, the entire planning.

4.7.1 Types of Uncertainty

One of the most commonly agreed-upon accounts of uncertainty, associating it with randomness, may be given: "There are two kinds of uncertainty. One is due to randomness (when the laws of randomness are well known) . . . the other type of uncertainty arises when it is not known which laws of randomness apply" (Chernoff and Moses, 1986, p. 1).

This is a valid statement and can be considered as an all-inclusive one so long as it is presumed that all the laws of randomness are already known. Yet this does not fully cover the uncertainty

principle as it was meant by Heisenberg, and it is also a bit disputable on its own, as the randomness would have been no longer the case by nature had its constituents (e.g., laws of randomness) been all totally known and fully understood, strictly speaking about nonmathematical randomness. To alleviate this problem, however, Chernoff and Mosses (1986) go on to add another dimension to their discussion when they assert that "in statistical terminology we shall equate the laws of randomness which apply with the state of nature" (p. 1). Being trapped in the next pitfall, which is the "state of nature" and its uncertainty (unknown-ness), they try to make the problem succumb to the complexity of the knowledge involved, which is not in line with or at the level of the uncertainty embedded in the context, being the nature: "The statistician can perform relevant experiments and take observations" (Chernoff and Mosses 1986, p. 1).

Highlighting the creativity, some have actually drawn upon the human side of decision making, trying to avoid the inherent danger of arbitrariness: "Creativity and play are often important in complex and uncertain decision-making contexts" (Garbage Can Model of Organizational Choice in Cohen et al., 1972).

Back to planning, as could be expected from the descendants of rationalists, the blame is still most likely to go to lack of information rather than an information explosion. Bridge (2005) states, "Planners never have what we could consider to be perfect information, knowing all the options and being able to make clear-cut decisions about clearly defined problems, as the rational comprehensive model suggests"(p. 130).

However, for some simplicists, the existence of uncertainty, and hence complexity, are still in doubt. Surprisingly, the thinkers or planners who would take the facts into their consideration have been marked as "unrealistic" or "skeptical": "There are the skeptics, who labor uncertainty and complexity in planning" (Faludi, 1987, p. 102).

Those such as Wildavsky, who has traditionally given an extensive weight to uncertainty and complexity in planning, believe that modification applied to planning so that it can provide proper control over the future turns planning into nothing but ordinary decision making. By "making planning manageable," Wildavsky (1973) asserts, "it appears we have made it indistinguishable from ordinary processes of decision. Planning has been rescued by diminishing, if not entirely obliterating, the difference between it and everyday decision-making" (Wildavsky, 1973, p. 141).

Faludi's (1987) answer seems to be a bit conservative, as it is born out of the problem with no or little consideration of the interdisciplinary correlation and intra-contextual interactions:

But why not settle for "diminishing" rather than "obliterating"? That would allow for planning adding an extra dimension to ordinary decision-making (as the "IOR [Institute for Operational Research] School" would have it), without making the claim of replacing it altogether. (Faludi, 1987, p. 103)

Nevertheless, in light of the uncertainty principle and with its expansion in decision making, we can add the incapability of determining and controlling, simultaneously, all intervening factors in planning and specifically decision making to what Christensen attributes to the axis of known-unknown for goals and technology. Faludi (1987) explains that "Christensen (1985) discusses four possible situations: well-understood technology and agreed-upon goals (which is when optimization is called for); unknown technology, but still agreed-upon goals; well-understood technology but no consensus; problematic knowledge and no consensus" (Faludi, 1987, p. 106).

To conclude, it should be borne in mind that uncertainty and complexity are two very important issues that determine how the process of decision making is dealt with and to which extent this process will be influenced by the role players and to which extent it will affect different beneficial bodies involved. To handle the decision-making process more appropriately and more predictably, as expected, the first and foremost approach to it is to formulize it using scientific

inductive reasoning methods to create a deductive method to comprehend and explain the similar situations.

4.8 Decision Theory

Although the concept of decision at a theory level is deemed very important, the most common understandings of decision theories (and even decision, decision making, and decision taking at a theoretical level) take place in and around the purely statistical (and to a high degree in mathematical) domains.

Chernoff and Moses (1986) claim "As a result of relatively recent formulations of statistical theory, today's statisticians will be more likely to say that statistics is concerned with decision making in the face of uncertainty" (p. 1).

The above quotation shows the other way around, equating statistics with decision making when faced with uncertainty. Once equated, however, this statement can easily be interpreted the other way. Chernoff and Moses (1986) explain, "Its [(statistics that is concerned with decision making in the face of uncertainty applicability)] ranges from almost all inductive sciences to many situations that people face in everyday life when it is not perfectly obvious what they should do" (p. 1).

Further on, they point at the main problem in using statistics as the panacea in decision making: "An interesting problem in the theory of decision making is that of finding all the admissible strategies" (Chernoff & Moses, 1986, p. 8). This is not simply the problem of decision making but the problem of statistics and making it equal to decision making.

Attempts to strike a balance or even to assuage the side effects of territorial behavior from classical science and mathematics can be seen every now and then. White (2006) claims

Nevertheless, consideration of cognitive aspects of selection will be important in any satisfactory pragmatic theory of decision: it may be that we want to stimulate selection processes mechanically, and hence remove mental effort, bearing in mind risks that the analogues may not be perfect; it may be that we want to convert to a pure choice situation into a full or part decision situation and hence add to mental effort. (p. 11)

But how this historical guilt will result in a healing remedy is still in serious question.

For mathematicians, though, once the decision is modeled as in its statistical conception, the only (easy) task of the decision taker will remain to be picking from supposedly but disputably equally known end options.

Some have recently taken into account that what was long thought to be a cure for all might not work as it was expected to. White (2006), for instance, states that "it is not presumed to be the case that the ultimate aim of Decision Theory is to enable all the actions to be decided . . . Decision Theory is part of a more general Theory of Selective Action" (p. vii). Yet while they accept that all cannot be done by equating decision making with statistical randomness, their determinism about what can be done still remains dramatically conservative and traditional, as evidenced in White's assertion that "decision-making is concerned with resolution of ambiguity and is synonymous with mathematical decidability" (p. 12).

There are some definitions that seem to be less exclusive to mathematics as they try interactively to take into account those who have been involved in the establishment, improvement, and evolution of the concept of decision. Thus, these could be counted towards the study of what is deemed to be forming its nonpractical principles, namely, *decision theory*: "Decision theory is the product of the joint effort of economists, mathematicians, philosopher, social scientists, and

statisticians toward making sense of how individuals and groups make or should make decision”(Resnik, 1987, p. 3).

Dubois and Fargier (2003, p. 3) also quote from Doyle and Thompson that, “however, in parallel to these developments, Artificial Intelligence has witnessed the emergence of a new decision paradigm called qualitative decision theory, where rationale for choosing among decisions no longer relies on probability theory nor numerical utility”(Doyle and Thompson, 1999). In urban planning, however, what has been introduced as *decision theory* has included more than mere probability combinations. As Faludi suggests: “Refined notions of optimality—coming from decision theory—comprise both goals’ achievement and probability scores” (Faludi, 1987, p. 98).

And it also seems to include a more humanistic side to decision making when the notion of optimality through which goal achievement can be realized is integrated into it: “It is well understood, therefore, that optimality includes an appreciation of uncertainties, as well as recognizing that one’s idea of what is optimal may change as new information becomes available”(Faludi, 1987, p. 98).

This said, the rationalists are still far too deterministic than the nature of a decision requires the decision maker’s attitude to be when unbiased and least exclusive decisions are to be made in urban planning. This is because, despite the fact that rationalists lend themselves and their principles of thinking to qualitative methods to some degree and enter the human factor into their equations to some extent, they are still very much loyal to a dualism that dominates the theory (of planning). It seems their compromise has come about as a deterministic incident rather than a result of a series of intellectual observations that have led them knowingly and willingly to their recent considerations.

4.9 Decision Making, Decision Makers, the City and Urban Planning

First, it is necessary to remember that this is an ingenerated and complex discussion on different aspects of decision making with various tendencies selected from the vast literature on the subject of debate. But the key point to decode the discussion, shaped by complicated theoretical dispute, is that there are two recognized and general tendencies concerning decision making. These two contradictory tendencies, with consideration of all their subcategories, are in one sense common: they attempt to satisfy their ideas at the furthest distance from their rival. However, what is occurring ontologically, we will see that, in many senses, they have to compromise on this grand idea because there is no clear boundary in between. These two, as will be further explained in chapter 6 (“Analysis”), are those attributed to the modern and postmodern schools of thought. These two schools of thought, with all their known attributes and axioms, have been the movements most influential on the mindset in planning, as in many other disciplines. It is explained later that based on the principles of the research, and in opposition to the view of many planning historians (for example, see Allmendinger, 2002, pp. 168-172), categorization in the proceeding sense cannot be completely true and helpful.

The concept of decision involves different areas when it is supposed to be considered in the very specific context of the city and planning. As a real case problem, it is not a one-person task, and its outcomes are not restricted to its immediate surroundings. Nor will its effects finish in its very own time frame. Although it has been advised that a much broader view should be taken even when the decision is targeting a much lower scale, the way a very general axiom is to be practically interpreted and put into practice is a matter of time, experience, and trial. Bull (2007) writes, “‘Think globally, act locally,’[⁴] the adage coined in the 1970s, expressed the importance of linking both global and local domains when making decisions about the environment” (p. 208).

⁴This phrase was originated by Rene Dubos as an advisor to the United Nations Conference on the Human Environment in 1972. In 1979, Dubos suggested that ecological consciousness should begin at home. He believed that there needed to be a creation of a world order in which “natural and social units recapture their identity, yet

A more in-depth pondering, however, takes into account both pros and cons of such an axiom more considerably and more constructively than when it is simply requoted or interpreted in a rather simplistic way:

In fact, while each urban intervention seems fated to rely on general criteria of planning, each part of the city seems to be a singular place, a locus solus. Although it is impossible to make decisions about such interventions in any rational manner solely on the basis of local situations, one must realize that their singularity is still what characterizes them. (Rossi et al., 1982, p. 21)

Faludi (1973a) believes that the notion of planning is identical to what, in different contexts, has been termed systems analysis and operational research. He refers to Quade and Boucher (1968) where he defines systems analysis as

a systematic approach to helping a decision maker choose a course of action by investigating his full problem, searching out objectives and alternatives, and comparing them in the light of their consequences, using an appropriate framework—in so far as is possible analytic—to bring expert judgment and intuition to bear on the problem. (p. 38)

And Faludi (1973a) also refers to Beer (1966) as he describes operational research as follows:

Operational research is the attack of modern science on complex problems arising in the direction and management of large systems of men, machines, materials and money in industry, business, government and defense. Its distinctive approach is to develop a scientific model of the system, incorporating measures of factors such as chance and risk, with which to predict and compare the outcome of alternative decisions, strategies and controls. The purpose is to help management determine the policy and actions scientifically. (p. 38)

The trap of pessimism seems to have survived well up until fairly recently, for Boyer (1983) declares, “Frozen into a rigid position, modern man, without perspective, has no power of decision, no ability to change the social situation” (Boyer, 1983; cited in Bridge and Watson, 2002, p. 41).

Some theoreticians, more specifically those characterized as rationalists, leave no choice for themselves (and prescribe nothing for the others) but to stick to an ultimate tool of rationality as the main driver in planning, thus giving decision making a crucial and dominant role by picturing planning as “a rational form of decision-making” (Faludi, 1973a, p. 39).

More recent readings of planning, such as the following, however, seem to take a more open-minded perspective towards planning as per the subject of decision making: “the field of planning is divided among those who define it according to its object (land use patterns of the built and natural environments) and those who do so by its method (the process of decision making)” (Campbell & Feinstein, 2003, p. 2).

The obsession with totalitarianism seems to have shriveled up more recently between the urban thinkers. To address the issue, some, like Campbell and Feinstein (2003), would remind the others of the already broadened planning scope: “Studies of planning refer to works in political science, law, decision theory, and public policy” (Campbell & Feinstein, 2003, p. 5). However, how much these new compromises are going to represent how the practical approaches to decision making are about to be overtaken by evolutionary amendments, if not revolutionary changes, remains subject to scrutiny.

4.9.1 Decision Making and Planning

interplay with each other through a rich system of communications.” In the 1980s, Dubos held to his thoughts on acting locally and felt that issues involving the environment must be dealt with in their “unique physical, climatic, and cultural contexts” (Eblen, 1994, p. 702).

This research does not intend to look at planning as the “application of reason to collective decision-making” (Faludi, 1987, p. 52; See Friedmann, 1959). In fact, the current research is against the reductionism and dualism circulating in 1970s’ planning theory (substantive-procedural planning theory), in which planning is considered equal to decision making.

However, this does not mean that the account pursued by postmodernism can be considered as the ultimate option here, where many notions are abandoned because they are too vague and undefined to be used. But the study follows the planning decision making as one of the crucial parts of planning as a whole.

4.9.2 Decision Making as a Means of Control

Decision making is usually known as a tool for *control, prevention, initiation, or cure*. Quite evidently, the control is deemed to take place wherever there is a need for improvement, to effectively and, in most cases, artificially create an atmosphere to retain the status quo or to offer an opportunity on a fair basis. More specifically, control may also be needed when prevention is aimed at. The initiation by ruling the codes and regulations, can encourage the private businesses and individuals to develop or revitalize some parts of the built environment. The solution, however, will come about almost totally out of the realm in which control could have been practiced. The cure (by providing solution to a problem) usually is the planning option wherever something out of control has happened and brought some unexpected or undesired results. Yiftachel (2002) suggests

The use of urban and regional planning as a means of control can be usefully studied by examining three key dimensions of planning policy: territorial, procedural and socioeconomic. These dimensions embody the most critical aspects of planning as an organized field of policy and professional practice: its spatial content (the territorial dimension); its power relations and decision-making processes (the procedural dimension); and its long-term consequences (the socioeconomic dimension). (p. 538)

Regardless of how the decision making is to serve its purpose, it can be done in different ways, as outlined by Faludi (1973a):

There are three ways of making decisions: by authoritative choice based on commitment alone, by calculation based on firm images, and by a mixture of both. Planning is about making decisions by a mixture of authoritative and calculative choice (Häusler, 1969) (though it may employ purely the latter as part of planning strategies). (p. 224)

However, in decentralized notions about planning, as seen in most recent postmodern accounts, one is advised to make and take the decisions through a fourth way, which is public participatory. But this cannot be counted as an ultimate method because it can result in ignorance of some key points of control that could have been known and handled by professionals at various levels.

4.9.3 The Role of the Decision Maker

In planning, as a fairly newly established and developing discipline, there have been some understandable worries about the role of planners—as in any emergent discipline there may be difficulty defining roles. In particular, since the inception of planning, there have been concerns about how the planner’s role would be justified within the framework of existing decision making parties. Some of those worries lasted long enough to provoke overreactions later on elsewhere. Gottdiener (1977) states, “The planning process as it is usually practiced in the society, makes planners advisory bystanders to decisions that are being carried out elsewhere—by political leaders and private businessmen” (Gottdiener, 1977, p. 143 quoted in ; Hall, 2002a, p. 322).

Faludi (1973a) puts this more meticulously but more bluntly:

The basis of a view which portrays planners as the servants of their politician masters can be traced back to the development of bureaucracies. The implication of this view in terms of decision-making is that politicians decide on ends, and that planners indicate the means for their attainment. (p. 225)

Different movements and theories of planning obviously have different readings of the issue of decisions and decision making and the role of the decision makers. *Incrementalists* challenge the large-scale complex decision making and details down to the role of the decision makers. Campbell and Fainstein (2003) explain, "Incrementalism challenges the viability of large-scale, complex decision making and offers the much more modest approach of comparisons of discrete policy changes at the margins" (p. 169).

By contrast, the communicative approach is what is known to aim at the inclusion of the personal qualities of those who make decisions. "The humanistic planners," Faludi (1987) states, "emphasize communicative aspects, which are a development of the planning-as-learning model, paying special attention to the personal qualities of planners" (p. 102).

However, from another perspective, communicative planning itself can be an incrementalist activity. According to this approach, the planner rather than looking from a totally different point of view and building up around the notion of decision itself, they define a system in which the role of the decision maker differs as it is defined as per the specifications of the decision making mechanism: "A decision is said to . . . be in the public interest if it serves the ends of the whole public rather than those of some sector of the public" (Meyerson & Banfield, 1955, p. 322).

"Public interest," however, appears to be a very contentious notion to be scrutinized and further clarified. Meyerson and Banfield (1955) distinguishes

unitary conceptions whereby the public interest is a single set of ends pertaining to all members of the public . . . and individualistic conceptions whereby the relevant ends are those of individuals, whether shared or unshared, which should be aggregated...

A different decision-making mechanism is implied by each conception. A unitary one implies a central decision-maker whose role is technical, but endowed with the power at the same time to assert the interest of the "whole" over lesser interests. An individualistic one implies compromise, in the case of the utilitarian and quasi-utilitarian conceptions, by means of bargaining in which representatives act as instructed by their constituents. Under the quasi-individualistic conception, finally, there must be a mechanism for excluding inappropriate ends (p. 322).

Nevertheless, as discussed before, there are far fewer worries and doubts about the necessity and significance of the role of urban planners (Margueritte, 2007, p. 118). The level of importance, how they are being dealt with, and how they fit in the whole picture of a city as an existing phenomenon or as an entity entirely designed from scratch varies, however, from one movement to another. Albrechts and Denayer (2001) observe that "planners have to operate in close collaboration with other actors and target groups in the decision-making process as well as to comprehend their interests and power relationships" (Albrechts and Denayer, 2001, p. 371).

Therefore, as was shown in chapter 2, the two dominant types of decision takers can be seen as those who fit the technicalist view of the decision taker's role, which implies that the person or institution is also a decision taker, and those who fit the managerialist view of decision takers. In the latter type, the emphasis on direct decision making is seen less than in the former type. This means that in the latter, planning authorities are defined more as the moderators of any aspects of decision making, with emphasis on the role of space users and empirical accounts. On the contrary, the technicalist view magnifies the role of the technical and rational side of the decision takers' and makers' roles. This type of definition gives a more expanded role to the authorities in more centralized and concentrated forms.

Thus, it can be deduced that differentiations between decision making and decision makers on the one hand and decision taking and decision takers on the other stem from what their

knowledge bases provide them with rather than what has been defined for them or what they were ordered to do.

4.9.4 The City, Planning, and the Methods of Decision Making and Their Impacts

Obviously, the city is both the context in which new decisions are required and the first and foremost entity affected by those very decisions. The effects of the decisions, however, especially when made in the centers of political and financial power, do not end in their immediate surroundings, regardless of the scale of the decision itself (or with that scale having little influence): "Decisions made in these centers of post-industrial growth and change, frequently termed global cities, disproportionately affected the course of economic and technological developments in distant parts of the world" (Shaw, 2001, pp. 286-287).

In a rather common outline, though, big cities and, hence, the built environment provided a series of different facilities; consequently, access to the political decision makers, whose decisions could affect both the city and the regional communities within the city's executive political and financial power, provide of high importance: "Large cities meant large local markets and an extensive array of advanced producer services, including data processing, financial and legal services, education, personal and ancillary services, access to political decision-makers" (Lever, 2001, pp. 273-274).

This, however, can be so pervasive as to diminish the individuality of those entities that symbiotically live within the city, giving the most powerful role to what the decision—as a result of interactive reconciliation between those entities in addition to other micro- and macroscale role players—offers. The fact, from another point of view, is reminded also by Shaw (2001). He suggests "The role and status of localities in general, and cities in particular, has become more tenuous. Kantor holds that cities in the post-industrial era are increasingly dependent on corporate decisions that generally are not subject to public accountability" (p. 289).

Shaw (2001, p.286) also believes that the concept of the postindustrial society is a large generalization and its meaning can be more easily understood if one specifies five dimensions, or components, of the term, one of them being decision making as the creation of a new "intellectual technology," as Bell (1973, p. 14) describes it.

Although *technical rationality*, as Beauregard (Beauregard, 1989, p. 384) suggests, may be "viewed as a valid and superior means of making public decisions," and information "gathered scientifically may be regarded as enlightening, captivating, and convincing" (p. 384), this important view should always be borne in mind: "The process of negotiation, mediation and joint learning can also help foster a sense of ownership and care within a neighborhood (and in a city) which will reap dividends beyond the parameters of the immediate decision-making requirements" (Great Britain. Urban Task Force. and Rogers, 2004, p. 44).

All in all, a successful decision should be perceived as a combination of some apparently divergent concepts and views: "Decision making involves not only cognitive choice but social expression, social articulation that divisively or redemptively addresses those served and those disserved, winners and losers alike" (Forester, 2000, p.150).

But there should be consideration not only of different fields or aspects of work. The different schools of thoughts and methods must also be taken into account in order to control the one-way mechanisms.

4.9.5 Mechanism of Decision Making

How the decisions are made and which bodies are involved as well as the structure of those bodies are also very important in how those decisions are effective:

Partly, elected representatives do not see public participation as their concern: their task in the planning process is to approve proposals in the final stages, and as such they are either unaware or unwilling to accept that public participation in planning might possibly conflict with their role or weaken their decision-making power. (Goldsmith, 1980, p.143)

This will be discussed in more detail further on in this chapter.

Despite all the problems inherent in rational decision making, there should be a mechanism to choose from a series of possible answers. Friend and Jessop (1969) explain,

Sooner or later, the formulation and comparison of possible actions leads to choice of one particular course of action; a formal commitment is then generated through an assignment of resources or a public statement of intent, and the stage of intervention in the community system begins. This is the stage of decision-taking as opposed to the wider process of decision-making which can be said to embrace all stages.(Friend and Jessop, 1969)

What is expected to be addressed here by Friend and Jessop or even by their successors is how decision taking happens. This no doubt again involves degrees of reductionism depending on how big and colorful the range of choices offered by the decision-making process for the decision-taking step is.

This needs the careful consideration that any rigid and inflexible formulation opens itself up even to self-criticism. Faludi (1976) writes,

Certainly, formulations like Friedmann's (1969) describing planning as the application of "scientific-technical intelligence" to the solution of practical problems are therefore liable to be criticized, much as my, basically identical, view of planning as a rational form of decision-making (p. 39).

The other alternatives to rationalism seem to be of very little help, if any, as they openly advocate the privilege of a community based upon their political or financial assets over the public interests. The first study of community decision making was Hunter's *Community Power Structure* (1953). Basically, he found that an elite consisting of a few businessmen made all the important decisions. This is known as the *power pyramid* model of community decision making. An alternative model was advanced by Dahl(1961). He found a much more diffuse pattern in which a plurality of groups succeeded in bringing their influence to bear. This became known as the *Yale poly-archie power* model...Sidestepping this controversy, a further line of thought which tried to synthesize these two models was called the *variable pattern* hypothesis. It built on the assumption that some communities would conform more to one model and some more to the other, the majority falling somewhere between the two extremes (Faludi, 1976, p. 197).

However, even the most democratic decision making (value-laden decision making based on nontechnical accounts) systems may still well suffer from the lack of a defensible basis for making decisions. Broady (1969)

suspect[s] that such decisions (in the planning of new towns about the pattern of rents, the size of households, the proportion of dwellings that should be built for sale, et cetera) are presently made either by hunch, by ministerial fiat or by a vague look at what other towns are doing.(Broady, 1969)

Broady later suggests the application of sociological ideas in development schemes. This might not look like a purely new or innovative idea, as it had been in practice long before it was scholarly formulated, but the reasons to support it have their own validity:

The real value of such methods (applying sociological ideas in the context of urban development schemes) is that they would make it possible to base certain kinds of planning decision more validly upon evidence and clearly stated assumptions and this would permit a greater control of

policy by the regular review of forecasts in the light of actual, on-going experience. (Broady, 1969)

Albrechts and Denayer (2001, p. 371) claim that the case for consensus-building has, of course, very often been made. Their view specifically refers to Hillier's (1993, p. 107), where she explains that practical reasons for planning decisions should involve the Aristotelian notions of persuasion, reflection upon "values," "prudential judgment," and "free disclosure" of ideas (See also Forester, 1989).

Hillier (1993) presents an empirical example of the systematic distortion of information and the consequent impacts of it in a particular planning context. He explains that choices are made according to certain power structures and decision rules for preferring certain solutions over others. Imposing patterns on information coming from the environment is basic to at least three different planning strategies, which he describes under the headings of routinization, sequential decision making, and mixed scanning. In the first and second case, the overall pattern or framework imposed on the information received from the environment is relatively stable, whereas in the last, this framework itself is subject to change (Faludi, 1976, p. 109).

Yet, as Foley (1963, p. 56) also noticed, it soon came to be absorbed into a political and economic process within central government that represented the very opposite: an adaptive approach, evolutionary rather than deterministic, that recognizes the importance of political and economic decisions in the planning process (Hall, 2002a, p. 186).

The humble attitude within the planning profession, heard here from Faludi (1987), should, however, be highly acknowledged, regardless of whether it is being stuck to loyally and effectively:

planning should never set itself up as an alternative—and allegedly superior—way of decision-making, but should help in improving ongoing choice, and that planning itself never comes to any definite resolution, least of all by adopting a document called "the plan." (p. 91)

However, with reference to McLoughlin's work, Taylor (1998) detects something completely deferent:

It is therefore significant that, in McLoughlin's seminal textbook on the systems approach to planning (1969), in which the chapters are ordered in terms of the various stages of the rational planning process, only 17 of the relevant 195 pages are devoted to plan implementation. It is therefore not surprising that the rational process model was generally described as a model of rational decision-making, rather than a model of rational action (Taylor, 1998, p. 112).

Nevertheless, as was mentioned, it might be criticized in the sense that it will downgrade the whole concept of planning to decision making, resulting in craftily and cunningly eliminating many disrupting role players and influential factors from the equation of planning. It should always be kept in mind that although planning is not a superior way of decision making, the decision making is not what the planning is all about.

4.9.6 Evolution of Decision Making

In line with the central idea of the current research, the crisp separation between notions and events that has happened in decision making is not completely reliable; however, based on a chronological order, five major phases of the evolution of decision making can be defined; these stemmed from a series of events and influenced many others:

1. evolution of the concept of decision making and related terms, like policymaking, plan, plan making and so on, with expansion of postwar physical town planning;

2. evolution of the decision-making scale, based on democratic economic political concerns, from centralized to decentralized decision making;
3. evolution of decision-making accounts and reasoning, from modern rationality to postmodern accounts;
4. evolution of decision takers and decision makers; and
5. evolution of the weighting of influential thoughts on the decision-making process.

4.10 Planning Decision Making and Business-Based Decision Making: Multiobjective, Multivalue, Multijudgment Nature of Planning

This section could be carried out in more detail than that in which it is discussed here. However, given the related discussion in the next chapter (on the fuzziness of decisions and decision making) and the reasoning employed in it, expanding here is unnecessary.

There is no doubt that the words *decision* and *decision making* can be studied from different points of view within various categories, for instance, normative versus discursive decision making, procedural versus consequentialist, rational versus successive, and so on.

Nevertheless, at a higher level, before getting into this type of discussion, the nature of decision making in planning as opposed to in other fields needs to be examined preliminarily.

4.10.1 Multiobjective Decision-Making Process

In almost every business, the decision-making process is pivotal. Decisions, from those on general policies to detailed executive decisions, in all processes from study to production, need to be identified in order to achieve the general path or the clarifications required. There are many businesses in which decision-making processes are characterized as multiobjective. The processes, typically, are used to examine, to apply, or to improve methods and to experience the improvements within those methods by upgrading the methods. Six Sigma is one example. This has been generated, developed, and used, first by Motorola and then by General Electric (GE), and is among the methods that might be better called tools of *decision-making on process*. Typically, this type of tool benefits from some guidelines that are being improved from time to time, though, generally, they are safe from revolutionary changes in methodology. For example, the six Cs of decision making, below, is a set of improving criteria for the decision-making process:

1. Construct a clear picture of precisely what must be decided.
2. Compile a list of requirements that must be met.
3. Collect information on alternatives that meet the requirements.
4. Compare alternatives that meet the requirements.
5. Consider the “what might go wrong” factor with each alternative.
6. Commit to a decision and follow through with it.

There are plenty of instructions of this type in various sections of every business—decision making for design, for manufacturing, for human resources, and so on. But they are rather the same. These are mostly the typical decision-making tips and tricks of product-based, commodity-

based, or goods-based industries that constantly use a costs-and-benefits method. The industry's products may vary from a range of physical to digital products. But the two common values among these industries are less cost and more benefit. Although these two seemingly simple aims in big companies like Motorola and GE can be very complicated in a confusing industry like "money" (GE money was a business of seven GE sectors that its major part was sold in early 2009 during the global financial recession of 2007 to 2009) and in an unpredictable market like that of the United States, there are some fixed bases within all types of uncertainty dominating the decision-making process. In these types of businesses, minimizing the consumption of resources and maximizing the benefits acquired by offering and selling the products (or services) are the final objectives. These all are attributed to the rational decision making of the multiobjective atmosphere with very finite targets.

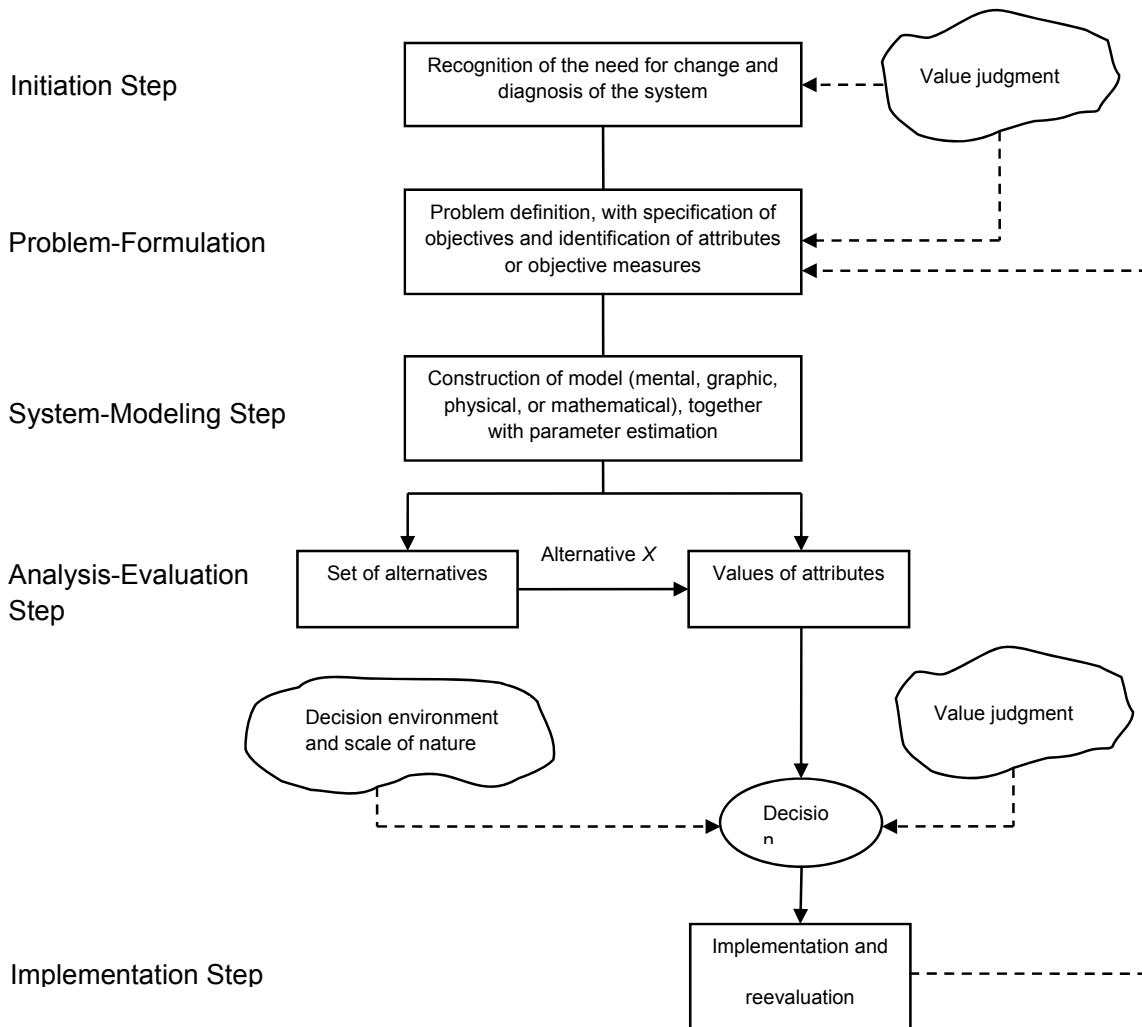


Figure 4.2. Multiobjective Decision Making process Developed based on Typical Multiobjective Decision-Making process (Chankong and Haimes, 1983, p. 5)

Therefore, in comparison to (urban) planning—with its countless users, including different interest groups and individuals; decision takers and actors, among which are technical and political

bodies; and interconnected decision spaces (visual and nonvisual)—the other fields (i.e., businesses) work within a clearer atmosphere with most likely clearer targets and objectives.

4.10.2 Business of Planning Versus Public Planning

One of the most important characteristics of planning, as Hall (2002a) explains, is that “Planning, as a general activity, may have one objective or many” (p. 234). As a result, the decision-making in planning is different than the decision making in other enterprises.

Profit-seeking urban developments, either as investments or for making profit (See Urban Process and Power Ambrose, 1994, pp. 48-102), established the business-oriented usage of planning. This usage of planning shows the private businesses how to increase their profit via more cost-efficient action as per market-based calculation. Such planning is the management of the business of development and can be seen as an opponent to that planning that advocates (in a general sense) the rights of users of the built environment. These aspects, as was discussed, are attributed to the attitude towards planning in which, first, the planning goal is to decrease the damage to the built environment to the minimum, to increase public benefits such that a greater number of users benefit as much as possible, and to decrease the costs in the same way. Second, the planning is to moderate, mandate, and monitor the rights of the built environment users so that they can participate in the process of decision making in a fair way.

This results in a multiobjective and multijudgment activity of planning that ontologically differs from the business-oriented attitude towards planning, which is a single-objective task within which are multiple variables.

Therefore, planning, in the sense of business (i.e., what is pursued by planners who are employed by private agencies) can have the same attributes and principles as the other businesses have. Although the planners employed by governmental bodies also have some guidelines with which to comply and serve the respective institutions in which they work, because of the differences between the responsibilities of these two types of institutions, these planners have different job descriptions and responsibilities. This difference, even in the market-based economic models, is evident because of the loyalty of the systems to democratic accounts of planning advocate people's rights. And at a larger scale, as Cullingworth (1997) asserts, the process involves many others:

Of course, when a plan involves other people (which it usually does) . . . this is a major feature of any type of [urban] planning [and decision making]; and the more numerous and diverse the participants, the greater the difficulties of planning [and decision making] (Cullingworth, 1997, p. 6).

Therefore, the decision making in both activities involves technical issues directly and public interests somewhat indirectly. However, they are fundamentally different. The first activity deals with a single objective in a complex market-based calculated atmosphere, and the second is to deal with a multiobjective and multijudgment atmosphere with a number of parties involved.

4.11 Decision Structures and Decision-Making Bodies

These differences are not limited to concerns and problems, but they were caused by dominant schools of thought, dominant political systems at the time, and also limitation of the references and information sources. Therefore, in the entire discussion, regarding this issue, many of the quotations illustrate the prevailing condition of planning and decision making and, thus, planning institutions and governmental bodies.

It was addressed before that the decisions are broadly determined by those who makes them. Therefore, the structure of decisions varies with the structure of the decision-making bodies. The

decision-making body, who comprises it, how the members are appointed to those positions, how they work those decisions out among themselves, and how they publicize their decisions to the public are very important factors and may defy the purpose of decision making and its underlying philosophy easily, should they not be defined or chosen appropriately.

A traditional yet simplistic point of view grants the task of decision making to the politicians: "The role of the politician (regional politicians, ministers and commissioners) is essentially that of decision making" (Martin and Robert, 2002, p. 56).

More in-depth contemplation on the structures of decision will take the politician's role into account rather carefully and scrupulously. As Goldsmith (1980) asserts, "Without an understanding of the power structure we cannot begin to understand how decision-makers formulate the policies and take the decisions (or non-decisions) that they do, or even to know who the decision-makers are" (Goldsmith, 1980, p. 47).

Even the undemocratic decision-making bodies seem to have felt a need for their own justification—a need to legitimize themselves, their decision procedures, and their decisions. Deutsche (2002) claims "Lefort does not deny the necessity of power or political decision making. Appropriation is a strategy deployed by a distinctly undemocratic power that legitimates itself by giving social space a 'proper,' hence incontestable, meaning, thereby closing down public space" (p. 401).

By contrast, capitalists are expected to do much better than what they are currently advocating. Peterson (1981, p. 132), who applauds growth boosterism, is acknowledged by some latter thinkers "such policies are often promulgated through a highly centralized decision-making process involving prestigious businessmen and professionals. Conflict within the city tends to be minimal, decision-making processes tend to be closed" (Logan and Molotch, 2002, p. 468).

In the bigger picture, however, changes in ethics are to be blamed for providing a firm ground to justify different methods of decision making. Goldsmith (1980) suggests "The changes in planning ethics and what might be called planning style have produced changes in the kinds of political processes associated with planning decisions" (p. 128).

Nevertheless, whatever the decision and whoever the decision-making body, all the decisions share common principles. Etzioni (1968) suggests "Fundamental decisions . . . are made through an exploration of the main alternatives seen by the actor in view of his conception of his goals" (p. 283).

Etzioni then decodes his approach into decision-making steps in which implementation, as a stage of planning, plays a major role. In fact, as Camhis (1979, p. 59) suggests, Etzioni's actual contribution is to see the process of implementation as an inseparable part of decision making in planning. But the old problem of lack of information is still persistently faced. Then, Camhis (1979) adds: "Etzioni trusts that decision makers do not have all the information that they potentially need to examine all the pertinent consequences of the various alternatives" (Camhis, 1979, p. 35).

The same concern is key point in Klosterman's work where he asserts: "Public officials still lack the information required for adequate decision making" (Klosterman, 2003, p. 93).

From a systemic point of view, looking at decision-making bodies is important to justify the advantages of cumulative decision-making systems over individual ones. Faludi (1976) suggests that the obvious objection one might raise against drawing an analogy between planning and individual thinking is therefore that it is a simplification. Planning agencies are indeed more complex than individual decision makers to the extent that they "are internally more differentiated, they can make use of larger amounts of knowledge and more sophisticated decision-making technology and their process of decision making is more institutionalized and organized" (Etzioni,

1968). However, their most effective way is not separable from the personal characterization of plans carried out by a planner or a committee of planners yet. This system strongly relies on the human brain as the reference of the plan proposer and the decision making after the analysis of problems and primitive data. Therefore, it can be deduced that the ability of the planner or committee in taking the proper position on the plan or in summarizing the citizens' ideas within a very economic-political atmosphere is still crucially vital.

Faludi (1976) also draws attention to the quality of the individuals working within an organization over its structure:

The claim is often made that, ultimately, what matters is the quality of the individual members of an agency rather than its organizational structure. People find it particularly difficult to see how agencies can perform creative tasks and argue that decisions must always be taken by individuals who are alone capable of shouldering the responsibility for what they do (Minett, 1971). Amos (1972) once made himself into their spokesman saying in relation to local government reform that "... the real success of reorganization does not depend so much upon the structures and processes which are adopted as the attitude of those who work in the authorities ..."(p. 59)

Acknowledging that individuals are obviously the ones who make the decisions, he then adds that the emphasis on the importance of individuals within an organization should not distract attention from the influences that may be practiced through the organization upon those individually made decisions:

I do not underestimate the importance of having well-trained and innovative minds in the planning situation. But to say that only individuals can make decisions is, at best, a truism. Emphasizing that the locus of decision-making is in the individual (which is deceptively obvious since individuals are at the nodal points of planning agencies) distracts from what should be of the foremost interest: the influences upon decisions. (Faludi, 1976, p.59)

He even goes further on to root the problem in how external influential bodies, mostly political and social systems, enforce their authority through what Deutsch calls "communication channels" and "decision points" on the decision-making bodies:

To a very considerable extent these do not come from within the individual but from without him, that is from the "... configuration of the communication channels and decision points in the political and social system in which they occur ..."(Deutsch, 1966). When one is talking about agencies (metaphorically speaking) thinking, learning, being creative, and making decisions, one is therefore talking about the preconditions which the "configuration of channels and decision points" in agencies must fulfill before individuals filling their positions can take meaningful decisions (Faludi, 1976, p. 59)

For the moment, it is useful to accept Faludi's view, drawn upon Etzioni's, can be accepted, and his concerns about the importance of the individuals within the organizational structure of an agency can be appreciated; however, the current research will later pursue the fact that Faludi's justification for simplification, wherever necessary within the structure of planning agencies, is not actually a justification with a firm ground even according to his own approach.

The subject of the legitimacy of a decision very much depends on how and by whom it is made. Goldsmith (1980) draws attention upon the importance by suggesting:

Representative government implies a political division of labor, under which the process of political decision-making is carried by those for whom politics is an all-consuming passion—Dahl's homo politicus—while the rest of the population—homo civicus—follows those pursuits that are of greater interest to them. (Goldsmith, 1980, p. 17)

Bolan (1967, p. 12) points out that the form of a planning organization is a function of the "decision-making environment, with smaller non-partisan communities being particularly prone to maintaining planning boards" (p. 12).

There are totally different and even contradictory points of view on participation, its significance, and its role in the decision-making process and the general framework of planning. Faludi (1987) claims

More often than not, participation results in awareness of conflicts, thus raising the issue of whether the preconditions for democratic decision-making exist. But whether democracy is able to resolve conflicts, which, thanks to participation, become apparent, is not an issue of planning theory (Faludi, 1987, p. 59).

This will magnify the divergence of ideas when compared to some equally important ideas of the other practitioner-theoreticians in planning:

People living in urban areas are often strongly committed to their neighborhoods and are skeptical of change. We therefore need to promote consultation alongside more proactive mechanisms for active participation, linking people with the decision-making processes which affect their own neighborhood. (Great Britain, Urban Task Force, & Rogers, 2004, p. 46)

By contrast, though, Friedmann (1973) puts an emphasis on the interpersonal dimension of decision making.

The structure of power and how it influences the decision making procedure may well be outlined by Faludi's (1987) account:

Higher-level agencies often do not implement anything at all; they stimulate others to do so. They exercise indirect control, by approving plans, budgets, loans and the like. These are their operational decisions. For others they form an input into their decision-making (p. 118).

He previously pointed at the level of influence of organizations due to the level of technology they own, the level of resources they can allocate, and the executive power they have:

In a certain sense, organizations are even superior to individuals in decision-making. As mentioned before, they command a better decision-making technology and larger resources than individuals do. Their importance becomes evident when positions are filled by individuals who, in normal circumstances, would not be eligible. (Faludi, 1976, p. 60)

Even the most radical advocates of public participation, though, cannot deny the importance of power, if a decision is to be made and implemented effectively: "In particular, there is a need for new decision-making structures with real power, that reach right across the policy domain to co-ordinate the implementation of urban policy" (Great Britain, Urban Task Force & Rogers, 2004, p. 307).

But the main question remains to be answered: "What are institutional forms by which the mediations of the city and the representations of its groups in decision making can be made democratic?" (Young, 2002, p. 438).

To answer this question partially—and although the basics of a democratic government seem to be of least help to making democratic decisions—some thinkers and, more specifically, political scholars have tended to sponsor alternative solutions. Goldsmith (1980) claims that

the emergence of local pressure groups as a primary means by which people seek to influence local events. Yet the evidence to date suggests that many such groups are regarded unfavorably if not with hostility by elected members, with only a few groups being considered as having a positive role to play in the urban decision-making process. (Goldsmith, 1980, p. 82)

Although political pressure is deemed to be an unavoidable hurdle, it is very dubious for it to move towards a rather democratic approach to planning. The pressure, as Faludi suggests, turns decision making into the activity that moves between the political process(es) and planning: "Any planning decision is based on some political choices, and during most planning operations the need for more choices is revealed. Thus, there is a need for constant interaction between the political process and planning" (Faludi, 1976, p. 103).

The other remedy, argued before, that has very unlikely grounds for justification, is to cling to ethics, while the decision power is generously bestowed upon one individual and is very likely to derail them towards any biased decisions in favor of a more favorable minority in the society:

The ideal model (of decision making in planning agencies), to which they should approximate, is a mature person making a choice based on knowledge, including self-knowledge, and on commitment to certain causes. Such a decision based on evidence and on genuine commitment has integrity. (Faludi, 1976, p. 224)

To emphasize the importance of rationality, it is enough to quote Diesing (1962) where he claims that, out of the five types of rationality he identifies, political rationality concerned with "decision structures" (like planning agencies), is the most important:

Negatively, a rational decision structure removes internal obstacles to decision, such as conflict, rigidity, and disproportionate influence. Positively, a decision structure so organizes a person's or group's perceptive, creative and communicative faculties as to enable him to reach effective decisions. (p. 231)

Deutsch (1966) and Buckley (1967) even provide models of "self-guiding systems" that incorporate highest order feedback loops or consciousness. These models have their normative aspects. By identifying what a self-guiding system would be, they give a direction to the consciousness of any decision maker. Finally, Etzioni (1968) links the same concern for increasing self-awareness of decision makers with his or her belief in the potential of the social sciences to provide a firm basis for such awareness:

As an intellectual process overlaying normative commitments, as a critical evaluator of existing social combinations, as an explorer of alternative combinations and their transformation, the social sciences are able to clarify basic commitments and to make them more realistic and, thus, more sustained. (p. 244)

With all the concerns that a decision-making process be democratic, "professionals seem to be particularly prone to succumb to ultimate goals. Apart from pressure of work, the reason, in their case, is that ultimate goals promise to provide a rock-solid basis for basing program proposals on. They thereby enhance the status of their professional guardians and increase their autonomy *vis-a-vis* other participants in the process of decision-making, politicians in particular" (Faludi, 1976, p. 102).

Darden (2001, p. 177) quotes Smith on ideology as a fundamentally political, prescriptive medium through which the popular legitimacy of iniquitous social and economic arrangements are secured. Ideology involves collective decision making and serves as a way to gain popular support for strategies adopted by the dominant group, particularly in democratic societies (Smith-Rex, 1989, p. 4). Trying to close the deal, Faludi seems to be inclined to eliminate the ideological critique from the equation:

Undoubtedly, such an ideological critique of planning proposals enriches intellectual discussion. But ideological critique has relatively little to contribute to the essential role of planning as making decisions. A decision-taker presented with a multitude of arguments made by the advocates of particular courses of action is faced with the problem of judging which course of action to accept as worth implementing. (Faludi, 1976, p. 37)

Alleviating the responsibility of the decision taker to the outside conditions (subtly to the decision makers who provide the decision taker with different choices), he tries to lessen his or her burden and encourage him or her to take up the action confidently and accept the indirect responsibility:

He must resolve, if only tentatively, to accept some reasons put before him as valid grounds for adopting one line in preference to others. For him, the information provided by ideological criticisms is a useful signpost to what may underlie a proposal, but it must not paralyze him lest he should become defunct as a decision-taker. He is more likely, therefore, to evaluate the arguments as they are manifestly made (meaning in their reconstructed form), judging premises for their acceptability and conclusions for whether proper inferences have been drawn. (Faludi, 1976, p. 37)

After all, he seems to set the scene to be able to redirect every single course of action to rationality as the only justifiable ground for decision making, although elsewhere he had surrendered to the individual discretion (which seriously challenges the rationalist approach to decision making):

Furthermore, the decision-taker will combine these premises of individual courses of action into more holistic conceptions, balancing demands on the use of scarce resources against each other and thus coming to conclusions which may be judged intelligent in terms of his total situation. In short, he will combine particular demands and proposals into one overall rational choice (Faludi, 1976, p. 37).

There must, therefore, be a plurality of planning agencies, operating with enough measure of independence to put forward their points of view, but also coordinated by decision-making structures and procedures to provide a measure of unity.

The other trade-off for power is the participation share in the decision-making procedure, which looks a bit controversial on its own, as losing power (which means autonomy in the process of decision making) will automatically lead into a lower level of share in the decision-making process, one more equal in relation to other participants in the process. Benz (2002) suggests the term "the Europeanization of policies" to point out the issue of power at lower levels: "As a result of the Europeanization of policies, these compromises imply that lower level governments lose some or all of their powers, for which they have to be compensated, by giving them the right to participate in decision making" (Benz, 2002, p. 151).

It should be kept in mind that the American and European patterns of democracy (built upon the principles of the free market) differ widely from each other. This results in significant differences in the level of government involvement in the process of decision making.

At the same time, there are fundamental disputes over how and to which degree the federal and state governments should and could practice their power over city authorities. According to Dear and Scott (1981),

the more that the State intervenes in the urban system, the greater is the likelihood that different social groups and fractions will contest the legitimacy of its decisions. Urban life as a whole becomes progressively invaded by political controversies and dilemmas." (Dear and Scott, 1981, p. 16)

Benz, who analyzes decision making on and application of the European Spatial Development Plan (ESDP) as a multilevel process, quotes Scharpf (1988) on the idea that negotiations between member states in the European Union are generally jeopardized by the joint decision trap: "The trap occurs where decisions require agreement among a multitude of actors from different institutional settings found in multilateral negotiations To avoid the joint decision trap in European multilevel governance, decision costs must be reduced, and coordination limited to what is necessary and feasible" (Benz, 2002, pp. 146-148).

4.11.1 The Problems of the Established Methods of Decision Making

4.11.1.1 Multiplicity of Decisions

Almost everyone agrees that if decision-makers were dealing with isolated problems, there would be little objection to this. But they have to cope with many problems occurring both concurrently and in sequence." An array of the problems within the current and dominant urban planning approaches may well relate to, be characterized by, or even be caused by the course of decision making in urban planning. Some of these problems seem very evident, yet they are crucial, to the extent that ignoring them may well put the existence or workability of urban planning as a discipline in jeopardy. An example is the question of content. As Camhis (1979) states, "What is characteristic of all the current definitions of planning is that the words 'objective', 'actions', 'goal', 'thought', 'decision' and so on are without content" (p. 3).

4.11.1.2 Reducing Planning to Decision Making

As was explained before, quite to the contrary, some of the contemporary thinkers and lead figures in urban planning go to the extreme, even looking at the whole field from a vantage point of decision-making. Faludi (1987), in his seminal work, takes a look at planning, emphasizing decision making as its focal point.

Surprisingly enough, some of his predecessors having very realistic and unbiased points of view, either for or against the planners, believe that planning is not decision making, but about making decisions. Häusler (1969), for example, states, "Planning is about making decisions by a mixture of authoritative and calculative choice" (Häusler, 1969).

The "objective" versus "subjective" dichotomy of *city versus all others*, for example, as Le Corbusier (2002) points out, is a known view in which the decision making attempts are considered to be subjective tools used for defeating the object called city: "And these decisions are reached in a sort of frantic haste in order, as it were, to hold a wild beast at bay. That BEAST is the great city. It is infinitely more powerful than all these devices. And it is just beginning to wake" (Le Corbusier, 2002, p. 21).

Independently of or subsequently to a series of activities and concerns that were raised as a result of faulty decision-making processes in urban planning, a pull-back movement came about after a widespread obsession about how and why planning (chiefly regarded as a decision-making process) had not been working properly. To the satisfaction of all the parties involved, some rather radically extended the problem to the level that requires a shift from theories to metatheories or grand theories. Camhis (1979) explains, "We examined the reasons for the shift of emphasis from the theory in planning to the theories of planning. This can also be attributed to the identification of planning with advance decision-making" (p. 30).

This, however, seems very unlikely to be the solution to the problem, as it zooms out and looks at the issue in even less detail, whereas the solution probably requires a method that involves more detailed scrutiny, perhaps using an utterly different underlying knowledge base from the grand theory but certainly not limited to that level.

4.11.1.3 Methodological Bases for Decision Making

The concerns, however, date well back to the mid-1970s, when some urban writers, using a rather softer approach, in which new theories of planning were introduced, attempted to address the problem perhaps less knowingly but more meticulously. According to Freidmann and Hudson (1973) "Planning in this view (rational planning) is a set of methods designed to prepare information in such a way that decisions can be made more rationally" (p. 8).

Even in the best possible assumptions and the most optimistic cases, the definitions of planning as or related to decision making seem to have faced or included some fundamental structural challenges. As was quoted before, "Planning is about making decisions by a mixture of authoritative and calculative choice" (Häusler, 1969).

Further attempts to alleviate more and more complicated conditions, in which planning was sinking, did too little good, if any at all, as they were trying to bind planning to the positivism of the scientific thinking methods even more radically, as evidenced by this assertion from Faludi (1973b): "Planning is the application of scientific method . . . to policy making"(Faludi, 1973b, p. 1).

The result was greater and greater complexity, and planning slipped towards that status that undermine the community groups for whom the decisions were supposed to be made. This occurred on the basis of the decision makers' (or decision takers') pure technical privilege or based on a reluctantly admitted right of supremacy of those who were in charge or who might be responsible for the decisions on the grounds of the supposed existence of the least measurable variables such as "commitment" (see Faludi, 1976). To cover up (but least possibly to solve) this problem, some theorists tended to outline the decision makers' authoritativeness as a "must" that had to be followed. According to Camhis (1979), "Disjointed incrementalism claims to be both a descriptive account of how planners or administrators go about decision making and also a normative/prescriptive model of how they ought to proceed" (pp. 38-39). This insistence on following conventional or governmental authorities could well justify its roots either in the norms (or even in what could have arguably been perceived, in some cases, as commonsense) or as a feature complementary, peripheral, or additional to those descriptive approaches.

4.11.1.4 Concerns for the Situation of the Planner; Responsibilities of the Decision Maker and Decision Taker

As addressed before, the worries around and about the role of the planner and how it can be justified within the existing array of traditionally powerful decision makers resulted in some exclusive tendencies that attempted to portray the planner's role as nothing but a decision maker. These tendencies are, however, not necessarily harmful so long as they are taken as offering only alternative views of planning, not dominant manifestos to overrule the planning realm. In the book *A Decision-Centered View of Environmental Planning* (Faludi, 1987), which draws upon Friend and Jessop (1969) and Litchfield, Whitbread, and Kettle(1975), Faludi differentiates decision making and decision taking. Decision making allows for free discussions among all those concerned, including planners. Decision taking, on the contrary, involves the exclusive holding of political responsibility, and planners have no part in it (p. 58). But as Faludi states "Decision-taking does involve the specification of objectives, but only rarely are any of the goals modified. In view of the confusion about goal-setting, this is an important point and one which will be developed" (Faludi, 1976, p. 78).

However, in practice, it is evident that such an extremist view is not correct, and in many local plans, planners usually take the decisions even if they are taken based on the general guidelines provided by higher level governmental bodies. This generalized conception of decision making and decision taking is more like an unreal "conspiracy theory" that downsizes the planners' responsibilities. (We need to take into account that in 1976, when Faludi talked of this sort of categorization, political issues and the relationship between planner and politician were different from today. In addition, by considering that, we can conclude how valid such a generalization can be. These points notwithstanding, his ideas on decision making are crucial to planning theory; hence, they are examined here very carefully.) It is evident, though, that once a decision is made, taking the decision requires no apparent and immediate effort but does lead to future responsibility, which may bring either pride or blame for the decision takers.

4.11.1.5 Justified Methods for Decision Making

The methodological approach is what has been backed by many different movements. Faludi (1987) claims,

Now, it is true, a methodological approach to planning is also being associated with experts arrogating decision-making to themselves—what is being described as technocracy. No doubt method can be, and has been, used in this way; but as we have seen, to plan without method means courting the same danger. It leads to decision-making by men whose wisdom seems to entitle them to a superior role. On the other hand, the proper use of planning method can reduce this danger. Minimally, a well-designed methodical approach helps in distinguishing facts and values, a precondition, if anything, of holding experts at bay. (p.18)

However, this approach to planning does not give the process of decision making any legitimacy about how it will work towards consensus building. Also he argues,

There is nothing that inherently contradicts freedom of choice in this view of method. Methods are not constraints, but they assist with coming to resolutions in arguments, as we have seen. They are not sacrosanct either, but open to criticism; and the legitimacy which they convey is conditioned upon recognition of their validity. It is more the everyday view of scientific method, endowing it with too much authority, which needs to be attacked, than the use of methods as such. They are tools for decision making. They do not take the human element away from decisions. On the contrary, the critical application of method in arguments around planning issues makes the value judgments involved the more evident. (Faludi, 1987, p. 18)

Yet, what seems to be forgotten is that the nature of this approach intrinsically encourages the practicing of too much authority (because the approach requires this).

The main problem yet remains consensus (and consensus building) over a made decision to give it enough legitimacy to be applicable within its context. There is no problem so long as “there is a highly consensual mode of decision making, with elaborate consultation of social groups and heavy reliance on third-sector organizations for implementation of policy” (Fainstein, 2003, p. 189). The problem starts turning up when the *heap paradox* (see chapter 5) occurs in urban planning practice.

By embracing diversity and relativity, Friedmann (2003a) asserts that the “collapse” of the old system of planning happened and planning had already entered to a “non-Euclidian” status of existence: It is nothing less than the collapse of the Euclidian world order of stable entities and common sense assumptions that have governed our understanding of the world for the past two hundred years. The engineering model of planning that served us during this period, with its penchant for advance decision making and blueprinting and its claims of superiority to other forms of decision making because of its scientific character, are [*sic*] thus no longer valid and must be abandoned (p. 75).

Those concerns spread well over the curricula in the planning schools. The confusion about where to start can easily be felt even today. Faludi (1987) argues,

The program started in the fall of 1947. At the beginning the faculty (Chicago School), with Tugwell, saw planning as really reflective decision-making. Also with Tugwell, it searched for planning as a separate discipline. . . . In response, and for the first time, a planning curriculum was developed which, rather than mimicking architecture, drew on the social sciences. The ‘Chicago’ answer to the question of how this should be done was a core curriculum based on the assumptions (1) that planning is a generic term; (2) that it refers to decision-making, as well as implementation; and (3) that it relates to public policy. (Faludi, 1987, pp. 23, 25)

4.11.1.6 Categorical Problems of Decision Making

There are few but fundamental restrictions or unsolved problems embedded in the process of decision making when considering it in regard to some specific schools of thought in planning. In this regards, Meyerson and Banfield (1955) states

Obviously no decision can be perfectly rational since no one can ever know all of the alternatives open to him at any moment or all the consequences which would follow from any action. Nevertheless, decisions may be made with more or less knowledge of alternatives, consequences, and relevant ends, and so we may describe some decisions and some decision-making processes as more nearly rational than others. (Meyerson & Banfield, 1955, pp. 314-315)

At the same time, *disjointed incrementalism* offers an approach to decision making explicitly based on the "opposites" of the principles for which *synoptic rationalism* is still supposed to stand (Camhis, 1979, p. 39).

Alternatively, when the rationalists tend to handle more complicated situations, they need to breach their very own principles of rationality. For doing so, they require a very good justification. They try to establish another type of rationality for what they need to do against what they advocate, which is quite evidently in clash with the first one, to give good reason for how and why they were bypassing the basic classical logic underlying their approach.

Faludi (1976) states that "There are again three strategies which one can name. In an ascending scale of the degree to which they suspend rational judgment, they are the following: satisficing, a-priori decision-making, random decision-making" (Faludi, 1976, p. 114).

None of these so-called strategies seem convincing, as they are supported by no firmer ground than a vague and arbitrary personal taste and have to be bound to some additional and more likely external ties to make sure that those decisions are following a rationale in favor of public interest rather than a driver, which is more likely to be in the particular interest of one or more groups of political or financial power. They then tend to draw upon morality and ethics, the very basics that have had no place in their approach so far. As their prescription reaches, it becomes very vague and will leave everything to personal judgment, with no applied method to assess it. This means the unknown aspects should be substituted for by a taste-based process. This way, the process will face serious questions of methodology which should be based on rationality by their own primary assertion. This also raises the question of where the public intervention would sit in the decision-making process? This also needs to be explained from two different perspectives: the consequentialist and procedural views of decision making.

The other charge rationalists are not quite successful in resolving is what they call simplification . Simplification is nothing but the reductionism inherent in any scientific method but seems to be knowingly and cunning avoided by the rationalists in hopes that they are not going to get trapped in the basic incapability of classical logic when dealing with nonclassical case problems. Faludi (1976) gives an account to justify the use of simplification:

The second answer to the charge of simplification is that the distinction between planning and individual thinking which has been drawn, for instance, by Etzioni, is a matter of degree. Looking at it from a different angle, one can say that individuals are similar to planning agencies in that they too are differentiated, use certain amounts of knowledge, have a decision-making technology, and are organized, only less so. It is therefore possible to draw comparisons between the two. The charge of simplification could only be sustained if the critics either showed awareness of the inescapable need to simplify, that is if they indicated precisely a degree of tolerable simplification, or if they argued that planning and individual thinking were entirely different so that no useful analogy between them could be drawn. The latter view would run counter to current thinking on the logical structure of planning being the same whether the actor is a person or an organization (Meyerson and Banfield, 1955; Banfield, 1959; Dror, 1963; Rieger, 1967; Bolan, 1969).

As Faludi (1987, p.47) asserts, the alternative (to rationalism) is described variously as consisting of "limited comparisons" (Lindblom, 1959); an incremental process of dispersed decision-making, "disjointed incrementalism" (Braybrooke and Lindblom, 1963); or "mutual adjustment" (Lindblom, 1965); and it has different dimensions. The attempt to cling to dualism and put rationalism up against one other major movement—no matter whether that movement can adapt to what rationalism fails to fulfill—does not fully recognize encase that even the rationalists submit, to some degree, to incremental changes. This implies fuzziness underlies their attitudes towards decision making. Quite interestingly, those postmodernists in planning theory who advocate what has been addressed above as an opponent to the modern rational account of planning have in many cases yielded to the principles of rationality to be able to justify their reasoning. This also denotes that they are giving up their classical principles of duality and applying fuzziness in their tendencies towards decision making.

The critics of rationalism identify it as one of the modes of decision making (Healey, 1983), which has the power to downgrade it to something other than a planning theory on its own.

Trying to draw upon the field's predecessors, Faludi (1987) admits "Mannheim (1940), Meyerson and Banfield (1955), Braybrooke and Lindblom (1963), Friedmann (1966a; , 1966b; , 1967) and Etzioni (1968) had led him to conceive of planning as the application of reason to collective decision-making" (See Friedmann, 1959, pp. 327-328). But it should be borne in mind that it is a repetition of the same logic.

There are very sharp criticisms, such as the following, about this point of view: "The knowledge-society is an exploitative and alienating one, because it is built on capitalist lines with an elite class of decision-makers having access to knowledge and the distribution of it" (Albrechts & Denayer, 2001, p. 376).

Faludi (1987) later tries to alleviate the burden by criticizing the advocates of other theories:

Davidoff's followers associate the rational planning model with excessively refined methods. . . . One cannot blame them for jumping on this bandwagon; but in retrospect we know that this has diverted attention away from the recognition of planning as decision-making under uncertainty and conflict. (p. 42)

Although there have been attempts to regain the justification of rational planning by challenging the advocates of the other theories, it is very important to bear in mind that the inefficiency of the other theories does not necessarily imply the rightness of rationalist decision making. Even if such problems are associated with other theories, rationalism cannot be justified on this sole ground.

Faludi (1987) adds,

Wedgewood-Oppenheim (1972) compares strategic choice with the rational planning model and various of its alternatives. Like Etzioni's "mixed scanning", it is intentionally rational and comprehensive, but imbued with awareness of the fragmentation of real-life decision-making at the same time. (p.94)

Nevertheless, as Certeau (2002) states, "the rationalization of the city leads to its mythification in strategic discourses, which are calculations based on the hypothesis or the necessity of its destruction in order to arrive at a final decision" (p. 385).

Furthermore, rationalist planners have also tried to answer major critics of their favored method, in the long run, by finding the ways in which they could demonstrate a weakening of their opponents' views or by obliterating those disputed aspects from the decision-making process as a whole. In some particular cases, they have even tried to absorb, rebrand, and relocate an idea somewhere within their own process.

Friend, Power and Yewlett (1974), as an advocate of connective planning, for which "opportunities come around when people acting in policy systems . . . are stimulated by their perception of decision problems to activate and shape networks of decision makers in order to explore alternatives . . .," emphasizes selectivity. As a result, they conclude "the practical influence of public planning activities on decision making depends on the dispositions among public accountable agencies of skills and resources relevant to the selective activation of inter-agency networks" (pp. 372-373).

Faludi also emphasizes the responsibilities of planning academics in highlighting the challenges: "So planning academics should debate the challenges of practical decision-making, even more so than the functions of planning" (Faludi, 1987, p.84).

Despite amplification of the right issues, there is too little, if anything, done to address how this should be carried out.

The Tavistock Institute of Human Relations, with its tradition of qualitative research, provided the ideal context for attention to the human dimensions of organizational decision making. One of its first projects was concerned with communication in the building industry. Its significance lies in the development of the so-called Analysis of Interconnected Decision Areas (AIDA); (See Luckman, 1967), using graphic representations of the interrelations between various options per decision area to generate alternatives systematically. In simple manner, it lays open the decision-making process so that every assumption can be changed at will (Faludi, 1987, p. 89). This method first of all outlines an approach based on the building industry (as opposed to an approach that sees planning as an autonomous discipline). Second, it uses the basics that have shown to be of little help because they build upon the principles of ordinary logic with a rigidly thinking framework.

Portraying the analysis of decisions as a bonus, rationalists seem to be processbased rather than product based, the approach that has its justification in manufacturing industries but hardly in the planning discipline. Faludi (1987) observes,

If it were not for the fact that planners do not generally perform it, the need for decision analysis would hardly bear mentioning. But planners are prone to emphasize the noble aims of plans. They forget that their plans must have an impact on operational decision-making, or else remain the products of fantasy. (p. 124)

Surprisingly enough and despite all the process-based applications that favor sensible room for thinking and speculating about all possible problems, a hasty move from plan making to decision making is encouraged. This seems to be prescribed to try to eradicate the problems that arise as a result of the ineffectiveness of the conventional methods. According to Faludi (1987)

On the other hand, the longer in advance plans are made, and the farther removed plan-making is from operational decision-making, the greater the uncertainty surrounding planning decisions—and the greater the chance that we must depart from it. The reason is that the broader perspective for which planning stands may prove to be irrelevant to the real problems in operational decision-making. (Faludi 1987, p. 125)

Yiftachel (2002, p. 539) believes planning processes can be used for the exclusion of various segments and groups from meaningful participation in decision making, thereby contributing to their marginalization and repression. This form of control can be explicit, as in the case of decisions imposed "from above," or implicit, through sophisticated methods of information distortion and meaningless forms of public consultations (Krumholz and Forester, 1990; Friedmann, 1992; Hillier, 1993). From another point of view, planning professionals can be seen to exclude themselves from the community and the context for which they are supposed to make decisions. Beauregard (1989) addresses this possibility:

As a body, planning theorists became highly eclectic, pursuing theoretical projects for their own sake. Collectively, they lost the object, the city, that had given planning its legitimacy. Their new objects—the planning process, policy-making, decision-making, and so on—were only tangentially the objects of practitioners; they were procedurally relevant but not substantively so (p. 387).

Anything that diverts such contenders (various segments and groups) into fragmenting their power and watering their efforts by going through “decision making” motions with hierarchies and boards at ineffectual levels where no responsible government powers of decision reside, vitiates political life, citizen effectiveness, and self-government (Jacobs, 1994, p.136).

As Broady(1977) reminds us, there are, however, always other ways to portray the participation process in the safest possible modes:

The full council meetings at which the public are entitled to be present give no indication of what really affects policy decisions, while minutes, as we all know, are carefully drafted so as to reveal the least possible about the real meat of civic affairs. (p. 42)

Although the level of responsibility over finances and local decisions typically depends on the size and wealth of a “commune” (Stern and Halfani, 2001, p. 479), the dominance of the financial sector of the society may manifest itself in many different ways. On the other hand, Baily (2001) explains: “The structural constraints of quasi-markets necessarily restrict both user choice (in terms of exit to alternative providers) and user voice (in terms of being better represented in management and decision-making processes)” (p. 343).

One of the other challenges for planning is flexibility. This is a major factor in decision making at large. Faludi (1987) explains, “flexibility refers to the ability of matching the definitions of the situation in planning and operational decision-making” (p. 125).

Regardless of theoretical point of view, there are some thinkers who have dexterously pointed out the very problem upon which the premise of the current study is intended to be based. Faludi (1973a), for example, illuminates the problem in this way:

At first glance, to describe the perennial problem of planning as information overload seems to conflict with an alternative view of the difficulties which planners face as evolving around how to obtain information. These difficulties may be used unwittingly to deflect from the more demanding question of how information informs decisions taken. Development plans adopted . . . are far from explicit about the way in which their recommendations flow from the facts collected. The folklore of planning is full of stories of surveys being conducted by research sections, and plans being drawn up quite independently by people who have taken neither a hand in designing the surveys nor much notice of their results. I suggest that these results are not used because there are limits to the amount of information which people can handle. (p. 106)

Worries about how the decisions are being made where there is not enough hard evidence for the so-called rational approach to take place were always overshadowing the dignity of the decision makers as well as the integrity of their decisions. These worries provoked planners to take a series of self-control and self-assessment actions to ensure that the morality and ethics of the profession were firmly followed. For instance, among the supporting materials provided for technology of choice training sessions at the Centre for Environmental Studies in the 1970s, Hickling offered a commitment package. This commitment package catches the variety of responses to uncertainty. It represents an adaptation to our inability to resolve all issues at once and complements decision making in a context often characterized by conflict.

4.12 Changing the Mode of Planning: Changing the Mode of Decision Making

Taylor (1998) point out, "Central to Lindblom's questioning was a critique of the ideal of comprehensiveness, which, Lindblom contended, could never be achieved in practice (Lindblom, 1959, p. 160, as cited in Faludi, 1973a). Lindblom's alternative model of "disjointed incremental" planning was thus advanced as a more realistic account of what the process of planning was like, and could only be like, in practice" (p. 113).

Rational-comprehensive	Successive limited comparisons
1(a) Clarification of values or objectives distinct from and usually prerequisite to empirical analysis of alternative policies	1(b) Selection of value goals and empirical analysis of the needed action are not distinct from one another but are closely intertwined.
2(a) Policy formulation is therefore approached through means-end analysis: first the ends are isolated; then the means to achieve them are sought.	2(b) Because means and ends are not distinct, means-end analysis is often inappropriate or limited.
3(a) The test of a "good" policy is that it can be shown to be the most appropriate means to desired ends.	3(b) The test of a "good" policy is typically that various analysts find themselves directly agreeing on a policy (without their agreeing that it is the most appropriate means to an agreed-upon objective).
4(a) Analysis is comprehensive; every important relevant factor is taken into account.	4(b) Analysis is drastically limited: (i) important possible outcomes are neglected; (ii) important alternative potential policies are neglected; (iii) important affected values are neglected.
5(a) Theory is often heavily relied upon.	5(b) A succession of comparisons greatly reduces or eliminates reliance on theory

Table 4.3. Model of decision making. Note. From C. E. Lindblom, 1959, pp. 154-155, as cited in *Planning in the USA: Policies, Issues, and Processes* (p. 16)

Also Cullingworth (1997) states,

The concept of comprehensive planning in theory may be contrasted with the narrowly focused planning which takes place in practice. Each administrative agency takes its decisions within its particular sphere of interest, understanding, resources, and competence (Cullingworth, 1997, pp. 9-10).

The move from centralized planning towards the decentralized government has been influenced by both ethic perspectives in planning and the postmodern school of thought (in its broadest sense). The recent accounts of planning stem from postmodernism, with emphasis on the thought underlying decision making and the importance of people's attendance and voices (in political sciences) with an impact on the procedure of decision making. It has been accompanied with the inherent uncertainty and unpredictability of planning activity and, hence, has resulted in change in the traditional (rational) cost-and-benefit equation and affected the scientific view of the decision-making process.

By criticizing rational accounts, it also raises concerns about the procedural view against the consequentialist one, but in a more practical way. The path has been enforced by changing not only the reasoning method but the crucial variables and their relationships that are at the center of attention of related planning people.

Bridge and Watson (2002) explain,

Political scientists, economists, local politicians, and planners agreed that the urban future could never be accurately predicted, that community goals in a turbulent world remained elusive, that information would always be indeterminate, that a decentralized democratic political system made comprehensive planning from a centralized authority impossible. The ideal of a public interest embodied in a comprehensive plan, moreover, conflicted with the reality that private interests directly influenced public policy formation and that political decision making operated on fragmented choices, not integrated wholes. (p. 41)

Therefore, by considering all the unpredictability of the decision-making process, with a safe distance of skepticism, the planning people came to the conclusion that no aspect of decision making is achievable to carry out in a purely scientific way and that social justice to justify the process of decision making is strictly required. They also assert, "Frozen into a rigid position, modern man, without perspective, has no power of decision, no ability to change the social situation" (Bridge and Watson, 2002, p. 41).

4.12.1 Decision Making in Modernist and Postmodernist Senses: Dualism of Thoughts

Historically, the differences between modernist and postmodernist planning have been intensified by pursuing different interpretation of the aspects and variables of planning. It is evident that these differences turn into the dichotomy since the late 1960s, exactly at the heart of the discussions related to the end of ideology in planning. Accordingly Taylor (1998) reports,

The 1960s was the high tide of the social democratic, "corporatist" state, and the acceptance of rational planning was so widespread that some social theorists, such as Daniel Bell (1960), spoke of the "end of ideology." At local government level, this political stance was reflected in the adoption of strategic and corporate styles of management, following the recommendations of the Bains report (Bains, 1972) into the structure and management of local authorities. (p. 69)

Through scrutinizing the literature on the decision-making alternatives, one can recognize two major categories. These two categories have been chronologically set up as a bipolar system of decision making as a whole, with their difference represented in approaches (see Table 4.1). Regarding the discussion on fuzziness in the next chapter, the sets framed here are two general sets whose dimensions and attributes are different in detail. For example, if it is expressed by thinkers of the postmodern era that "modernist planners and theorists typically emphasize the possible consequences of their decisions," the statement cannot be completely true, because any a planner needs also to consider *procedure* in his or her work. As seen before, recent modernist planners who are reportedly said to be in pursuit of rationality in their works, in emphasizing *hearing* (in the United States) and *public consultation* (in the United Kingdom), demonstrate that procedure is an inevitable part of decision making for planning spaces. (The issue of the bipolar method of reasoning and knowledge is more familiar when considering deduction versus induction. The relation between these two is complicated because some have tried to justify one against the other, typically deduction against induction. But it is evident that without first rationality and induction through deductive methods, the whole issue will be undermined. This is why at the theoretical level some still try to clarify the issue and give advantage to one of these notions, but in the real world, there is no crisp boundary between them, and using both of them in coalition is inevitable.)

Again, with consideration of the second type of fuzziness, in chapter 5, it can be seen that the definitions presented in each school of thought are involved with fuzzy coverage of their

contradictory ideas. Therefore, the whole idea of setting the bipolar categorization of decision-making domains is unrealistic, because, at the least, there is a small portion of the proponent idea within the defined one. This means that despite the favoring of such a separation by the reductionist (and here dualist) school of thought, it is not realistic. Therefore, it is necessary to make a distinction between what it would be and what it should be (in this realm, what that should be is what is (more) accurate).

Then the more general categorization (here, modernist and postmodernist decision making) necessarily contains a degree of certain attribution, and beyond that it usually is amalgamated with the “truth” of the related notions, including the contradictory notions. This is because these models are not realistic. This issue is discussed under fuzziness and crispness in chapter 5.

4.12.2 Traditional Dual-Contradiction of the Decision-Making Process

When one considers the literature of decision making, seven dimensions are recognizable as the most important observations of the decision paradigm, in which a dual-contradiction was traditionally sought after to justify the two major dominant planning schools of thought against each other:

- a. Emphasis and justification
- b. Approaches of deduction and induction
- c. Basis and tools (defuzzifiers and defuzzification methods)
- d. Vision on planning
- e. Amount of the expansion of the decision-making operation
- f. Ethical accounts
- g. Model of control

The above seven bivalued sets are summarized in the table below:

Decision-Making Mode	Emphasis	Approach	Basis	Vision	Expansion	Ethic	Model
Modernist	Consequences	Structuralist	System-Based	Apolitical	Comprehensive	Utilitarian	Centralized
Post-modernist	Procedure	Poststructuralist	Value-Based	Political	Incremental	Deontology	Decentralized

Table 4.4. Modernist versus postmodernist decision-making dualism.

These traditional (classical logic-based) dual-contradictory terms do not accord with real-world integrated concepts that are internally involved on the opposite side. This means that, in practice, by being loyal to one of these extremes, decision making will present a nonreal theory on decision making whose application will not be justifiable (for more details, see the next chapter).

4.12.3 Mixed-Scanning Method

The above problem has been mentioned very rarely in some thinkers' ideas. However, this type of consideration has been pursued, first, via classical logic and, second, in very limited notions of decision making. One of the most important exemplars of this type of pursuit is traceable in Etzioni's work under the title of *mixed-scanning*, a model described below:

An alternative [to two conflicting decision-making models, comprehensive and successive] is provided by Etzioni's "mixedscanning" model: this incorporates elements from both comprehensive and incremental planning theories. It holds that decisions on "fundamental" issues—such as primary goals—are followed by detailed examination of alternative programs of implementation (Etzioni, 1967). This is an attractive theory, though skeptics are not convinced! (Cullingworth, 1997, p.16)

In accepting the dual-contradiction of the expansion of methods of decision making (comprehensive and incremental), Etzioni emphasizes that each of the methods, singularly, is not able to solve the issue of decision making. He therefore suggests a mixed method containing both ideas, which deals with planning issues in different layers proportionate to the nature of the issue. This approach is invaluable because it is one of the rare methods in which the coalition of both methods is recommended. Instead of declaring a single method right, it talks of relative trueness. However, through further scrutiny of his literature, it becomes evident that he attempts to categorize the planning cases based on the method they may (have) use(d), which is again based on the classical logic of categorization.

4.13 Slaving Principle and Normative Reductionism of Decision Making

The general notion of the slaving principle is described by Haken (1983) in its temporal dimension, which was used in the dynamic analysis of economic systems. It is applicable to the planning decision making and can effectively be used in the process to clarify many of the relations. This principle is usually indirectly known and applied to human scientific activities to describe the systems. However, the usage of the principle based on a classical reductionist view can omit most of the influential factors and may result in the failure of analyzing the systems and, hence, in misleading information. It is supposed that slave principles, first, cannot be applied to all combinations (or situations) of a single relationship of two or more interacted parameters, because the relationship is temporal and this can change or reverse (an example is the relationship between changes in the electronic components market and the computer market, between 30 years ago and now). Second, the scale of influence of phenomenon A on phenomenon B (as the slave) can be different from the influence of phenomenon A on phenomenon C. Third, this influence can be simply reciprocal and unknown, invisible, or supposedly too small to be considerable. The most important issue that is directly related to this research is the expansion of the sets defined in which the slaving principle is supposed to be examined; this can potentially introduce any type of fuzziness in definitions and their relations.

Based on the explanation on slaving principles provided by Dendrinos (1992):

According to a general principle in dynamical analysis, sometimes referred to as the "slaving principle," slower-moving variables slave or determine the behavior of faster-moving components. There is another dimension, however, to record the effect of the slaving principle. Equivalent to the temporal slaving principle there might be a spatial slaving one, according to which a larger spatial unit might determine the behavior of a smaller constituent one. (p. 44)

In the systemic view of decision making based on the dominating rationality of planning as a system, the pure scientific or semiscientific values (economic and political values that are involved with human changes and ethical values but are still known as sciences) of decision making are supposed to have the rationality of the bases. Therefore, as the slower moving factors, they slave the decisions made, which normally move faster. And also in postmodernist

accounts in which empirical accounts acquired from space users are supposed to be the fundamentals of the decisions, the decisions should move faster than the interests. This means that, in both views, the decisions are slaves of the bases of the decision-making processes. However, based on the vast literature of the social sciences that examines the relation of public interests and economic-political changes, these two are not two separate spheres, and they are in ever-changing interaction all the time.

Therefore, in a multiparty atmosphere like planning, assuming that decision making can be the slave of either constant values or changing human interests imagines a linearity to the sphere that cannot be real. This type of supposition, in which some issues are known as the subset of the others in an end-state way, changes the activity to a rigid system and reduces the processes to impractical models, resulting in the models' having imprecise outcomes. Thus, when the slaving principle is used, even if the comprehensive approach is avoided, many of the factors are not reducible or eliminable.

4.14 An Alternative Logic in Decision Making

4.14.1 Attempts to Mitigate the Problem

The all-inclusiveness of planning is the factor that creates an unavoidable level of complexity for decisions. King (2002) asserts that

given such economic or technological influences, the extent to which urban forms and planned environments differ clearly depends on political and economic factors, cultural values, historical experience, geography, and the values and ideological beliefs of those power-holding groups and professional elites responsible for structuring and implementing decisions about urban planning and the overall shape of towns. (King, 2002, p. 529)

Up until now, it has been argued that a series of problems were arising in the planning discipline that involved decisions and decision-making process. Some attempts were made to address, clarify, and mitigate the problem. For instance, Emery and Trist (1965) show that a priori decision making is an approach institutions take when operating in what they call a turbulent environment.

Some, by contrast, try to legitimize the reductionism inherent in rationalism that underlies some planning theories. On the other hand, as Cooke (1983) writes, the reductionism in rationalist approach to logic comes with idealism which compromises many other important factors of decision making: "An idealized and rationalistic conceptual logic being elaborated whereby, irrespective of location, time or organizational context, only limited variants on a basically rationalistic model of decision-making are derived" (Cooke, 1983, p. 261).

Even the most radical rationalists admit that the way the human mind works is not how decisions are intended to be rationalized. As Faludi (1987) states, "Decision-making, planning, indeed, human thought processes generally, cannot be straight-jacketed by rules. The mind works differently, as critics of rationality are quick to point out. Nor does it matter whether thought processes are systematic, methodical, or rational" (p.56).

There also have been concerns about the accountability of the plan and the responsibility of those who decide on it, as expressed by Great Britain's Urban Task Force and Rogers (2004): "An accountable planning system renders those making or advising on planning decisions responsible for the quality of the decisions they take" (Great Britain Urban Task Force, and Rogers, 2004, p.45).

Clinging to the principles of *operational research*, rationalists tried hard to mitigate the problem as it was targeted in engineering. Faludi (1976) writes,

Optimization is merely another way of saying that, whilst attending to any one problem we also preserve our chances of attaining other ends now or in the future. It is thus a formal expression for the maximization of the chances for further growth. This introduces a new element into program formulation which is termed a decision-rule, this decision-rule being invoked in all those cases where the action space contains more than one program. (p.93)

As the following points by Faludi (1987) demonstrate, they also underlined the false attempts of IOR to eliminate the uncertainty inherent in the process of decision making in planning:

It (the "IOR School") helps us to appreciate the problems of practitioners. Also, it insists that planning is concerned with improving day-to-day decision-making. . . . But the "IOR School" is partly also to the widespread misrepresentation of the rational planning model, wrongly identifying it with the quest for certainty. (p.99)

Healey (2006) also contributes to this critique:

In the US in particular, it stimulated an explosion of work on the "science" of decision-making, with much discussion on the forms the rational planning process could take and on the kinds of urban systems models which were needed to underpin analyses of the consequences of alternative actions. (Healey, 2006, p. 24)

The rationalists admit, however, that, in Faludi's (1987) words, "In the ordinary course of operational decision-making, not all effects are in fact taken account of" (p.171).

In order to reconcile the situation where there is not enough supporting evidence for optimization, some other models bring forward the decision makers' personal satisfaction, which is, by contrast, criteria far too subjective to be fulfilled. Bridge (2005) explains, as an example, Simon's model that "replaces the idea of optimizing with satisficing in decision-making. In uncertain conditions and lacking perfect information decision-makers may take the satisfactory option (in terms of aspirations), rather than seeking to fully maximize their utility" (Bridge, 2005, p.130). Bridge then goes into more details about how this model is adapted, interpreted, and employed by others:

Forester's adaptation of Simon's model sees the constraint in terms of limits to the computational abilities of the planner: the fact that the planning situation is socially differentiated (involving different actors with their own interpretations of the situation). The latter constraint makes satisficing difficult - as planners have to exploit social networks in a form of information gathering to help inform the decision. A further constraint is that of pluralist conflict: the fact that different actors have different interests means that the political perspective that informs other's interests and opinions has to be taken into account. Structural distortions are the fourth constraints on the decision-making situation and these comprise structural inequalities in power between the actors in the situation. (p.130)

Simultaneously, incrementalists have their own interpretations of reductionism. Faludi (1973a) states, for instance,

According to Lindblom, the dominant characteristic of decision-makers in action is that they focus on increments by which alternatives differ from the status quo. On the whole, decision-makers therefore restrict consideration of alternatives to those which are not only incremental but for which they also possess adequate information, thus limiting the range of alternatives from which their choice. (p.152)

Modernists had, by contrast, their own approach to facilitate the impreciseness of the decisions to be embraced and justified. Bridge (2005) asserts that "the modernist idea of completeness gives way to an appreciation of the messiness of most socio-physical contexts in which planning decisions must be made" (p.132).

New pragmatists have totally and utterly different interpretation of the cost effectiveness of the decisions made. For example in Urban Task Force it is stated that "The introduction of 'Best

Value' should enable local authorities to make decisions with their local partners on the basis of what works best in any given situation, based on comparative evidence on costs and quality" (Great Britain Urban Task Force, & Rogers, 2004, p.118).

In addition to the lack of resources, the importance of structural problems of planning authorities should be seriously considered:

Some of the delay and inflexibility can be laid at the door of the planning system itself, and the lack of resources, but much is down to the attitude and approach of local planning authorities, and a lack of priority status within some local authority decision-making structures.(Great Britain Urban Task Force, & Rogers, 2004, p.197)

The importance of day-to-day decision making is surprisingly highlighted in works of some theorists, including Faludi (1987), who writes, "Suffice it to say that my criterion of success in planning is whether it can inform day-to-day decision-making. A plan can inform-and improve decision-making without being followed during implementation" (pp.102-103).

To fill in the gap that exists when a decision system is superimposed on the dimensions of everyday needs, the rationalists put forward the issue of flexibility. Faludi (1987) explains, "Flexibility refers to the ability to bridge the gap-created by uncertainty-between planning and operational decision-making; the ability, in other words, to adapt the definition of the decision situation as we proceed from plan-making to development" (p.179).

One of the downfalls in the employment of new approaches to decision making in planning is the delay, which continues to the present, in applying technology as a *social process*, despite the fact that it was first acknowledged as such a relatively long time ago. Although the question of technology, as Albrechts and Denayer (2001, p.371) suggest, is paramount and although technology meanwhile has successfully been analyzed as a social process(Bijker et al., 1987), no serious attempt has yet been made (in planning or in politics) to design a strategy aimed at democratically politicizing decision making concerning technology (Kirsch, 1995; Van Dijk, 1995).

Pointing out the failure to employ technology as a social process in a more democratic decision-making process does not mean that involving people with the aim of improving the level of participation has been undermined, regardless of how their viewpoints were about to be taken on board. Jacobs (2002) claims,

A public hearing in a big city is apt to be a curious affair, simultaneously discouraging and heartening. The ones I know best are held in New York's City Hall, on alternate Thursdays, on measures that require decision by the city's chief governing body, the Board of Estimate. (p. 418)

Some of those disadvantages may be settled by the attempts to achieve a system in the decision making. As he also writes, "Administrative districts in a big city would promptly begin to act as political creatures, because they would possess real organs of information, recommendation, decision, and action. This would be one of the chief advantages of the system" (Jacobs, 2002, p.435).

At the same time, according to Urban Task Force and Rogers (2004, the plans for modernizing those "political creatures" seem necessary to elaborate the approaches to decision making tasks: "The Government's current process of modernizing local government includes a number of positive steps to speed up decision-making, moving away from strict adherence to rigid service-based committee structures" (Great Britain Urban Task Force, & Rogers, 2004, p.153).

But it should always be kept in mind that, despite the public consultation's intrinsic merit, "consultation can be abused as a means of rubber-stamping decisions and side-stepping a genuine debate and full local participation" (Great Britain Urban Task Force, & Rogers, 2004, pp.160-161).

For those particular cases, there might be some foreseeable remedies that remain subject to trial. Therefore in Urban Task Force suggests that “we recommend using integrated spatial master-plans for area regeneration as a basis for making subsequent planning decisions” (Great Britain Urban Task Force, & Rogers, 2004, p.197).

All those sectional remedies have of course some specifics of human language. As Alexander, Ishikawa, and Silverstein (1977) explain,

The sequence of the language will guarantee that you will not have to make enormous changes which cancel out your earlier decisions. Instead, the changes you make will get smaller and smaller, as you build in more and more patterns, like a series of progressive refinements, until you finally have a complete design. (Alexander et al., 1977, p. 464)

But Alexander et al. develop no explanation for the logic of the basic reasoning principles underlying that language.

As briefly addressed before, rationalists still strive, as Faludi (1973a) does here, to explain how the limitation of a rational approach could be handled and even bypassed if necessary, wherever it is causing obstruction:

There is a second range of approaches which decision-makers use in coping with their limitations: they simply suspend rational argument. This is rational for three reasons: firstly, when a problem cannot be tackled by exercising rational choice, then even the effort of trying to do so is not only pointless but positively wasteful; secondly, by concentrating planning resources on what can be planned, the compound chances of success increase, even though parts of the operation may be left to chance; thirdly, to suspend rational argument in a controlled manner depends on one's knowing about the problem and which parts one may tackle by using such argument and which not. It thus represents a rational decision in itself. (pp.113-114)

Yet again giving way to the personal qualities of the decision maker, which are by no means measurable, rationalists try to justify how decisions can be made in very complicated situations in which no rational model works. Faludi (1973a) insists, for example, that

as long as the decision-maker is confident that these are well thought out, that they form part of a strategy and are not mere rules of thumb or, even worse, biased prescriptions masquerading as technical rules, he need not worry about not investigating the reasons underlying routine solutions. He should merely be aware of the fact that he has to make compromises, and that developing, prescribing, and accepting routine solutions to problems is one of the strategies for obviating limitations on information-handling capacity. (p.110)

Quite to the contrary, the postmodernist accounts of planning, in rejecting any comprehensive attempts to solve the problems of decision making, try, first, to decentralize the idea of decision making, second, to reduce the size of plans and areas, and third, to rely on the empirical deductive method of decision making. These steps are all accompany the values that postmodernist thinkers emphasize. Therefore, in this era of decision making, as will be discussed in the chapter analysis, there is an attempt to use a new type of reductionism, limiting the dimension of human knowledge in decision making.

4.14.2 Emergence of an Alternative Way

A new alternative way in decision making theory is bound to emerge, should the existing deadlocks be handled in a justified manner. Some attempts have been started but abandoned halfway through, left unfinished.

Hall (2002a) suggests,

In turn, Webber's view of planning—which flatly denies the possibility of a stable predictable future or agreed goals—provides some of the philosophical underpinnings of the Social Learning

or New Humanist approach of the 1970s, which stressed the importance of learning systems in helping cope with a turbulent environment. But finally, this approach divorced itself from logical positivism, returning to a reliance on personal knowledge which was strangely akin to old-style blueprint planning; and, as developed by John Friedmann of the University of California at Los Angeles, it finally resulted in a demand for all political activity to be decomposed into decision by minute political groups: a return to the anarchist roots of planning, with a vengeance. (p. 366)

Concerns about how the learning process happens in human beings exist among planning thinkers, some of whom turn their attention to patterns that reportedly have the ability to imitate human learning abilities.

Faludi (1973a) states,

The last of the planning strategies based on pattern recognition, mixed scanning (Etzioni, 1967, 1968), is the most versatile of the three. Besides being more versatile than routinization and sequential decision-making, it yields a very important return: a structure within which learning can occur. (Faludi, 1973a, p. 113)

The importance of negotiation is a key issue but not all that matters for an alternative method. This is evident because negotiation has been at the center of attention long enough, yet through negotiation alone, initiating a new method has not been possible. Camagni, Capello and Nijkamp cite, "it means we can avoid, at least partially, the intriguing and probably (theoretically) unsolvable problem of the representation of future generations at the negotiating table of present decisions" (Heister and Schneider, 1993, Pasek, 1993, cited in Camagni et al., 2001, p. 128).

A new way of decision making requires much more than just one or even all the missing points already discussed during this chapter. It requires a full new mindset and thinking framework, which will be discussed in the next chapter. Here just a very general hint about it is given to show the way forward.

The alternative approach started in other disciplines, where it has been used for over four decades. Zadeh has pointed, in several papers, to the inability of classical mathematics to deal with humanistic systems. What has become increasingly clear in recent years is that classical mathematics—based as it is on set theories and two-valued logic—is much too restrictive and much too rigid to serve as an effective tool for understanding the behavior of humanistic systems, that is, systems in which human judgment, perceptions, and emotions play important roles. Such systems pervade the fields of economics, psychology, sociology, linguistics, management science, medicine, philosophy, and law, and of many others in which the basic concepts are fuzzy rather than precise and in which the reasoning is, for the most part, approximate rather than exact (See Negoita and Ralescu, 1975, Negoita et al., 1978).

In the 1970s and well after fuzzy logic was introduced, formulized, and even utilized to mimic the human mind's learning patterns, thinkers in the urban domain had just started to realize that the model of the human mind as a learning system [was] now complete. With variations, it has been used to represent the acquisition of motor and social skills (Argyle, 1967), the process of cognition (George, 1965, George, 1970), operational thinking (Stachowiak, 1969), complex defense systems (Stachowiak, 1969, Howland, 1966), and even political decision making systems (Deutsch, 1966).

4.14.3 Planning Authorities and Decision-Making Actors

There is or should be an actual distinction between planning authorities and decision-making actors. What distinguishes planning authorities from decision-making actors can be seen as two factors. First of all, the planning authorities are engaged with normative and discursive notions of planning as professionals, versus those who are not as familiar with technical terms but are in fact the actual users of the planning space. Second, the former group is not as diverse as the latter. Therefore, in planning, who makes the professional decisions ought to differ from who

makes the decisions overall. In such a situation, the importance of adopting a justified decision making, as Cullingworth (1997) states, should be highlighted: "Of course, when a plan involves other people (which it usually does), it must incorporate an acceptable way of reconciling differences among the participants" (Cullingworth, 1997, p. 6).

This is why this approach is mostly called value-laden planning, planning whose decision-making processes should follow a rights-based account. Nevertheless, rights-based statements about decision making have been underpinned by rationality and rational premises that may be ethical or legal. That is the main reason that the pursuance of rational planning, for example as Cullingworth cites, raised many concern: "We must first exorcize the ghost of rationality, which haunts the house of public policy" (Wildavsky, 1987, p. 25, as cited in Cullingworth, 1997, p. 6).

Therefore, again, decision making stands alone in the middle of a multidimensional and uncertain stage with many professional and nonprofessional actors. With consideration of this activity in such an environment, whatever the rational basis, the existence and share of each intervening party seems undeniably important.

4.14.4 Integrated Decision-Taking and -Making Parties

With the changes in the conceptualization of decision making and decision taking in planning, the concepts of decision makers and decision takers, like many other aspects of the decision process, have changed (see the sections planning mode changes and change of decision-making model). As was mentioned, in the recent mode of planning, according to the works of so-called postmodernist theorists, the term *decision maker* needs to be changed to *decision-making parties*. However, the planning people who were characterized within postmodern accounts, in rejecting rational planning, explicitly emphasize only the parties that include interest groups, individuals or at most advocates.

Yet, in line with the idea of a multiobjective and multijudgment atmosphere of planning, ignorance of any intervening parties can damage the entire decision-making process. Therefore, it is important to count the intervening parties so that the decision making can be justified. While promoting this idea, many (of the postmodernists) have spoken of the necessity of the profession, its discretion, and the public planning agency, which explicitly implies that rational organizational requirements are undeniable. Davidoff (1965) explains, for example, "In presenting a plea for plural planning, I do not mean to minimize the importance of the obligation of the public planning agency" (p. 333).

The parties can be the clusters of people who are involved either in planning or in space in an effective size. The members of the former group are engaged with the idea of space making in the framework of planning as an activity, and the members of the latter group are those who benefit from space making or are faced with possible problems.

In this new mode of thought, we need to look at the fact that more groups ought to be involved in the decision-making and decision-taking processes. These groups can be categorized into six distinctive ones:

- Party One: The planners and planning institutions involved with technical and scientific aspects, such as ecologists and geographers.
- Party Two: The planning people, institutions, and authorities from controlling human sciences, politics, economics, and law; those who are in the structure of power.
- Party Three: The institutions and agencies engaged with additional human sciences, such as sociology and psychology.

- Party Four: The institutions, agencies, NGOs, and quangos that are mostly involved with human sciences as nonprofit parties.
- Party Five: The groups and businesses that are engaged with the costs and benefits of the space⁵ making or that, in some cases, are the proposers of various schemes.
- Party Six: The individuals affected by the planning and decisions made.

4.14.5 Additional Explanation

These six parties are usually based on the power structure in which decision-making and decision-taking parties take part, more or less, in each planning environment. However in a rule-based atmosphere, as will be discussed later, these groups must have their voices, through various organizations, in all processes—policy making, plan making, and decision making and taking—regardless of the discretion possessed by the dominant structure of power. This means the voices should be heard based on some factors other than only power. These six parties perform in different forms in different societies. Based on the *fuzzy border of influence*, these parties are typically a *cluster of influence* whose size depends on the scale as well as type of plans.

4.15 Justification of Decisions and Decision-Making Compartments (Justifications Required)

As was discussed, the process of decision making in the built environment includes three distinct processes.

1. Policy making (setting the targets, goals, and objectives) shows the path as roughly as necessary.
2. Decision taking results in methods (individual methods or an amalgamation of methods that can be categorized as physical, normative, or discursive) for achievement of the plans.

The outcome of these two steps is almost complete plans (by whoever has been involved in these processes).

3. The third process is making decisions on the plans provided to legitimize them for the implementation phase. This part involves the final evaluation of the existing plans to be implemented and the selection of the final option (in the next chapter, see the explanations under the defuzzification section). However, the final plan is set in a dynamic system, allowing for modifications based on feedback, rather than having an end-state plan.

The discussion on the justification of the decisions is the central debate in this part because, if they are not justified in one or more aspects, the planners, advocates, interest groups, or individuals can object to them. Therefore, the issue of the justification of both decisions and decision-making methods has two main parts, first, the justification of the procedure and, second, the justification of consequences.

⁵ Obviously, the word *space* is not used in its physical sense but refers to every space, in spatial planning sense, made in the planning sphere.

4.15.1 The Importance

The much expanded ethical reasoning (such as the moral reasoning for the rightness of equal opportunities for users of space) on the issue need not be discussed here. It suffices to say that any decisions should be justified.

Flathman (1996) explains,

Determining justifiable government policy in the face of conflict and diversity is central to the political order. . . . The much discussed difficulties with the concept [of the public interest] are difficulties with morals and politics. We are free to abandon the concept but if we do so we simply have to wrestle with the problems under some other heading. (Flathman, 1966, p. 13)

This reminds us of the importance of the necessity of justification for the probable consequences of decisions. Otherwise, we should expect a case (or many cases⁶) to be reported to the courts, for “another striking characteristic of US land use planning [and, hence, decision making in planning] is its domination by lawyers and the law” (Cullingworth, 1997, p. 17).

This is a crucial attribute of the planning system pursued in the democratic political and free-market economic system, which emphasizes consequences through procedural approach. This means that the consequence needs to be legitimized through a justified procedure. If there is no justification for the process, then the law and lawyers are needed to settle the case. However, in various cases, the utilitarian aspects of the law or the preservation of the individuals’ freedom and independencies are the bases for judgment in the procedures.

4.15.2 Procedure Versus Consequences

In “Utilitarianism's Bad Breath? A Reevaluation of the Public Interest Justification for Planning,” Heather Campbell and Robert Marshall (2002, pp. 163-187) investigate, from a binary point of view, the issue of the justification of public interest as a subject central to planning (versus the method in which consequences are studied and based upon which plans will be justified). In this paper, the binary contradiction of consequentialist and procedural views towards the justification of planning is discussed. There, it is claimed that only one of these concepts can be “true” or “justified” (for being the justification of decision making in planning) to be applied. Then the contradictions (in the traditional sense of epistemology) are examined in order to find the “truth”.

This paper, like many others, contains a fuzzy notion, which will be completely explained later. It cannot be clarified with a traditional model of nonfuzzy sets. Even if it is supposed that this bipolarity can be defined (at least in some notions) and that these two notions are contradictions of each other (standing on two extremes of the axis of the decision-making mindset), there is no crisp line between the two. For instance, in the abstract, the writers comment that “the purpose of this article is to explore the ‘public interest’ justification of planning and whether it has outlived its usefulness in an increasingly fragmented society” (Campbell and Marshall, 2002, p. 163).

This fragmentation as it is expressed is supposed to be based on “the public interest against private and sectional interests” (Campbell and Marshall, 2002, p. 163). Although it is evident that there is no crisp boundary between public interests and private ones (see Cullingworth’s comments on interest groups and local interest, 1997, pp. 8-15), the issue of “the dominant interest of the time” (Cullingworth, p. 3) reveals the temporal changes of the interests. Then, from the pragmatic point of view [OR “in the pragmatic sense”], the generalization of this bipolarity and the attributed values (in order to find the final truth that would be valid in every condition) cannot help to clarify the justification at all.

⁶ In objection to the California high-speed train path, there were reports of many California court cases brought by local property owners close to the proposed track in June 2009.

As a result, the whole idea of a procedural versus consequentialist justification of planning (beyond which one is completely justified) is not realistic, but practically, there is an amalgamation of both without a universal advantage of one over the other. Therefore, the utilitarian view can approximately present the justification in some problems, and the procedural view (in the deontological sense) can in some others, or even both can be present with different portions in a single problem.

4.15.3 Justification of the Consequences, the Methodologies, and the Processes

Campbell and Marshall (2002) argue,

“Governments [and planning bodies] are expected to justify their actions and it is in this descriptive sense of defining what is ‘good’ that it provides a normative standard against which decisions or policies can be evaluated” (p. 165).

In a precise explanation of what is justified for the process of decision making (in planning), three justifying issues should be considered: first, the justification of consequences; second, the justification of the procedure through which the decisions are taken and made; and third, the justification of the methods used to evaluate the consequences and run the procedures (the methodologies used can be seen that includes reasoning methods such as rational and empirical accounts).

Since the different definitions of planning stem from what ultimate goal(s) is (are) conceivable for planning—and hence what ultimate goal(s) is (are) plausible for decisions and decision making—the different accounts of planning expect decision-making processes to fulfill their objectives to be most justifiable. Thus, it can be concluded that the issue of justification is engaged with the three above objectives. Therefore, a decision-making activity is justified enough and can be legitimized where and when it contains those three types of justifications, at least to some extent, but in coalition, rather than separately and in isolation. In other words, “what is good” can be seen from different points of view. But to achieve the fulfillment of justification in the decision-making processes based on what changes, the coalition among these can be defined.

At the same time, as additional points to the practical level of approach, within each type of justification sought after, some dimensions of qualities such as affordability, feasibility, and so forth need to be present. This means that the practicability of a decision-making system as a justification set also needs to be taken into account, unless this discussion were conducted in a purely theoretical sense. For instance, Allmendinger cites that

Forester (Forester, 1989, p. 5) raises two themes early on in his seminal *Planning in the Face of Power*. The first is a question: “In a world of poor information and limited time to work on problems, how are careful analyses of alternative futures possible?” (as cited in Allmendinger, 2002, p. 127)

4.15.3.1 Justification of the Consequences

For a long time, one of the most powerful values among human societies has been justice. From the ancient world to the modern era, this complex value has been interpreted in different ways. Discussions have been conducted in which pivotal attention has been given to ideas ranging from the very simple notion of “equal opportunity” to complex differentiations between “desert or merit” or “equality or need” (See Fowler and Orenstein, 1993, pp. 65-78). Among the massive literature on the issue, one notion, utilitarianism, has attracted strong interest because of the emphasis on benefitting the largest numbers of people. According to Fowler and Orenstein (1993),

Quite another pathway [to justify the decisions] to justice is cut by utilitarians. They agree that justice is what is due to us, but to decide what is due to us, they argue that we must look at the common good or the greatest good for the largest number. (p. 74)

The justification of the consequences of the decision-making process in urban planning involves ethical accounts of planning—justice. When this notion is considered through the utilitarian school of thought, emphasis is put on the importance of the outcomes of planning and decisions made in relation to the issue of justification. The main questions are who benefits, where, how, when, why, and how much. This is the matter of utility or benefit.

The theoretical basis of this approach to justice, along with distributive justice, is one of the most important methods for evaluating the justification of a “civil act,” such as decision making. According to the debates on the issue in a democratic system, the interlinks between the decision-making processes for human societies, and hence their citizens, that are to be justified with utilitarian thought are outstanding. This means that the decisions made by planning authorities or individuals need to meet the utilitarian axioms, though that is not enough to be justified.

4.15.3.2 Justification of the Processes

In the decision-making processes, meeting the utilitarian prerequisites cannot be enough for a decision to be justified for at least two reasons. First, utilitarianism, in its narrowest sense of social justice, can go along with a dictatorship. Decisions made could result in a scientific or technical dictatorship, therefore undermining the democratic values of human societies. Second, it is impossible to achieve absolute loyalty to utilitarianism or any other purely theoretical thoughts in this area. This is seen as a technical difficulty of the calculation of interest groups’ benefits. Moreover, some parallel issues, such as affirmative action, add more complexity to this type of calculation and discussion. Also Cullingworth (1997) writes,

A planner shall seek to expand choice and opportunity for all persons, recognizing a special responsibility to plan for the needs of disadvantaged groups and persons, and shall urge the alteration of policies, institutions, and decisions which militate against such objectives. (p. 14)

Consequently, it is necessary to employ a method that emphasizes the justification of the procedure of choosing and deciding. Among the proceeding models, one that can be of help is the pluralist model, which emphasizes the procedure of decision making for those (parts of) decisions that are not calculable in a utilitarian way. The pluralist model can focus on the other values of public decision making based on democratic values through the concept of the diversity of justice. Therefore, the opportunity for interest groups to intervene in the decision-making process can help in the justification of decisions that are supposed to be made for citizens.

However, a pure emphasis on the procedural method of justification can be rejected on the basis of the citizens’ lack of knowledge about the technical side of planning. On the other hand, as Klosterman (2003) argues,

Underlying . . . [the] diversity [of modern industrial context] is an implicit consensus about the need for public sector planning to perform four vital social functions—promoting the common or collective interests of the community, considering the external effects of individual and group action, improving the information base for public and private decision making, and considering the distributional effects of public and private action. (p. 94)

4.15.3.3 Justification of Methodologies, Axioms, and Knowledge

As was shown, from an ethical point of view, the discussion on the justification of decisions involves the consequences and procedures of decision making. There are no known ways to establish a method to prioritize either of the two—consequences or procedures. On the contrary, such a nonlinear atmosphere needs to be considered in a dynamic way. Any actual case needs to be studied from a cost-efficiency point of view and with a degree of certainty about the knowledge of the plan to be evaluated and decided on by use of both approaches (if we agree upon that we need these two only).

But the other important aspect of decision making that needs to be justified is the part related to the method of decision making. This crucial part of justification deals with epistemological accounts. The epistemological accounts provide the basis of the knowledge achievement process in planning and decision making. These accounts, which are usually shaped in dual systems, have been examined from two different perspectives: first, the method used (rational versus empirical) and, second, the expansion of knowledge (comprehensive versus incremental). Cullingworth (1997) cites, "Lindblom (1959) went further, and dismissed rational comprehensive planning [and, hence, its decision-making method] as an impractical ideal" (Cullingworth, 1997, p. 16).

With reference to the discussion carried out in the section "Changing the Mode of Planning," the issues of induction, deduction, and even intuition (which is not widely used yet, for its problematic epistemologically characteristic) as the basis for knowledge achievement are examined here, as these are issues with a wide range of implications in decision making.

4.15.3.4 Justification of Logic

In the light of the above comments, based on deontological or nondeontological accounts, either only one of the two contradictory notions can be justified, or neither of them can; they are either right or wrong. One can pass the stage of "justified true belief," can answer the problem cases, and can be justified for adopting either consequences or procedures, and, either centralized or decentralized etc. Thus, based on this logic (classical logic), there is no way to trust both contradictory methods at the same time. This issue has a strong relation to the logic used in processes of planning.

On the contrary, with consideration of the multivalued nature of planning, it is evident that, in some senses, each of the bipolar values can be relatively true. At the same time, in reality, there is no determined boundary between these bipolar and dual values, and in all cases involved with human values, both clashing values in a single set with an uncertain amount are true. Thus, the justification of the above issues has a direct interlink with the logic applied to planning as a whole and decision making as a process within it. This means that, according to classical logic and classical sets, which imply that only one true notion can exist, the model cannot be shaped based on practical reality. It can thus be concluded that the logic applied to the planning decision making needs to be justified unless it will easily face falsifying cases and the issue of fallibility turns up. In addition, the disproportion between the logic used within an activity and the nature of that activity brings the justification of the operation into the action. Therefore, the issue of employing proportionate logic with the operation is necessary in order to justify an operation.

4.16 Conclusion

There are myths about universal values and benefits in planning and decision making, respectively, there is myth that cost-and-benefit calculations or ratios are constant or always equal. Space users' costs and benefits are not constant amounts. They change from time to time and from person to person, for example, with changing one's job or living location. Thus, the related regulation and rationality for the changing phenomena cannot be based on a calculation with constant formulations. As a matter of fact, most factors are variables, and their proportions in spatial planning change all the time.

Planners and planning thinkers, like any other experts, have continued to request certainty. In their search, they have employed and adjusted their approaches in different pragmatic or even positivist ways (see, among others, (Etzioni, 1968, Lindblom, 1959, March and Simon, 1958, Rittel and Webber, 1973, Faludi, 1987) Simon, 1960). Most of the attempts in every aspect of decision-making processes can be summarized in two points and purposes: first, clarifying the parts of the decision making from both subjective and objective points of view and, second,

illustrating the interwoven relationship of the clarified issues with the other parts of decision making. The former notion establishes the related discussions based on reductionism. The latter typically is brought about after observing the unsuccessful results of the reductionist method (including pragmatic, empirical, or rational methods), which is typically attributed to the complexity and uncertainty of the issue.

Although in the next chapter the roots of and reasons for this problem will be discussed under “Fuzzinesses,” here it is worthwhile to point out that the procedures within decision making, like planning itself, are involved with merely theoretical and impractical clarifications to achieve certain bases. It is evident that the proceeding chapter shows that epistemologically justified decisions cannot be acquired by the assertion of any exclusive sets of methods, values, institutions, fields, knowledge, or so forth. This part indicates that many variables and parties are inherently engaged with decision making and that they ought to take a role in this process at the same time that the other factors are playing their respective roles, each proportionate to its level of influence. This will happen within the discourse of the available knowledge, while this idea is far from the comprehensiveness that is an idealist notion.

This inherent differentiation can portray planning decision making as a very sensitive activity in which complexity and uncertainty are inevitably at play. This also explains that this unique action differs from what is called decision making in other fields or even private planning. It is a big mistake to suppose that planning, either physical or intellectual, can be treated in the same way as a simple business usually is.

Thus, the innate separation between planning decision making and nonplanning decision making is a crucial issue with which to deal. Otherwise, the wrong or dysfunctional adoption of the methods applied to nonplanning decision making by or for situations in planning decision-making situation is imaginable and can lead to unexpected and unpredictable consequences.

Some may tend to attribute the difficulty of planning decision making to the complexity of planning problems, but one needs to remember that the multiple-actor atmosphere of the built environment leads to this type of problem. Single-person or vague committee decision-making faces the serious difficulties of the fuzziness of human language in describing and defining planning and its compartments, variables, and their relationships.

In an activity with inherent requirements of discretion,

planning is practised at different levels of government where often the local interprets planning policies formulated nationally and generate local policies and plans. Discretion or choice is inherent to planning and government throughout the world and allows for some autonomous interpretation and formulation of theory. (Allmendinger, 2002, pp. 19-20)

There is no way to recognize certain truth or falseness and things are not so clearly one (true or false) or the other. The fact of the matter is that statements belong, to some degree, to the set of true and, to some degree, to the set of false statements. Planning is, to some degree, comprehensive and, to some degree, incremental; to some degree, centralized and, to some degree decentralized, and so on. Consequently, the statements, theories, claims as well as decisions can be partially true AND partially false. They can be partially both.

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5 Classical and Infinite-Value Logic: Implications for Decision Making

5.1 Introduction

As discussed before, planning has been facing a series of problems with regard to, rooted in, or fueled by the decision-making process. Although one of the underlying reasons for a decision-making process to be justifiably practicable is uncertainty, the irrefutable correlations between uncertainty and complexity make the study of the latter an inevitable task, should an effective strategy be intended to be taken in planning. The paradox, however, begins to form at the very same moment. The unavoidable principle of decision making, complexity, if it grows exponentially, becomes the source of the problem. Although some general remedies to cover the incapability of the established method of thinking of planning, such as systemic remedies, were partially successful in addressing those deficiencies, the problem was proving so unsolvable that some thinkers and practitioners assumed it as a type of wicked problem. However, more optimistically, there seems to be an array of methods to handle those problems, even if they are not promptly aiming at solving the problem.

Several categorical approaches have been taken to tackle this problem. Those solutions have been formed either as ramifications of the prevailing way of thinking from which those problems arose or as partially or totally external solutions. Fuzzy logic is one of the solutions rooted outside the main paradigm in which those prototypical problems emerged.

This chapter aims to study the nature of the planning and decision-making process and to investigate the following in a theoretical manner:

- Is there a consensus on planning value(s) sets, and can there be absolute values assigned to the sets?
- With planning's multiobjective nature, how can the decision-making aspects come into coalition? Is this possible by pursuing bivalued logic?
- What type of features should an alternative logic have in order to be justified for application to decision-making cases?
- Benefiting from a multivalued logic like fuzzy logic in planning decision making, what types of implications and challenges will there be for planning decision-making theory?

This chapter will explain the deficiencies of classical logic in answering questions and solving problems, and will explore alternatives to tackle the problems, generated from using classical logic. The concept of dualism and reductionism, as those notions came into existence to tackle the problems, will be scrutinized in planning and decision making, and the chapter will carry out a comparison between alternatives presented by classical and multivalued logics. The chapter will also explain the reasons that many-valued and infinite-valued logic, in order to have a justified decision theory, should be considered as a major concern of decision making, and ought to be applied to planning.

In addition, a comparison between classical logic and infinite-valued logic (or so-called fuzzy logic) will be made after definitions are given for binary and infinite-valued phenomena. The types of fuzziness, which could be addressed in general and in planning in particular, will also be introduced in this chapter. Concepts such as what the multivalued logics are, and the related issues, will be examined. The epistemology, roots, ways of reasoning, and applications of both types of logics will be analyzed. The different milestones, mostly reached in the 20th century, will be scrutinized, and a well-developed, many-valued logic, namely, fuzzy logic, will be discussed in

two distinct senses: first, as in fuzzy thinking and, second, as fuzzy logic. In addition, the possibilities and opportunities given by this logic to the decision-making theory (as a whole and in planning) will be explored. Finally, in this chapter, analysis and further ideas about fuzzy logic's possible applications in planning will be introduced.

Discussions on logic, both classical and alternative, are rigorously and vigilantly related to decision and decision making and also to planning theory. As the nature of this part of the discussion is intrinsically involved with the aforementioned issues, it should be very carefully kept in mind that the separation of these issues, in a traditional linear way, will have an immense reverse impact on the research. Nevertheless, to keep the cohesion of the framework, these issues have been separated into different chapters, but the interrelationships of chapters have been conveyed in as accurate a way as possible.

Finally, the chapter concludes with how and why this logic may be useful to address the problems of planning regarding decision making, which will persist otherwise. Needless to say, many fuzzy scholars have acknowledged this very fact, at least to some extent, and some have even gone to extremes. Nguyen (2006) asserts, for instance, that

human logic, value-giving, decision-making and reasoning owes its success to the effort of Aristotle more than that amount that the concept of precision of mathematics owes to his ideas. Every aforementioned term brought to the highest level of conciseness and abstract. Of course whether this take place with inspiration of mathematical world or preciseness was a priori to mathematics is a very crucial issue, but not as important as the existence of the issue. (p. 12)

5.2 Classical Logic

Classical logic,⁷ or shortly, *logic*,⁸ depicts a correct “form” of reasoning. This is why it is called *formal logic*. In this form of logic, the psychological factors of reasoning are not taken into account, nor is the issue of whether the result complies with the reality. According to this logic, only when reasoning is correct can a true conclusion be made based on true premises or accurate evidence. If the premises are known to be correct, using the accurate forms of reasoning, the consequences can be expected to be true. This is not, however, the whole account about logic when it involves reasoning in particular, because, forgetting about the virtue of the logic, the correctness of reasoning is what counts. Regardless of the criticism about formal logic (and, hence, logical reasoning), reasoning still contributes vastly to the progress of human knowledge building.

Every philosophical system, whether Eastern or Western, has introduced at least one formal logic system. In Western philosophy, Aristotle—known as the father of logic—is believed to be the first thinker ever to introduce an accurate reasoning method using a systematic approach in its rather traditional meaning. Although the history of logic dates back to the 6th century BC in India and the 4th century BC in China, Aristotelian logic was the most predominant and prevailing occidental logic until the 19th century.

5.2.1 Types of Logical Reasoning and Their Applications

Reasoning is the process of searching for reasons on which to build hypotheses, beliefs, and actions. Logic as a method of reasoning means the study of principles and criteria for valid

⁷ Classical logic is almost equal to formal logic, although some may argue that it is no more than a part of it. Formal logic, as opposed to its rivals *informal logic* and *symbolic logic*, is quite old.

⁸ During two millennia, classical logic, or formal logic, has so established itself that talking broadly about logic implies talking about classical logic.

argument, inference, and demonstration. Basically, there are three methods for logical reasoning, deduction, induction, and abduction, which are explained below:

Informally, abduction is typically defined as inference to the best explanation (O'Rourke, 1990). Given a , b , and the rule $R_1 : \alpha \succ \beta$ (α therefore β), then deduction is using the rule and its preconditions to make a conclusion ($\alpha \wedge R_1 \Rightarrow \beta$); induction is learning R_1 after seeing numerous examples of a and b ; and abduction is using the postcondition and the rule to assume that the precondition could explain the postcondition ($\beta \wedge R_1 \Rightarrow \alpha$) (Levesque, 1989). Abduction is not a certain inference and its results must be checked by an inference assessment operator (Menzies, 1996).

Russo, Miller, Nuseibeh and Kramer (Russo et al., 2000) suggest that 'abductive techniques' are able to generate "explanations" for a given property ("goal") to be satisfied in a specification. These techniques have been shown to be particularly suitable for addressing problems such as diagnosis (Console et al., 1996), planning (Esghsi, 1998), theory update (Console et al., 1994, Inoue and Sakam, 1995, Kakas and Mancarella, 1990), and knowledge-based software development (McMillan, 1993).

Although widely condemned by a large number of philosophers, analogy can also be regarded as a reasoning method. Analogy is an inference or argument from one particular to another particular despite abduction, deduction, and induction and when at least one of the premises or the conclusion is general. Analogy is argued to be the core of cognition.

It was argued before that induction and deduction have been used on different occasions by the mainstream schools of thought in planning. Later in this chapter and in the analysis chapter, the current research will address how the advocates of one logical reasoning system (as a result of what has been manifested by their respective movement) have failed to be loyal to that with which they have defined themselves and have grasped onto ideas of their opponents wherever needed. Here some general problems that have posed serious challenges to classical logic will be addressed to provide the proper ground in general to link the issue to the deficiencies with which planning is inevitably struggling.

5.2.2 Incapability of Classical Logic

Although some problems started emerging in the early 17th century, it was no sooner than the 19th century that the thinkers and philosophers pointed out the deficiencies embedded in the Aristotelian logic and attempted to introduce other forms of logic either to rectify that of Aristotle or to establish new infrastructures to support the tools to meet the recent challenges more expediently. In the 19th century, skepticism about the capabilities of formal logic started with Kant. To date, at least three different substitutes have been introduced as alternatives to formal logic: ternary logic (a specific form of the broad branch of multivalued logic), fuzzy logic, and intuitionistic logic. Some, however, support up to half a dozen alternate solutions.⁹ For instance, an account chiefly advocated by Franz Brentano almost declares war on the idea of reasoning as having logic as its essential forming factor (Brentano, 1995, p. 221).¹⁰ He asserts that logic is more fundamental than the reasoning for which it is supposed to provide an underlying infrastructure and that there is therefore no essential relation between logic and argument. Some more recent modern logicians argue that logic does not serve the purpose of good

⁹ By considering dialectic logic, transcendental logic, and modal logic to belong to the category of nonclassical logic, they would broaden the category. However, in the case of modal logic, which is normally formalized with the principle of the excluded middle as well as bivalent semantics, this inclusion is disputable.

¹⁰ The original book in German was published in 1874 and 1911 under the title of *Psychologie vom empirischen Standpunkte: Von der Klassifikation psychischer Phänomene*, published by Ontos Verlag, Frankfurt, 2008. The citation here is based on the 2nd revised edition of its English translation.

reasoning because it deals with inferences whose formal features of representations are rooted in those very inferences and, thus, the validity of that logic is in question.

Beside the historic account of more holistic approaches and the non-Western philosophies of the Far East, some more recent incidents, discoveries, and findings were to challenge rationalism, the very principle of classical logic and formal reasoning. Copernican heliocentrism, Darwinian evolution, and the Freudian unconscious, along with the quantum and relativity theories, were some of the most fundamental challenges of their type for the Aristotelian rationalism. By the late 19th and early 20th centuries, it was obvious that even the most radically avant-garde reinterpretations of classical logic were hardly able to justify what was being observed in different branches of science. Not only did this apply to microcosmic sciences, such as molecular chemistry, particle physics, or the physics of light, but it also posed a serious challenge to macrocosmic sciences, such as astronomy and astrophysics. Surprisingly, classical logic also showed an incredible incapability in problem solving in the least expected areas, the humanities. As a result, there were several alternative solutions; some rose from the ashes of classical logic, and others started almost from scratch. The systemic was among those that bloomed from the heritage of the Aristotelian philosophy—but not to refine or redefine it, as Cartesianism had tried to earlier in the 17th century. It used the very principles of rationalism but tried to eliminate reductionism—the very principle of Cartesianism. Meanwhile, some other accounts, such as Gestalt (in psychology), dawned in utterly distinct fields of human knowledge, with the same aim to overcome the problems generated as a result of reductionism.

Other challenges that attacked classical logic and its core ideas of rationalism and formal reasoning badly were the unpredictability and turbulence in social incidents and natural phenomena. The occurrence patterns of natural disasters, for instance, were among those challenges that thinkers tried to address partially or fully by probabilistic and stochastic approaches—fairly new and definitely much more complicated solutions but ones still deeply rooted in formal logic. At the same time, the nonconformity between the natural languages and the language of logic (which subsequently had formed the language of mathematics and sciences) was dramatically undermining the creditability of formal logic, which was inherent to the restricted nature of the natural languages and was considered by the language philosophers. Fisher (2000) states,

Logical positivists have claimed that natural languages which use poorly defined terms and concepts are equivalent to nonsense (Ayer, 1946) but that is to preclude most of the vocabulary of everyday human language from having meaning. Such an interpretation dismisses the richness of natural language, and ignores the importance of understanding the vagueness, which characterizes it. The concept of vagueness can be extended from the vocabulary of every-day language to that of technical language and to objects in the real world (Sainsbury, 1989, , Williamson and Graff, 2002). (Fisher, 2000, p. 8)

These challenges were met by a range of utterly different alternative solutions.

The former one was dealt with by utilizing a completely new notion, namely, complexity (and consequently, the concept of chaos). Attempts to handle the latter were made with alternative solutions, approaches, or methods that encouraged classical logic to conform to human language as a set of “symbols” as much as possible yet to be able to reflect the underlying structure of reasoning with the clarity and preciseness targeted by classical logic. *Symbolic logic* was a prototypical exemplar of the former attempts. It consists of *propositional logic* and *predicate logic*.¹¹ Symbolic logic was later associated with the introduction of modern mathematics,

¹¹ Propositional logic is a symbolic system in which declarative sentences in the form of propositions are used to depict knowledge. While propositional logic usually acquires its accuracy through the correctness of the propositions it uses and relies fully on the external logical relationship between the reasoning units of two or more propositions, we sometimes are faced with some inductions in which these external relationships between the reasoning units seem not to be fully functional or applicable. This appears as a direct result of the lack of interplay between the *singular proposition* and the *general proposition*. To resolve this problem, another form of symbolic logic has been introduced as predicate logic. In

Boolean algebra, and the sets theory. Although symbolic logic and the sets theory were both great successes in the application of everyday language to the formal sciences, they were both rooted in formal logic. Therefore, afterwards great problems soon arose again in handling the everyday problems of human language and informal logic and its reasoning methods and bases.

5.2.2.1 Impreciseness of Human Language

The other generic restraint on prospective certainty is the usage of natural language¹² in scientific descriptions and the knowledge transfer process. We are quite familiar with the misunderstandings caused by using words, expressions, and sentences in a symbolic, ironic, or sarcastic meaning as opposed to their conventional, literal or expected meanings. Our understanding of these meanings is tied to our cultural backgrounds and our personal communication routines, and understanding varies extensively from one person to another. Therefore, although we might be able to communicate and understand each other using our shared human language tools (i.e., common sense, compromise, interpretation, puzzling, deduction, psychological techniques and tools, etc.), full, collective, and tacit agreement on many occasions seems to be far beyond reach. In other words, natural language often entails vagueness and ambiguity (see Figure 3.2). The heap, or sorites, paradox, presented by Eubulides of Miletus,¹³ is one of the commonly referred to examples to show vagueness embedded in natural language. According to this paradox, a mass, for example, a sand heap, is comprised of an aggregation of its constituents, sand grains or gravel. If a grain of this sand heap is taken, as the change has not been remarkable, the heap still can be called a heap. Taking another grain of sand will likewise have no significant influence on the sand heap. This process will continue to the point at which the sand heap is not a sand heap anymore. But the questionable part lies in the intermediate occasions when, exactly after a sand grain is removed, what was a sand heap can no longer be classified as such. In other words, we can never find that exact sand grain that turns the heap to a nonheap. There are some moments in which the heap can be understood both as a heap and a nonheap.

This shows that most, if not all, natural language often imply vagueness or ambiguity. The vagueness may be caused by different degrees or limits of uncertainty that may be attached to each word or expression—as it was in the heap paradox—or different interpretations of the meaning of one identical word or expression. In either case, to explain using pure scientific languages is problematic.

As an example for the second case—different interpretations of one definition—one can refer to two different persons in the same country, one living in southern England (Southampton), the other living in northern Scotland (Dundee), and both talking about a cloudy day. Both persons, as they are native English speakers, have a common understanding of the meaning of the word *cloudy*, and perhaps any other expressions about the weather. Neither will use *cloudy* as a description for a sunny day. Yet it is quite expected that their interpretation of a cloudy day would be different. In other words, as the person who lives in Dundee has gotten used to heavier cloud conditions, his or her interpretation of a cloudy day might be a day with 30 percent or more of the sky covered by clouds. He or she simply would not consider a day with less than 30 percent cloud coverage a cloudy day. The person from Southampton, by contrast, may consider a much

this, the predicate term is under speculation, trying to increase the flexibility due to interaction between the singular and general propositions. This is why it is called *predicate logic*.

¹² Known also as human languages or high-level languages.

¹³ The origins of the heap or sorites paradox have been traced back to Zeno of Elea, but the evidence indicates Eubulides of Miletus to be the first to utilize the paradox or puzzle. It is not known just what motives Eubulides may have had for presenting it; the paradox is, however, recognized to be among the most profound of all those known to logicians and philosophers. Because the paradox is at the center of defining vagueness in philosophy and vague boundaries in logic, it is also fundamental to an appeal for a formal approach to vagueness in planning (for more information, see the *Stanford Encyclopedia of Philosophy*, Sorites Paradox entry).

smaller amount of cloud coverage in the sky enough to call a day *cloudy*, as he or she is less accustomed to cloudy conditions in that part of England.

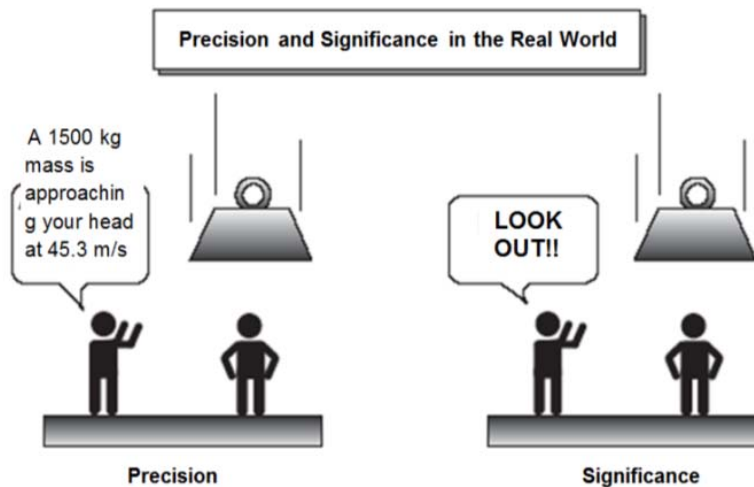


Figure 5.1. Significance versus precision. *Note.* From *Fuzzy Logic Toolbox for use with MATLAB®* (users' manual), by MathWorks, 2006, Natick, MA.

Vagueness or ambiguity in some scientific grounds, in which scientists and researchers tend or have to maintain an extent of preciseness or clarity, is deemed problematic. Physicists, for example, when talking about force, space, electrons, and so on, need to be in full agreement upon the meanings. Hence, to achieve clarity and accuracy and to avoid committing errors and getting trapped in an unwanted uncertainty, they define their technical and scientific jargon very clearly. Yet to achieve more preciseness they do not use only natural language but are inclined also to use another language with very straightforward—and more often one-dimensional—meanings, artificial language.¹⁴

While the language mostly came into existence in the 20th century, they all owe their principles to the people of the early systematic rational reasoning era, the ancient Greeks. These languages are very widely used in many fields (e.g., mathematics, physics, engineering, etc.) because of their capability to handle numerical and quantitative methods. Although these languages are tremendously valuable—indispensable—they do not comprehensively include every imaginable linguistic idea that is innate in natural languages. One of the reasons behind this is that these straightforward and certain languages usually lose their ability to articulate factual and real-life experiences that are multilayered. Here a qualitative method with a vague, ambiguous yet multidimensional nature is needed to respond to complex conundrum. These methods are effectively helpful in humanities, biology, psychology, sociology, and economics, which are oblique, implicit, uncertain, and highly dependent on human factors when it comes to assessment, operational research, and decision making.

5.2.3 Classical Sets Theory

One of the primary aims of symbolic logic in either of its forms, propositional or predicate, was to help clarify preferences and differentiations. To promote this clarification, another useful tool, which was born as an offspring of new symbolic logic, is *classical sets theory* (see Figure 5.1). Classical sets theory, like propositional logic and predicate logic, is built upon the main idea of precise differentiation and sharp separation between groups or sets, namely, crisp memberships.

¹⁴ Known also as machine language or low-level language.

Here, the judgment is clear and straightforward: an element, constituent, or member either belongs to a set or group or does not. Although in reality the arbitration procedure is not as simple and straightforward as this, having crisp boundaries is still the fundamental prerequisite for the classical sets theory.

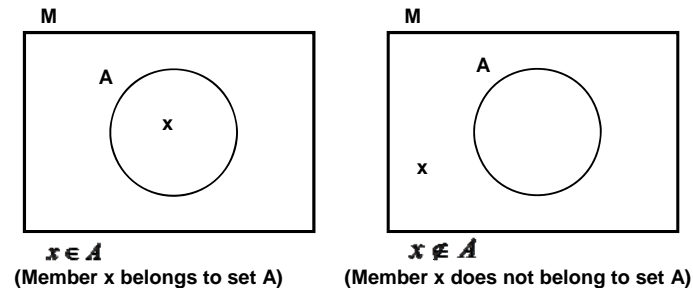


Figure 5.2. Classical sets theory: memberships and subsethood.

5.2.3.1 Limitations of Classical Sets Theory

One of the main principles of classical sets theory is the crisp boundaries between different sets, so the membership function, and hence the epistemological notions of reasoning, are consequently quite clear (see Figure 5.2). An element either belongs to a set or does not. This sharp differentiation also exists in classical logic. Each and every statement is either “true” or “false”; there is no third illustration for any statement. But as a matter of fact, not all the statements and sets in the real world can be explained or defined using these straightforward rules. For instance, there is no way to define a crisp boundary between tall and short people. Moving from shortness to tallness is a continuous transition with a blurred borderline in between rather than an on-and-off situation with a crisp and precise rule. In other words, drawing a very sharp line between the tall and the short is impossible. In classical sets, if 180 cm is assumed as the minimum height for the *tall* set, a person whose height is 179 cm does not belong to this set. In reality, this 0.55 percent difference is hardly observable, so we assume a person of 179 cm is tall without any compromise at all.

This crispness is the main constraint both in classical logic and classical set theories that are made too rigid to fulfill the inherent vagueness and impreciseness of natural languages, in which a more inclusive yet flexible interpretation is required.

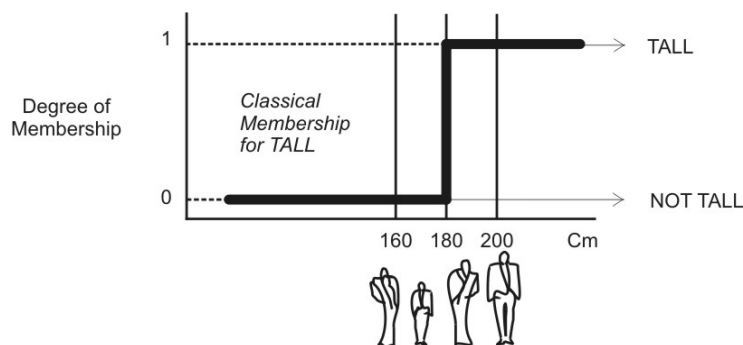


Figure 5.3. Membership in classical sets

5.3 Many (Infinite)-Valued Logics: Epistemological Similarity to and Differences with Classical Logic

Multivalued or many-valued logics are nonclassical logics. In one sense, these kinds of logics are analogous to classical logic because they comply to principles of truth functionality, the idea that the truth of a compound sentence is determined by the truth values of its component sentences (and so remains unaffected when one of its component sentences is replaced by another sentence with the same truth value). But, in another sense, they differ from classical logic by the fundamental fact that they do not restrict the number of values of truth to only two: true or false (right or wrong). They allow for a larger reference set (*W* set or *World* set) of truth degrees. This means that multivalued logics attribute the degree of membership of a statement to a set of trueness or falseness. This seemingly small difference in interpreting the degree of “true” or “false” leads to a fundamental divergence in the concept of “truth.” In fact, this difference results in a new “thinking” in which the concept of “truth” itself dissociates from a universal definition. This means that, in this thinking, *truth* (as a noun) is not seen as an abstract idea that has no interconnection with “falsehood” and “untruth.” The result of this thought can be seen in the adjective forms of the words, *true* versus *false*. This is what has been translated into the “relativity” of truth. However, by contrast, it is the relativity of “being true” or “being false.” Although the relativity of being true or false has already been discussed, it is of the same kind that multivalued or infinite-valued thinking mentions. For example, in pragmatism, that type of relativity has the objective-subjective path, meaning that the subjective concept of being true would be supposed to be related to an exogenous alternation mode, for instance, the changes of time, person, or situation. These can affect the condition of being true. Those objective influences can only affect the trueness of a phenomenon, not the entire concept of truth. This, again, means that finding and searching for the concept of truth is deemed to be a definite idea itself, but the concept appearances (here, in the concept of true) can alter from case to case, from time to time and from place to place.

To return to the infinite-valued types of thinking, it can be realized that the path of the nonclassical thinking is a subjective-objective one. This path, at its epistemological level, contains a question of truth. In spite of classical thinking, the question here is whether the “nature of truth” can intrinsically be a definite concept. Therefore, the grand theory of the existence of either a single universal truth or a group of truths (under different circumstances) is brought into question. As the direct outcome of this discussion, it is deemed that certain truth (supposing that there is any) is a specific concept among infinite concepts that belong to the axis whose one end is *truth* and whose other end is *untruth* or *falsehood*. Based on this definition of *thinking*, the related logical concept is true versus false, hence, the attributes, features, and characteristics of phenomena, acts, or concepts can be true or false. Now, after having the relativity of the concepts defined, the logic suggests that we attribute amount or degree of qualities such as trueness versus falseness (as a quality of evaluation and decision making) to every phenomenon. At the next lower level, the sets composed of phenomena with different degrees of membership in the “reference set of quality” are working within the logic within the larger set of thinking.

Just as the notion of *possible worlds* in the semantics of modal logic can be reinterpreted (e.g., as *moments of time*, in the semantics of tense logic or as *states*, in the semantics of dynamic logic), there does not exist a standard interpretation of the degrees of truth or, consequently, of “true phenomenon.” How they are to be understood depends on the actual field of application and the environment. It is general usage, however, to assume that there are two particular truth degrees, usually denoted by 0 and 1 (*false* and *true*, respectively), that act like the traditional truth values *falsum* and *verum*.

The formalized languages for systems of many-valued logic follow the two standard patterns for propositional and predicate logic, respectively. There are propositional variables together with connectives and (possibly also) truth degree constants in the case of propositional languages. There are object variables together with predicate symbols, and possibly also object constants

and function symbols, as well as quantifiers, connectives, and (possibly also) truth degree constants in the case of first-order languages (for more details on this section, see the *Stanford Encyclopedia of Philosophy*, 2010, “Many-Valued Logic” entry).

5.4 Systems Theory and Systemic Approach

The Western scientific method is established based on the principles of classical Aristotelian philosophy. Before Aristotle, there were some dominant schools of thought, such as those of the Pythagoreans and Heraclitus in the West or those of Far East philosophies, which can be accounted for as more holistic philosophies as opposed to the rationalism of Aristotle's; however, they were not of such importance prior to the 20th century. The principles of Aristotelian philosophy were repeatedly revised and redefined by some modern philosophers. The most influential rereading of rationalism, however, is believed to have been done by Descartes in 1637 in his treatise *Discourse on the Method* (full name: *Discourse on the Method of Rightly Conducting the Reason in the Search for Truth in the Sciences*).¹⁵ It formed the principles of epistemology, or so-called Cartesianism. This method is basically developed using the idea of reductionism in which each complex entity or phenomenon can be reduced to the sum of its forming parts. With this method, study of complex entities or phenomena is made much easier because, by reducing them to their fundamental parts and studying them, the whole can be understood.

What Descartes suggested in his rereading of classical logic includes four main principles. The first principle is not to assume anything as a fact unless it is fully observed and reconnoitered. With regard to the decision-making process in the rationalist account of planning, this first principle plays a crucial role and creates one of the most vulnerable Achilles' heels of this account.

The second one is reductionism. It implied that every investigated problem, condition, or phenomenon can be degraded into its components. It can be easily assumed as a sum of its elements. Having said that, study, analysis, and improvement of the relatively simpler components can and will end up with study, analysis, and improvement of the whole entity. This, as Descartes suggests, can help the observer have a clearer and more sensible vision of the main problem. Reductionism has been criticized not only in planning but also in the general philosophy of science as the type of simplification that trades off the state of reality in turn for the solvability of a complex (or complicated) situation.

The third principle is that order and sequence in furthering investigations is essential in making positive and sensible progression. Starting from easy bits or procedures and moving to more complex or complicated ones will help to build up a reasonable knowledge tree. Yet this is not always the case, especially when speaking about multidisciplinary domains such as planning, in which a linear process hardly works as it does in pure or applied sciences. In planning, the high number of involving factors, the complicated relations between them, and the different levels of those relationships make it almost impossible for this simple Cartesian rule to hold.

The last rule is that in each and every stage, sampling, counting, and calculating (or, in short, physical measurement) should be carefully sought for, to make sure that no crucial involving factor (i.e., members or relations) is missing. This last rule also hardly applies in humanities and social sciences. One of the remedies to handle this problem in those fields of study is to cling to qualitative methods and try to quantify them. Although the main purpose of this research is not to

¹⁵ This seminal writing is also known for the quotation “I think; therefore, I am.” It is important, however, from other points of view as well. In this book, for the first time, Descartes challenged the subject of “academic skepticism,” which was put forward by Sextus Empiricus in the second century AD and dominated scientific reasoning for over 14 centuries. This piece of Descartes's writing, along with *Meditations on First Philosophy*, *Principles of Philosophy*, and *Rules for the Direction of the Mind*, formed Cartesianism, or the bases of epistemology.

show the incapability of the established methods of gathering and analyzing data, there are many examples that can prove those methods to be inefficient when challenged by real-world cases (for more information on the discussion, see Ragin, 2000).

Despite all of the above problems that surfaced after a relatively long time, the new notion of *systems* was developed through different branches of human science, mostly in the past six decades after WWII. Five names are remarkably influential in this field: Karl Ludwig von Bertalanffy,¹⁶ Claude Elwood Shannon,¹⁷ Norbert Wiener,¹⁸ Warren Sturgis McCulloch,¹⁹ and Jay Wright Forrester²⁰ are the main figures in forming and improving the systems theory.

5.5 Uncertainty and Complexity

There are different definitions for complexity. That is basically because it is rooted in different disciplinary approaches²¹ and different types of problems are supposed to be addressed and solved using it. The formal definitions of complexity fit into two main groups, algorithmic and organizational, as Stewart (2005) suggests, in writing of “definitions of algorithmic complexity, deriving largely from computer mathematics; and organizational complexity, deriving from the new biology and a revived systems theory” (Stewart, 2005).

Some other definitions within apparently irrelevant disciplines can be significantly helpful in casting light onto the notion of complexity for the specific purposes of the current research. The writing of LaPorte (1975) provides an example: “the degree of complexity in organized social systems . . . is a function of the number of system components . . . , the relative differentiation or variety of these components . . . , and the degree of interdependence among these components” (La Porte, 1975).

What is really remarkable to bear in mind here is, first of all, the elements (referred to as system components), second, their variation (variety or differentiation), and last but equally important, their degree of interdependence. These three will later help this research establish a practical method to delegate the influential factors, to eliminate those that either originated in more

¹⁶ Austro-American scientist and biologist Von Bertalanffy (1901-1972) was one of the founders of the general systems theory. His individual growth model published in 1934 is still widely used in biological models. He established the Society for General Systems Research in 1954.

¹⁷ Shannon (1916-2001) was, a telecommunication engineer and the founder of information theory, the mathematical theory of communication, and communication theory of secrecy systems. He contributed widely in finding and developing systems theory application in applied science and engineering.

¹⁸ Wiener (1894-1964), an American theoretical and applied mathematician, is best known as the founder of cybernetics and has a seminal book on the field, published in 1948. This area formalizes the notion of feedback and is widely used in control engineering, system control, philosophy, and biology. He worked on ballistics during WWI and then established similarities between missile behavior and human reactions to environmental stimulators. Through these studies, he also established close links between mathematics and engineering.

¹⁹ McCulloch (1899-1969), widely acknowledged as the father of bionics, was an American neurophysiologist who developed his research field in relation to mathematics and engineering. He also investigated areas that later helped to establish (artificial intelligence (AI) in the late 1970s and early 1980s.

²⁰ American computer engineer and systems theorist, Forrester (b. 1918) was the founder of the system dynamics theory and investigated and facilitated the use of systemic methods in industry. In collaboration with John F. Collins, mayor of Boston, he wrote *Urban Dynamics*, whose social modeling possibilities attracted the attention of urban planners all around the world. He later met up with members of the Club of Rome to discuss issues around global sustainability. This was followed by the book *World Dynamics*, which models the global economy and addresses complex population and ecological problems.”] In 1972, his *Limits to Growth* spread the systemic methods far beyond several universities in which it was founded. He has contributed to the further promotion of system dynamics in education ever since.

²¹ In modern philosophy of science, it is sometimes equal (or very closely related) to catastrophe theory, chaos theory, information theory, self-organization theory, or hierarchy theory within different science fields (e.g., mathematics, physics, chemistry, mechanics, control engineering, etc.).

significant ones or are entirely or partially dependent on the others, and to weigh or score them in a respective manner.

The correlation between uncertainty and complexity is a very important point consider with regard to the current research. There is a bilateral relation between the two. Once one comes along, the other initiates. How these two affect the process of decision making in planning requires a fresh look, which is advocated by the current research. Once the level of uncertainty grows, the complexity of the system in a decision process increases and vice versa. Normally, up to a certain level and so long as the level of complexity is proportionate to the method (or tool) to handle it, the uncertainty is manageable using the established methods. Once the complexity of the system passes a certain level, as a result of growing uncertainty, normal methods are incapable of handling it, and the auxiliary methods come into the equation, the methods that have been developed based on classical logic and the underlying philosophy of science.

The current research will argue that this is a valid argument neither generally nor with special reference to planning and, more specifically, with reference to the decision procedure in planning, as it is only a limited specific case within a bigger reference set of all possible combinations. Although the current research needs to build up its methodological approach towards the theory and provide a rational procedure in building the knowledge—and does so—because of the limitation of time and the necessity of narrowing the scope, it will mainly focus on what is concerned with planning and the decision process in planning. Here, a very brief introduction to how the two work together and how they contribute in this discussion in a general sense will be given. Later in this chapter and in the next chapters, more focused attention will be given to the current research's subject study with respect to the growing complexity in the decision process in planning.

5.5.1 Uncertainty of Scale and Measurement

In experimental research, scientists and experts have to examine a situation, monitor a change, or measure a substance, quantity, or quality to gain higher knowledge about a phenomenon or to establish a fact. This kind of research and investigation needs great transparency and a high degree of certainty; otherwise, it will arrive at false or misleading results. Any kind of measurement-observation (M/O) process needs an M/O tool, an M/O system, and a human factor to measure or observe. To have an acceptable and satisfactory result, there are different types of tolerances involved in the M/O process that should be correspondingly met. Apart from the tolerance that is somehow adapting to the notion of impreciseness and helps to compromise between precision and applicability, M/O processes are always limited by the restrictions on the tools and systems. In other words, regardless of the necessity of high precision in an M/O process, it is limited by the imperfectness of its operators (i.e., tool, system, and the human factor). For instance, the meter is the international scale for measuring length. In fact, there is no theoretical restriction on downsizing the scale to measure infinitely small distances or lengths, but in reality, we cannot exceed some practical levels. The smallest length scientists can measure today is about one millionth of a meter, or one thousandth of a millimeter—remarkably small but not necessarily small enough, as there are lots of lengths below this limit that need to be measured, both in nature and manmade products. Even the most precise scales in any measurement systems, regardless of the degree of accuracy or exactness involved, are imperfect. Here, then, the issues of error and uncertainty come into the equation, and when dealing with them, the tolerance design and dimension coordination are inevitable.

5.5.2 Information, Uncertainty, and Complexity

The cure, though, seems to be to increase the level of preciseness. To do so, one of the solutions is to observe a phenomenon from a closer distance. The closer the observation is, the more details there are in information, and hence, the more preciseness there is in the measurement. But as one gets closer to something to measure it more precisely, not only do the details in the targeted area increase, but some undesired and most likely irrelevant details also

become more apparent. This information explosion, and the fact that one usually cannot be exclusive in the type of information received during the measurement or observation, cause a multidimensional complexity. On one hand, the linear relation between these measured factors, usually in pairs, prevents the observation from being capable of eliminating the undesired collected data and sizing them down to just the relevant data. Omitting apparently irrelevant data may cause the other information to end up with vagueness or increased unpredictability (one of the cases that may be regarded as a wicked problem). On the other hand, the uncontrolled increase in the amount of the involved data causes mayhem and may introduce some false factors as role players within the observation process although they really are not. This complexity, which emerges as a result of growth within the data collection process when the number of involving factors increases, is due to the classical logic system with which humans have been acquainted for over two millennia. In classical logic, the first attempts to introduce the uncertainty factor in concordance with complexity resulting from a mass expansion of available information was made no sooner than the early 20th century, however, when the *uncertainty principle*²² was introduced in modern physics.

Before these attempts to introduce and embrace uncertainty as an inevitable but manageable part of human knowledge, it was long treated as an undesirable problem when dealing with information. This was because it was understood to have detrimental effects on the decision-making process. However, human beings, even before Heisenberg and Born introduced the uncertainty principles, have always managed to make the most complicated decisions with a lack of comprehensive knowledge. This has been necessary partially due to the nature of available information. As Bouchon-Meunier and Yager (1987) assert, "An inherent characteristic of the information available to humans is that it is 'imperfect' in the sense of being incomplete, uncertain, inconsistent, or otherwise not totally suited to the judgmental task at hand" (p. 4).

That humans successfully made such decisions even in the absence of full knowledge and the desired information can also be understood in relation to the mechanism of the natural human reasoning system. This system's triangulation capability partly comes from a continuous learning process. The system also relies partly on its strong capability of comparing a given case with other identical or similar situations (a process that can be compared to logical abduction but is not limited to its classical restrictions). And another characteristic that facilitates this approximate reasoning method is the ability to build up the decision-making process even with some apparently and logically missing bits.

Although fuzzy logic was basically set to handle uncertainty and its due complexity, the evolutionary development process that resulted in fuzzy logic, as an alternative mainstream to the dominant formal logic, contains an inherent historical complexity. An idea highlighted by Wang, Ruan, and Kerre (2007) illuminates this point: According to Professor Sir G. Elliot Smith, Invention is not an isolated phenomenon in the history of civilization. Even the simplest advance represents the interweaving of many threads of knowledge that took centuries or thousands of years to spin" (Wang et al., 2007, p. 1). This fact substantiates the very theorem that no emergent phenomenon, including fuzzy logic, happens quite independently. Quite to the contrary, it has been, in fact, the product of the progressive evolution of formal logic, which reached a point where its conventional bivalued system proved not as useful and operative as it allegedly used to be for over two millennia. According to Wang, Ruan, and Kerre (2007),

²² Also known as the principle of indeterminacy, this is a principle in quantum physics, put forward by Werner Heisenberg and Max Born in 1927. It explains a fundamental limit on the precision of the simultaneous measurement of the momentum and position of a particle at the subatomic level, irrespective of the quality of the measuring tool (i.e., its measuring tolerance). The result of uncertainty in position and uncertainty in momentum exceeds $h/2\pi$, where h is Planck's constant. Thus, precise measurement of the position of a subatomic particle means that the uncertainty in its momentum will be large, and vice versa.

The enormous complexity of the process and the fact that a progressive development is built on the foundations of the accumulated knowledge of the whole world of civilization are fatal to the common opinion that significant inventions can be made independently. A case in point, the subject matter of this volume dealing with fuzzy logic is no exception. (p. 1)

5.5.3 Types of Uncertainty

Epistemologically, there are different taxonomies regarding uncertainty. Provided that uncertainty, if studied in the framework of risk assessment, can be considered the source for danger or risk, and the framework will set up a ground to look at uncertainty from a different angle. This will bring forward the outlined differences between human knowledge and human ignorance; the former results in risk, while the latter leads to danger, and they are different levels (of implications) of uncertainty. Although the pure natural scientists Tannert, Elvert, and Jandrig deterministically acknowledge the involvement of probability in the process of the creation of knowledge or ignorance (which is not necessarily the case when the subject of study is humanities), their approach to the issue of certainty is still quite worthwhile. That is because the igloo of uncertainty,²³ as they tend to call it, provides the underlying discussion for the further development on the theme of variation of uncertainty and its types (see Figure 5.4).



Figure 5.4. The igloo of uncertainty, Note. From “The Ethics of Uncertainty”, 8 (10), p. 893, by (Tannert et al., 2007) *EMBO Reports*, Inspired by (Faber et al., 1992)

They argue that to pin down the gaps in knowledge, the type of uncertainty should be signified. The uncertainties based on this account are divided into *objective* and *subjective* uncertainties (see Figure 5.5). Building upon Van Asselt and Rotmans (2002), Tannert et al. argue that objective uncertainty can be subdivided into epistemological uncertainty, where the gaps in knowledge can be filled by research, and ontological uncertainty, in which stochastic models dominate the technical, social, or biological fields and cause complexity. In the latter, the

²³ Tannert et al. explain open and closed ignorance/knowledge according to the level of adherence to the premises and conditions that will lead to the creation of each, regardless of their being created or imposed. For instance, they assert: “If the cause of ignorance is a lack of knowledge, which cannot be reduced owing to stochastics and the randomness of the matter under study, and/or the structure of our cognitive apparatus, it is called closed ignorance or ‘nescience’—an absence of knowledge (Gross, 2007). Closed ignorance also results from rejecting or ignoring available knowledge, which we refer to as the ‘Galileo effect’—inspired by the cardinal in Bertolt Brecht’s play Galileo Galilei, who refused to look through a telescope in order not to accept the knowledge that the planets revolve around the sun.” For further reading, please refer to TANNERT, C., ELVERS, H. D. & JANDRIG, B. 2007. The Ethics of Uncertainty. *EMBO Reports*, 8, 892-6.

complexity is normally characterized by nonlinearity, which makes it impossible to resolve uncertainty using a deterministic approach to reasoning (Shrader-Frechette, 1996).

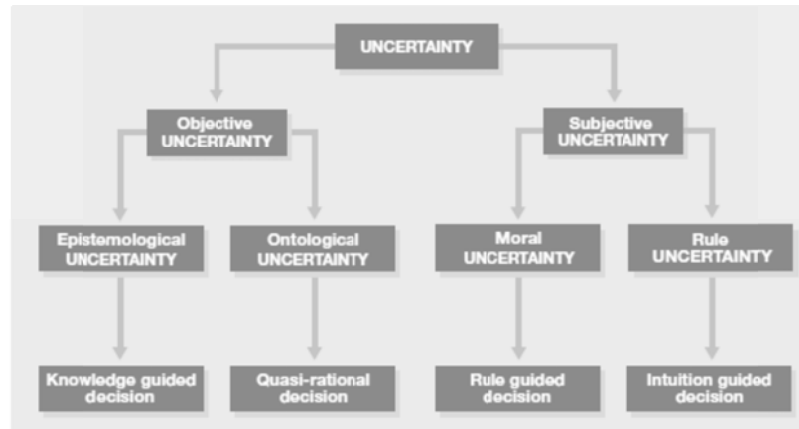


Figure 5.5. The taxonomy of uncertainty and decisions. *Note.* From “The Ethics of Uncertainty”, 8 (10), p. 894, by (Tannert et al., 2007) *EMBO Reports*

The second main category of uncertainty is subjective uncertainty, which is divided into moral and rule uncertainties. Moral uncertainty, Tannert et al. argue, involves those uncertainties in which no moral rule can apply. The way through here is to step back and apply the rules (of morality) applicable in levels above to deduce the guidance for the decisions that are to be made. The second subcategory is rule uncertainty. Although the type of decision strategy attributed to each of those subcategories is different, the explanation here fails to clarify the two successfully and clearly. In a closer inspection, the two appear to be exactly the same at the stage of uncertainty with different ways in which the decisions are to be dealt with. It is admissible, however, that where the uncertainty is dominated by the lack of or ambiguity in the (moral) rules, there should be two different ways out of the problem. In addition to applying the same rules that have been applied elsewhere successfully, relying on intuition is known to be another solution to the problem.

Regardless of the source of uncertainty, the types of decisions, as pointed out in the journal article by Tannert et al., are very much the same as the ones applied in the decision process of urban planning. Although it might look simplistic, other accounts of uncertainty within the decision-making process are definitely worth considering. For instance, what is suggested by Friend and Hickling divide uncertainty within decision making into three different subcategories (see Figure 5.6): “uncertainties about the working environment” (UE), “uncertainties about guiding values” (UV), and “uncertainties about related decisions” (UR).

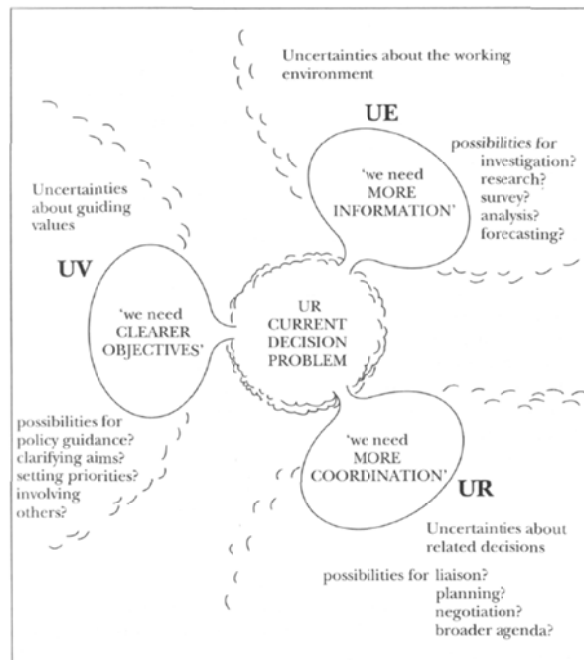


Figure 5.6. Three types of uncertainty in decision making. Note. From *Planning Under Pressure: The Strategic Choice Approach* (p. 11), by J. K. Friend & A. Hickling, 1987, Oxford, England: Pergamon Press.

To investigate these methods critically, this research will focus here on two different aspects: first, slight differences in matching the given definition with what is really dominating the planning realm as a tradition or trend and, second, where the defects turn up with regard to those decision strategies taken in planning.

The very important point is that the paper by Tannert, Elvers, and Jandrig comes from a biomedical context in which the definitions, principles, and philosophy differ from those of a discipline such as planning. The inherent differences between the two disciplines in particular and the two as representatives of pure science and mixed science (humanities) are important. This makes such decision strategies hardly directly applicable in the planning discipline.

That said, the same strategies are being advocated in planning. Yet there is little concern, if any, about the defects and inefficiencies this could potentially cause. The problem can be probed from some different angles particular to each decision category when it comes to the decision strategies being applied in planning.

5.5.3.1 Knowledge-Driven Decisions

Where these decisions are prescribed, this very important point should be borne in mind: planning is not purely science thereby not only the pursuance of employment of the principles of knowledge. In other words, what was advocated by the modernists as rational planning has a very weak ground for validation, should planning be handled only by pure knowledge-guided or knowledge-based decisions. Decisions informed by knowledge will apply well in experimental sciences where a set of “preacquired data” and “premises” repeatedly seen as acquired, stored, mulled over, and generalized information in an established manner and turned into knowledge about a single case makes the decisions very likely to be the best (or at least optimum) solution to that case.

5.5.3.2 Quasi-Rational Decisions

The problem with a quasi-rational decision (in the case of ontological uncertainty) is that it is extremely reductionistic, meaning that because of the complexity involved as a result of the nonlinearity of the process, parts of the information (given or acquired) that are neatly referable, clearly comprehensible, and reasonably deductable will be used in making the decisions. The reductionism involved in this method is what has been established as the principle for the scientific method for over two millennia. The other problem involved is that this method is normally applied in the fields in which the results cannot be seen in the short term, and by the time the implications start showing up, the involving and influential factors have changed such that the same goals, strategies, and principles hardly apply to the decisions to be made. This does not mean that had any other approach been taken, this response time would have been cut down. It means only that if some actions cannot be justified based on their consequences, they should, at least, be defensible based on the procedures they take.

5.5.3.3 Rule-Guided Decisions

It is important to notice carefully that the meaning of the term *rule-guided* here is nowhere near what the term *rule-based* means in many-valued or multivalued logics (e.g., fuzzy logic). Here, the rule-based decision means that the lack of enough information at a particular level requires the decision maker to refer to the upper levels and deduce the guides for making decisions based on similar situations. The most important problem with having such a strategy is that in this taxonomy where the solution involves rule-guided decisions, it is deemed that the guidance, principles, or rule are deduced from the upper levels. This remedy does not work in humanities in general and planning in particular. Although some similar cases may be used to deduce the most viable solutions for similar decision cases, upper levels usually have different dimensions, different role players, different problems to tackle, and different sets of stakeholders and beneficiaries. Although same-level experiences might be worth considering, their being extremely contextual makes their validity vulnerably exposed to reconsideration.

5.5.3.4 Intuition-Guided Decisions

As the name of these decisions indicates, they are made on a purely personal basis and are based on intuition rather than knowledge. In planning, the rationalists, represented outstandingly by Faludi, advocate the cases in which the planner makes a decision based on the absolute belief that what he or she has done is the best action to be taken, to his or her fair and unbiased personal knowledge. Here, whether it is in biomedical science or planning, the very likely danger to avoid is that the decision process becomes very personal and the solution is therefore very difficult to declare as the best possible one or even more difficult to achieve under the same conditions but by alternative decision-making bodies. This means that the process of investigation, justification, and defending the course of action in the decision process becomes very hard to achieve. Furthermore, the issue of how much the intuitive judgment of the individuals or organizations is under the influence of their knowledge, level of expertise, and their previous experience is subject to debate, and this defeats the main concept of intuition in the first place.

5.6 Fuzzy and Crisp Sets

As discussed before, crispness is one of the basic characteristics of the classical sets theory. Wherever intended by sets theory, the boundaries are deemed to be lucid, clear, and unambiguous. In classical knowledge, crisp sets as a representative of sets theory tend to deal with the type of problems whose nature lends them to classical scientific problems. In other words, using classical sets with crisp boundaries is widely acknowledged to be one of the strategies taken to deal with natural problems rather than arithmetical ones. Studying sets with crisp boundaries is very worthwhile because it, first of all, provides a platform for having *binary*

operations as opposed to *arithmetic operation*. This, in turn, provides a workable tool to bridge the gaps between the world of mathematics and the real world. Second, crisp sets and sets theory in its advanced meaning also have now been widely adopted by different branches in mathematics, helping them further their areas of focus and their depths of study. Third, the crisp sets, as per their relation to logic, have offered applied logic opportunities to link with the semantic web.

Despite all those benefits, crisp sets do not include all the dimensions of the real world. In reality and in different branches of knowledge, the crisp boundary does not always exist between the sets involved. Although those clear boundaries can work perfectly in a specific or limited case, the problems usually occur when it comes to generalization. In other words, the principles of reductionism are inherently imposed by the limitations of the methods, in which the studied sets are taken as in specific (and usually limited) cases, and this is to some degree due to the limitation of the tools in accommodating a real-world reasoning mechanism. The reality is that, in very limited cases, there are very clearly separated sets with sharp boundaries and with no ambiguity involved.

5.6.1 Crisp Sets in Planning

Despite existing fuzziness and sets with fuzzy attributes, some look only for crisp and fragmented sets in every field, and there is no exception with planning. These sets are usually looked at as reliable sources of clarification. First and foremost, it should be borne in mind that, like any other discipline, urban planning is faced with impreciseness in all its aspects.

In light of the previous section, however, it can now be concluded that in some aspects of planning, there is no trace of fuzziness. Nevertheless, this does not mean that even those specific areas are fully and perfectly safe from ambiguity when they are about to be used by, applied to, or developed in other stages, applications, or disciplines within planning.

5.6.2 Crispness in Data Gathering

First, in basic quantitative data gathering, fuzziness is not involved. This means that in pure data gathering stages (and not even data processing, let alone data analysis and other subsequent stages), when they are purely numerical (i.e., in pure quantitative methods of data gathering), no fuzziness is entailed. This is evidently because, by the selection of the method, fuzziness has been intentionally eliminated from the process in the first place. This does not, however, imply any defect in the process; the process has been structured in this way, and so, the method is selected accordingly. This concept is relied on with nonlinguistic and nonhuman-based characteristics. In fact, the quantitative data, where they entail no qualitative analyses and social intercourses, act as liaisons with the pure numbers and numerical calculations. For instance, as far as data gathering is concerned with existing factors such as population, crime rate, average household net area, and growth rate in its absolute meaning, with no interpretation or estimation involved (i.e., when data gathering is carried out using a census, and not a sampling), the nature of the activity is binary based. It is very important to recognize that if the methods of data gathering change or the data-gathering process itself involves a comparison—for instance, between the present and the past—the concept of fuzziness starts emerging.

5.6.3 The Binary-Framed Sets and Values

Second, intrinsically, in simple *binary-framed* comparisons, there exists no fuzziness. This latter type of crisp set in the planning discipline, which arises from comparisons and contains linguistic (merely linguistic rather than any other type of human-based attributes) values, can be used individually and within framed sets for dual contradictions. Sets with these attributes are very few, primitive, and of limited or no use or functionality in the planning process. More often than not, dual comparison, such as whether the population of a city, town, or neighborhood will increase or decrease over a given time frame in the future, might be of use in planning (the question in such

a case is not about the population of the given area itself; it is rather about which one is correct, “less” or “more”). This type of comparison is somewhat framed into a binary-coded area of two values (in extreme like true versus false) that have no intersection with each other. As long as the defined sets are so crude and neatly separated, there is no problem in taking them as part of a nonfuzzy process. But once the quality starts contributing in that duality in a binary-framed comparison, the duality itself starts vanishing. For instance, if the question changes to whether the condition of a specific neighborhood will be better- or worse-off in the coming year, the binarity makes very little sense, if any. This is because the adjectives *better-off* and *worse-off* involve two different aspects, which challenges the apparent duality of the question. First of all, *better* (or *worse*) on its own implies a type of vagueness involved in the meaning. There is no consensus on *better* or *worse*, no matter what the context is. Moreover, and equally importantly, *good* and *bad*, and hence *better* and *worse*, as a couple of sets, have some overlaps or intersections with each other. This means that even in the clearest cases, despite that duality, the vagueness of assumptions about *good/bad* or *better/worse* makes that duality very sketchy. This, in fact, defeats the idea of duality in its early stage.

The major difference between the above cases of *less/more* and *better/worse* is that, although the first pair is qualitative, it still entails a quantitative set of input data. The latter pair, by contrast, is qualitative and inherently covers an absolutely qualitative set.

Another example of framed values is the traffic light. The question of whether a traffic light is on or off relates to a binary-framed system. The question is certainly not whether the color is green or blue, even though the representatives of a green-category color may well vary from yellowish green in one country to bluish green in another, or from one traffic light to the other. There is no question about the greenness as it is categorically separated from red, no matter how red it is. It is a dual-valued framed set. Even if one points to yellow in considering the relevance of fuzziness to the traffic light, the discussion will be that adding yellow between green and red is by no means anywhere near adding fuzziness. The yellow, at best, adds a third value to the definite-valued system of a traffic light, altering a bivalued frame system to a tri-valued one. It cannot be compared to a many-valued or multivalued system of fuzzy logic in which values are so smoothly altering that no clear boundary can be recognized between them. At most, the yellow light is only the transitional stage between the two values, the stage that literally takes no independent value-laden status (except providing information for the next status which is *red*) of its own and hence has no credit in the framed value set.

5.7 Fuzzy Logic

5.7.1 Etymology of Fuzzy

In addition to its broad application, *fuzzy* as an etymological term has appeared to be appealing, fashionable, and stylish, particularly over the past two decades, in different fields of knowledge and science. However, its usage does not carry its very technical connotation in all cases. For instance, in the planning discipline only, and in one of the leading planning journals, *Planning Theory*, from the date it was first published until 2009, the term *fuzzy* has been used in seven different articles, of which only one, an article that reviews the book *Fuzzy Planning* (See Roo and Porter, 2007), denotes what is meant by *fuzzy* in its technical sense. The other six use *fuzzy* in the general sense of “unclear” or “ambiguous.” Here, a brief definition of the term, from the *Oxford Dictionary of English*, is given to clarify what it means etymologically:

fuzzy

- **adjective (fuzzier, fuzziest)** 1 having a frizzy texture or appearance. 2 indistinct or vague 3 *Computing & Logic* referring to a form of set theory and logic in which predicates may have degrees of applicability, rather than simply being true or false. ((Soanes and Stevenson, 2005)

Alternatively, these definitions for and examples using the adjective are available from the *Longman Dictionary of Contemporary English*:

fuzzy *adjective*

fuzzy /'fʌzi/

1 if a sound or picture is fuzzy, it is unclear [→ blurred]:

Some of the photos were so fuzzy it was hard to tell who was who.

2 unclear or confused [≠ clear]:

There's a fuzzy line between parents' and schools' responsibilities.

3 covered with soft short hair or fur:

I stroked the kitten's fuzzy back.

4 fuzzy hair is very curly and sticks straight up

—fuzzily *adverb*

—fuzziness *noun* [uncountable] (Summers, 2003, "fuzzy" entry)

According to one account, the word *fuzzy* etymologically dates back to between 1600 and 1700 with the word *fussig*, meaning "loose" in Low German.

Taking into account that *fuss* in (High) German also means "foot," the *Online Etymology Dictionary* (2010) relates *fuzzy* to *fuzz* and defines *fuzz*'s etymological roots in this way:

1601, *fusse*, first attested in *fusball* "puff ball of tiny spores," of uncertain origin. Meaning "the police" is Amer. Eng. 1929, underworld slang, origin and connection to the older word unknown. Perhaps a variant of *fuss*, with a notion of "hard to please." *Fuzzy* is 1616 as "soft, spongy;" 1713 as "covered with fuzz;" 1778 as "blurred;" and 1937 as "imprecise," with ref. to thought, etc.

5.7.2 Logic

The classical philosophy and its logic had been shadowing every piece and aspect of nonbinary phenomena, thoughts, and logics. This dominance is widely known to be in debt to Aristotle and his fellow thinkers. As Li (2006) states,

The precision of mathematics owes, to a high extent, its success to the efforts of Aristotle and the philosophers who preceded him. In their efforts to devise a concise theory of logic, and later mathematics, the so-called "Laws of Thought" were posited [1]. One of those, the "Law of the Excluded Middle," states that every proposition must either be True or False. (p. 1)

Despite the existence of a multivalued (or many-valued) way of thinking in other non-Western philosophies even prior to the blooming of classical thinking, some concerns arose with the dawn of classical logic in ancient Greece. Li (2006) explains that "even when Parmenides proposed the first version of the 'Law of the Excluded Middle' (around 400 B.C.) there were strong and immediate objections: for example, Heraclitus proposed that things could be simultaneously True and not True" (p. 1).

Interestingly enough and despite the wide acknowledgement backed by hard evidence to support the idea that many-valued logic, including fuzzy logic, originated in Eastern schools of thought, some have claimed, as Li (2006) does here, that it mainly comes from the same context where classical logic originated: "It was Plato who laid the foundation for what would become fuzzy logic, by indicating that there was a third region (between True and False) where these opposites appeared" (p. 1).

The more recent re-emergence of fuzzy, however, is unanimously agreed upon to have appeared in Lukasiewicz's works in the early 1900s. Li (2006) provides this background:

it was Lukasiewicz who first proposed a systematic alternative to the bi-valued logic of Aristotle [2]. In the early 1900's, Lukasiewicz described a three-valued logic, along with the mathematics to accompany it. The third value he proposed can best be translated as the term 'possible', and

he assigned it a numeric value between True and False. Eventually, he proposed an entire notion and axiomatic system from which he hoped to derive modern mathematics.

Later, he explored, there was no difficulty in deriving an infinite-valued logic. Lukasiewicz felt that three- and infinite-valued logics were the most intriguing, but he ultimately settled on a four-valued logic, because it seemed to be the most easily adaptable to the Aristotelian logic. (p. 1)

However, as Li (2006) explains, at the same time, there were other thinkers who were investigating alternatives for the bivalued system of classical logic:

In about the same time, Knuth proposed a three-valued logic similar to that of Lukasiewicz, from which he speculated that mathematics would become even more elegant than that in traditional bi-valued logic. His insight, apparently missed by Lukasiewicz, was to use the integral range $[-1, 0, +1]$ rather than $[0, 1, 2]$. Nonetheless, this alternative failed to gain acceptance, and has fallen into relative obscurity. (p. 2)

It should be kept carefully in mind that a three-valued logic, as discussed before, does not necessarily equate to fuzzy logic. Nor does it validly lay an underlying philosophical infrastructure on which to base rule-based systems in general and fuzzy logic in particular.

Inspired by pure human reasoning, the notion of establishing nonbinary logics and their sets was revived and rebranded in the 1960s, when “fuzzy logic” was first coined by Zadeh. The background Li (2006) provides about this is also helpful:

It was not until relatively recently that the notion of an infinite-valued logic was brought forward. In 1965, Lotfi A. Zadeh published his seminal work “fuzzy sets” [3, 4], which described the mathematics of what is called fuzzy set theory today. This theory proposed a membership function) or the values False and True) to operate over the range of real numbers $[0, 0, 1.0]$. New operations for the calculus of logic were formulated, and showed to be, in principle, a generalization of classic logic. (Li, 2006, p. 3)

Zadeh himself describes the idea behind fuzzy as “approximate” reasoning:

It is truism that much of human reasoning is approximate rather than precise in nature. As a case in point, we reason in approximate terms when we decide on how to cross a traffic intersection, which route to take a desired destination, how much to bet in poker and what approach to use in proving a theorem. Indeed, it could be argued, rather convincingly, that one a small fraction of our thinking could be categorized as precise in either logical or quantitative terms. (Zadeh et al., 1996, p.238)

He then goes on to discern three different features for fuzzy as a newly introduced logic:

Perhaps the simplest way of characterizing fuzzy logic is to say that it is a logic of approximate reasoning. As such, it is a logic whose distinguishing features are (i) fuzzy truth-values expressed in linguistic terms . . . ; (ii) imprecise truth tables; and (iii) rules of inference whose validity is approximate rather than exact. In these respects, fuzzy logic differs significantly from standard logical systems ranging from the classical Aristotelian [1] to indicative logics [2] and many-valued logics with set-valued truth-values [3]. (Zadeh et al., 1996, p.239)

It is significant, but less known, that Zadeh recognized the need for fuzzy mathematics a few years before he published the seminal paper on fuzzy sets. This recognition, which emerged from his work on system theory, is expressed, for example, in the following passage from his 1962 paper “From Circuit Theory to System Theory”:

there is a fairly wide gap between what might be regarded as “animate” system theorists and “inanimate” system theorists at the present time, and it is not at all certain that this gap will be narrowed, much less closed, in the near future. There are some who feel this gap reflects the fundamental inadequacy of the conventional mathematics— the mathematics of precisely-defined points, functions, sets, probability measures, etc.—for coping with the analysis of biological systems, and that to deal effectively with such systems, which are generally orders of magnitude

more complex than a man-made system, we need a radically different kind of mathematics, the mathematics of fuzzy or cloudy and quantities which are not described in terms of probability distributions. Indeed, the need for such mathematics is becoming increasingly apparent even in the realm of inanimate systems, for in most practical cases the *a priori* data as well as the criteria by which the performance of a man-made system is judged are far from being precisely specified or having accurately known probability distributions. (Zadeh et al., 1996, p. 2)

Focusing mainly on the theory and mathematics of fuzzy, Zadeh also addressed other aspects of fuzzy thinking every now and then in his several articles and papers, as here:

Another important concept recognized by Zadeh in his early papers is the concept of a *fuzzy language*. Although he did not develop fuzzy languages beyond their coverage in these four papers, they were further developed by other researchers and applied to pattern recognition and other areas. (Zadeh et al., 1996, p. 4)

Other key contributions of Zadeh that most directly relate to the subject area of this research are his works on fuzzy decision making (FDM). He and his colleagues write,

It is easy to recognize that the important and broad area of fuzzy decision making was initiated by a key paper, which Lotfi Zadeh co-authored with Richard Bellman. The paper is a rich source of ideas regarding fuzzy decision making, including fuzzy dynamic programming. Zadeh presented further ideas concerning fuzzy decision making and fuzzy optimization a few years later in another paper. (Zadeh et al., 1996, p. 4)

In addition to all different areas that fuzzy thinking may practically cover, more recently, as can be seen in the following passage, the technical definition of fuzzy logic has started to differentiate itself from pure philosophical (logical or, best said, theoretical) accounts of fuzzy:

Fuzzy logic has two different meanings. In a narrow sense, fuzzy logic is a logical system, which is an extension of multivalued logic. But in a wider sense, which is in predominant use today, fuzzy logic (FL) is almost synonymous with the theory of fuzzy sets, a theory which relates to classes of objects with unsharp boundaries in which membership is a matter of degree. In this perspective, fuzzy logic in its narrow sense is a branch of FL. What is important to recognize is that, even in its narrow sense, the agenda of fuzzy logic is very different both in spirit and substance from the agendas of traditional multivalued logical systems. (MathWorks, 2006)

The *Fuzzy Logic Toolbox* users' manual gives seven different reasons to use fuzzy logic as an alternative to classical logic but neither as a rival to it nor as an ultimate remedy:

- Fuzzy logic is conceptually easy to understand.
- Fuzzy logic is flexible.
- Fuzzy logic is tolerant of imprecise data.
- Fuzzy logic can model nonlinear functions of arbitrary complexity.
- Fuzzy logic can be built on top of the experience of experts.
- Fuzzy logic can be blended with conventional control techniques.
- Fuzzy logic is based on natural language and semantics dispute. (MathWorks, 2006)

As expected, some of the reasons belong more to the set of reasons than the others do! For instance, the last reason is the most important one whose membership function in the set of reasons is very close to 1.

Despite the extensive literature on fuzzy, both at a theoretical level and regarding its practical application in different fields of science and technology, it seems that the classical deficiency that led to the materialization of fuzzy is still a justification for complaint for some researchers who have recently set out to explore fuzzy in some particular disciplines.

Wang, Ruan, and Kerre (2007) mention the issue in psychology that highlights the lack of attention to the logic and its application in other disciplines too:

Hence at the very outset, we would like to claim that despite the enormous literature available at present on fuzzy logic, it just started the study of its very foundations and that important application field such as the highly relevant discipline of psychology research and its relations is of particularly lacking (Wang et al., 2007, p. 1).

As was mentioned before, it is very important to bear in mind that fuzzy logic is not in contradiction with classical logic. Nor does it aim at ignoring it. Quite to the contrary, fuzzy logic is a step forward that results in the logic of considering the details of values. It is a natural and expected step in the improvement process of the human reasoning tree, which perhaps should have been taken far earlier. Fuzzy logic is a tool to bridge the gaps wherever the nature of the available data is insufficient for other established methods to handle the process of data analysis correctly and effectively. It is not witchcraft. It is an alternative way of reasoning, considering a spectrum of values with which we are so familiar in our everyday life and language that we cannot easily see them. It comes to help where a lack or shortage of data leaves no room for the established methods but to compromise or cling to estimation or interpretative or predictive remedies. It is also helpful when a great deal of inconsistency is involved as a result of the impreciseness of human language, which thrives on a dynamic and ever-progressing learning process rather than a one-off precise incident in decision making. It may be argued that many decision-making processes will arrive at a yes/no condition. This might be true in many cases. But in many other cases, they just seem to be correct. This is because, as acquainted as we are with the simplicity of the duality of bivalent systems, we like and tend to simplify the process of decision making to a crippled equivalent in the binary system. In reality, however, we think, decide, and act in a multivalent manner. In addition to the general reasons to justify fuzzy logic as a way of thinking that are given later in this chapter, this research sets out to corroborate fuzzy logic as its core argument for some specific reasons, put forward below.

Planning as a multidisciplinary task involves many factors, role players, and stakeholders, and it comprises a series of complex interlinks between them. This provides a colorful variation of solutions. Many alternative and some evidently controversial alternatives may be conceivable from which choices should be made. Many decisions need to be made during the planning process to choose from those alternative solutions. These decisions have different dimensions and by nature consist of many parameters with many values. In many cases, the choice is not possible simply, and different measures need to be introduced for supporting those decisions. These measures may (and almost always do) vary in the nature, type, and degree of their input and output variables and cannot easily be summed up, integrated, or combined to form a single uniform measure that can replace all those different measures.

This heterogeneity requires a very firm yet flexible contingency plan, should any unforeseen or unpredicted incident happen. To devise this contingency plan and make it work to the full satisfaction of all parties involved is very difficult, if possible at all.

Even having a highly responsive contingency plan sometimes does not work. Therefore, when some unpredicted incident happens, or when the dominant rationale of a decision-making method simply does not apply or does not work, the other measures should be exploited, usually from outside of the ongoing process of decision making. The legitimacy of those on-loan measures is hardly justifiable and remains open to extensive disputes.

In addition to the above specific reasons, there are some general reasons, discussed in the next section, to employ fuzzy logic in similar cases.

5.7.3 Uncertainty and Fuzzy Logic

In the real world, there are different types of uncertainty, some of which can best be handled by fuzzy logic. In discussing the prevalence of uncertainty, Nguyen and Walker (2006) raise a question about fuzzy logic: "There are many kinds of uncertainty arising in real-world problems and a variety of techniques are needed for modeling them. What are some of these techniques, and when does fuzzy set theory provide appropriate models?" (Nguyen and Walker, 2006, p. 11)

One form of uncertainty arises when there is no sharp boundary between the sets defined. This is best demonstrated by the example of a man 180 cm tall and the question of whether he belongs within the set of tall people. Nguyen and Walker (2006) suggest,

Fuzzy sets deal with the type of uncertainty that arises when the boundaries of a class of objects are not sharply defined. We have seen several examples of such vagueness already: 'young' and 'high income', for instance. Membership in such classes is matter of degree rather than certainty one way or another, and it is specified mathematically by fuzzy sets. (p. 11)

Vagueness or ambiguity is another kind of uncertainty deemed a serious obstacle when trying to solve a problem or to make a decision using ordinary logic. This is due to the unknown-ness of some preexisting conditions. Nguyen and Walker (2006) discuss this:

there is uncertainty about any nominal value chosen from that interval for that parameter (Nguyen and Walker, 2006, p. 11).

Another type of uncertainty caused by unknown contextual conditions can result in randomness. Randomness usually occurs when the laws about how an incident or combination of incidents happens are fully or partially unknown. They also state that an example is

that of randomness, as exemplified by the uncertainty of the outcome of some experiment such as rolling a pair of dice, or of the observations made of some physical system. Randomness is typically modeled using probability theory. That is, outcomes are assumed to be observations of random variables and these random variables have distribution laws. These laws may not be known, of course, but each random variable has a unique one. This is in contrast to the fact that many different membership functions can be assigned to the same fuzzy concept. Again, probability and degree of membership are distinct things. (Nguyen and Walker, 2006, p. 11)

In formal logic and sets theory, randomness in its limited (and fairly predictable) sense is usually handled by the principles of probability. Although these are sometimes called rules, they actually are nothing but blind principles that provide a fairly wide range of possibilities in which for the incident to happen. In more complicated cases such as meteorological studies, other patterns or tools may come to help predict the highest possibilities.

In reality, however, one type of uncertainty will rarely be experienced alone. Quite to the contrary, two or more types of certainty may exist simultaneously. As Nguyen and Walker (2006) state,

In complicated real-world cases, several types of uncertainty can coexist. For example, to each population of humans, chosen at random, one might be interested in its "morality," its "political spirit"; to each town chosen at random, one might be interested in its "shape," its "beauty" and so on. (Nguyen and Walker, 2006, p. 12)

5.7.4 Theoretical Applications of Fuzzy Logic

Ragin (2000), by providing an ample of application for fuzzy logic, discusses the capabilities of fuzzy logic in dealing with qualitative sets:

Today, *fuzzy* has a new usage unrelated to its original meaning of "unclear" or "muddled" (Kosko, 1993, Grint, 1997). When applied to a set, it signals that relevant objects can have varying degrees of membership in the set (Zadeh, 1965). For example, people can have varying degrees of membership in the set "tall"; investments can vary in their degree of membership in the set "low-risk." Fuzzy sets are especially useful for categories that are imprecise, like "tall" or complex in construction, like "low-risk." (p. 1)

The examples below are patterned on the ones Zadeh used in his analysis of fuzzy logic but are applied to urban planning (and take the form of elementary examples of approximate reasoning based on Aristotelian syllogism):

A₁: Most metropolitan areas are *disorganized*. (Most postmodern theories in planning are loyal to political accounts.)

A₂: Los Angeles is a metropolitan area. (Advocacy is a postmodern theory in planning.)

A₃: It is *likely* that Los Angeles is *disorganized*. (It is likely that advocacy is loyal to political accounts.)
or

A₃: It is *very likely* that Los Angeles is *disorganized*. (It is very likely that advocacy is loyal to political accounts.)

In this example, both A₃ and A₃' are admissible approximate consequents of A₁ and A₂, with the degree of approximation depending of the terms *most*, *likely*, and *very* as fuzzy subsets of their respective universes of discourse. For example, assume that *most* and *likely* are defined as fuzzy subsets of the unit intervals by compatibility functions of the form shown in Figure 5.7, and let *very* be defined as a modifier that squares the compatibility function of its operand. Then A₃ is a better approximation than A₃' to the exact consequent of A₁ and A₂, provided *very likely*, as a

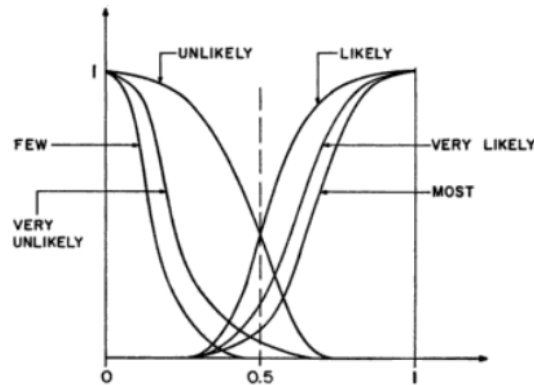


Figure 5.7. Compatibility functions (not to scale) of *most*, *likely*, *very likely*, *unlikely*, *few*, and *very unlikely*.
Note. *Unlikely* and *likely* are symmetric with respect to $u=0.5$; *very likely* is the square of *likely*; and *very unlikely* if the square of *unlikely*.

Fuzzy of $[0,1]$, is a better approximation than *likely* to the fuzzy subset “most.” This is assumed to be the case in Figure 5.7.

Additional examples of approximate reasoning in fuzzy logic are the following (in which u_1 and u_2 are cities).

A₁: u_1 is *big*.

A₂: u_1 and u_2 are approximately equal.

A₃: u_2 is more or less big

or

A₁: (u_1 is *big*) is *very true*.

A₂: (u_1 and u_2 are approximately equal) is *very true*.

A₃: (u_2 is more or less big) is *true*.

The italicized words in these examples represent labels of fuzzy sets. Thus, a fuzzy proposition of them, “ u_1 is *big*,” represents the assignment of a fuzzy set (or, equivalently, a unary fuzzy relation) labeled *big* as a value of u_1 . Similarly, the fuzzy proposition “ u_1 and u_2 are approximately equal” represents the assignment of a binary fuzzy relation approximately equal to the ordered pair (u_1, u_2) . And the nested fuzzy proposition “(u_1 is *big*) is *very true*” represents the assignment of a fuzzy-value *very true* to the fuzzy proposition (u_1 is *big*) Qualitative and Quantitative Methods

Naoum (2007, p. 37) identifies two basic types of research strategy, “quantitative” research and “qualitative” research, and asserts that deciding on which strategy to adopt depends on the purpose of the study and information (at hand and) required. Creswell (2009, p. 3) suggests that the quantitative and qualitative approaches to research are not “polar opposites or dichotomies” of each other, but that they represent different ends of a scale. A third research strategy can also

be identified. A combination of the quantitative and qualitative approaches, it is known as the "mixed method" (Creswell, 2009, p. 4).

Quantitative research is a method by which a hypothesis or theory is tested by an objective study of the relationship among variables (Creswell, 2009). The variables may be measured in a number of ways, but most typically, an instrument is used so that numbered data can be output and in turn statistically analyzed in order to test and determine the hypotheses or theory. Naoum (2007) identifies an instance where the quantitative research method could be employed for a purpose other than to determine a hypothesis or theory. This is simply when facts about a concept, question, or attribute need to be determined. With regard to social sciences in general and planning in particular, however, the case of at-hand and required information or data sets is not as simple as prescribed for or favored by quantitative methods. Many issues in the process of decision making require more than only pure numerical data, and in a vast number of cases, obtaining consensus is a way of making decisions, while in many others, discretion plays a crucial role.

Qualitative research can be described as research that does not obtain its results by statistical procedures or methods of quantification. Some data may, however, still be quantified, but the analysis is qualitative (Bouma et al., 1995). Qualitative research allows for the exploration and understanding of social and human problems through the study of individuals and groups (Creswell, 2009). Qualitative research is subjective in nature and lends itself to an open method of investigation, while the quantitative method is objective in nature and ordered. Bouma, Atkinson, and Dixon (1995, p. 208) summarize the two methods by stating that quantitative research is "structured, logical, measured, and wide," while "qualitative research is more" (p. 208) intuitive, subjective, and deep. Although, as per the late account, the qualitative method may be subjective and intuitive, it might not get as deep in the planning decision process as it can get in rather more solid subject studies. That said, even being intuitive (especially in the case of decision making) and being subjective (particularly in nonmeasurable subject areas of knowledge) are explicitly downturns for the data gathering and data processing of research. With more detailed focus on the decision process, purely qualitative methods ease the process, yet they open up an endless and broad way to debate on the validity and equity of the decision made or taken.

The mixed method is a strategy of inquiry that employs both quantitative and qualitative approaches. However, the strategy involves not only the employment of both approaches but the mixing of these two approaches combined with philosophical assumptions (Creswell, 2009). Rather than there being just a collecting and analyzing of both types of data, the methods are performed concurrently with one another; the overall strength of the study is then greater than either qualitative or quantitative research (Creswell and Plano Clark, 2007). Quite evidently, a mixed method has both the weaknesses and strengths of the two strategies, thereby opening room for discussion on why and to what extent one specific case should lend itself to each method. Obviously, different parties involved in a decision process in planning can argue for different combinations of both methods as per their very own costs and benefits. How the two methods are going to be combined is another, utterly different, subject to scrutinize within the main subject of the decision process. Traditionally, there is no established method to justify that combination, and there is no supporting argument or theoretical basis to endorse such a combination.

The crucial point is that, despite a few recent thinkers who have tried to portray qualitative methods as fuzzy logic or those who have implied that fuzzy logic is nothing but a rebranding of qualitative methods, fuzzy is something utterly different from qualitative or quantitative or mixed methods, as the underlying philosophies of fuzzy and the others differ fundamentally.

The current research will next explain fuzzy as opposed to classical sets, and then fuzzy models will be contemplated as an alternative to classical research strategies, whether they are quantitative, qualitative, mixed, or combined.

5.7.5 Fuzzy Sets

Fuzzy sets have been used with the main aim of tackling the inherent problems of the classical sets. Ragin (2000) explains,

Most theoretical arguments, as verbal formulations, deal with set-theoretic relationships. Because fuzzy sets also address set-theoretic relationships, they offer the opportunity for creating a very close correspondence between theory and data analysis. In short, with fuzzy sets researchers can analyze evidence in ways that directly reflect their theoretical arguments. (p. 2)

They are theoretically supported by fuzzy logic as an alternative way of thinking to classical logic. As explained by Zadeh et al. (1996),

Classical logic is like a person who comes to a party dressed in a black suit, a white, starched shirt, a black tie, shiny shoes, and so forth. And fuzzy logic is a little bit like a person dressed informally, in jeans, tee shirts, and sneakers. In the past, this informal dress wouldn't have been acceptable. Today, it's other way around. (Zadeh et al., 1996)

To tackle the linguistic fuzziness, the scientific language separates itself from the human language. In other words, to speak scientifically, one should be accurate and precise where each and every phenomenon should prove itself either to be or not to be X. In classical sets theory, as seen before, the same rule exists. Each element either belongs to a set or does not. In the real world, though, there are statements that are true but only to some degree; simultaneously, they are false but only to some extent. In other words, they are both true and false, or neither true nor false, rather than being either true or false. The real-world system is a multivalued system. This makes a multivalued logic a more suitable tool to deal with real-world problems (see Table 5.1).

Bivalence	Multivalence
Aristotle	Buddha
A OR not-A	A AND not-A
exact	partial
all or none	some degree
0 or 1	continuum between 0 and 1
digital computer (machine)	neural network (brain)
Fortran (machine language)	English (human language)
Bits	fits

Table 5.1. Value systems of classical logic and fuzzy logic. Note. From *Fuzzy Thinking: The New Science of Fuzzy Logic*, by B. Kosko, 1993

The language of new logic is both/and, as opposed to that of classical logic, which is either/or (see Figure 1.2). Likewise, in a multivalued-set theory, the membership function is not certain. The membership function is a matter of degree (see Figure 1.2). Each element belongs to a set to a certain degree varying between 1 and 0—the absolute values of belonging or not belonging to a classical set. No longer are the values either black or white. They are a spectrum of grays, ranging from the darkest, or full gray (i.e., black or 1), to the lightest, or nongrey (i.e., white or 0). No longer do we have the problem encountered in dealing with the issue of the *tall* set.

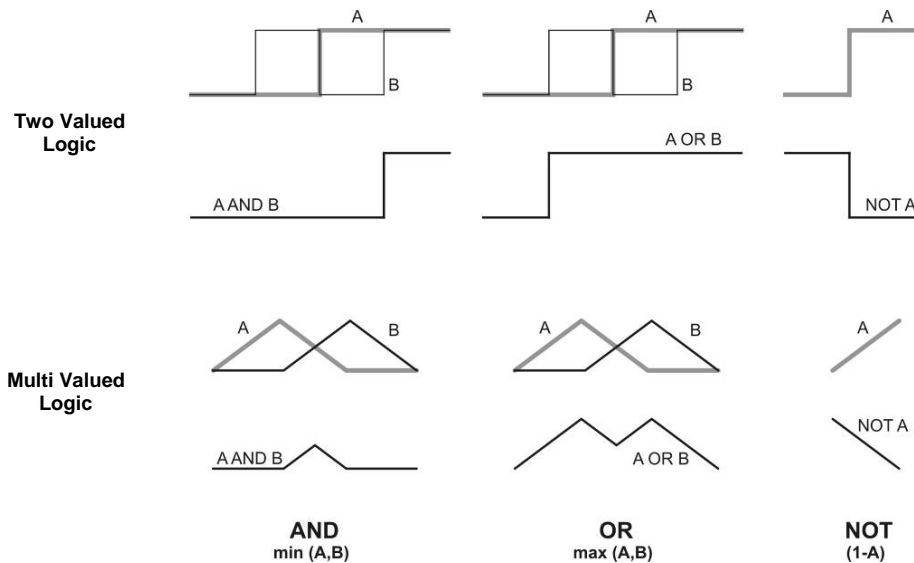


Figure 5.8. Logical operators in bivalent and multivalent logics.

Ragin (2000) cites a fearless statement from Diesing that highlights the range of capability of fuzzy sets as: "Fuzzy sets [fuzzy logic in its broadest sense] have the potential to transform research that is oriented toward 'discovery', toward gaining new insights about the world" (Diesing, 1971, as cited in Ragin, 2000, p. 2).

The vagueness inherited in the natural language has made its way through the very scientific approaches, not to make them less reliable, but to help them in employing the common sense of natural language. A word, as Kosko (1993) suggests, stands for a set. The word *house*, for instance, stands for many houses, a set of houses, a list of houses, a group or collection of things but does not depict what is a house or what is not. Terraced, semidetached, detached, castles, trailers and mobile homes, duplexes, time-share condominiums, teepees, yurts, lean-tos, caves, tents, and cardboard boxes in alleys are all houses and nonhouses, but each one to a certain degree, each one to an extent. Expectations blur the boundary between house and nonhouse.

So, A and not-A holds. So, fuzziness holds: the noun *house*, Kosko (1993) states, stands for a fuzzy set of houses. He then continues and concludes that the numbers, which he describes as "pure forms," are fuzzy too.

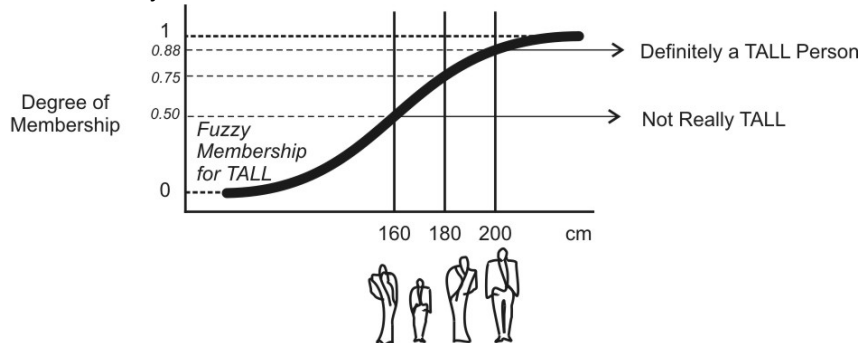


Figure 5.9. Membership in fuzzy sets.

With regards to fuzzification and defuzzification processes, with addressing Fuzzy Inference System (FIS) model, Espinosa, Vandewalle, and Wertz (2004) explain,

Fuzzy set theory can be used in the modeling of systems. The modeling task is carried by so-called Fuzzy Inference System (FIS). Fuzzy Inference Systems are processing units that convert numerical information into linguistic variables by means of a fuzzification process, process the linguistic information using rule base and generate a numerical result from the conclusions of the rules by means of the defuzzification process. (p. 3)

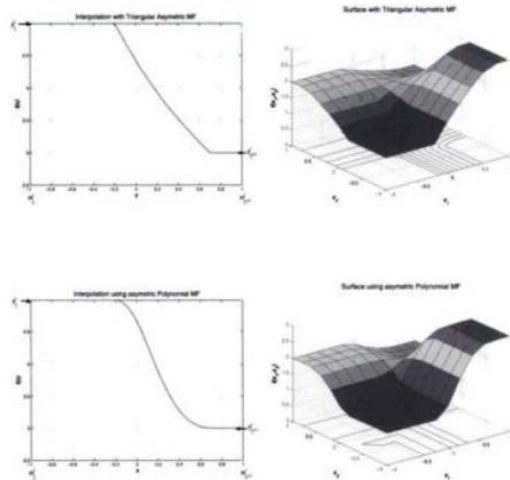


Figure 5.10. Interpolation and surfaces generated with triangular membership functions with overlap different than $\frac{1}{2}$. *Note.* From *Fuzzy Logic, Identification and Predictive Control* (p. 19), by J. Espinosa, J. Vandewalle, and V. Wertz, 2004, London: Springer.

However, there are still barriers to acceptance of fuzzy at a higher belief level of the methodical legitimacy. As Ragin (2000) explains, “[in social science research] the main problem is the dominance of ‘conventional’ forms of quantitative analysis. While there is nothing wrong with qualification” (Ragin, 2000, p. 2).

5.7.6 Fuzzy Models

Practically every fuzzy system needs to use a model to feed the fuzzy system with information; to handle, manage, and utilize the systems in the processing procedure; and finally to prepare the output in a form that can be used in the decision-making or control process. Because fuzzy is able to manage literally any type of information, different models will be needed.

Fuzzy systems, based on the type of information they are expected to process, fall into two categories. These two differ in their abilities to embody different types of information. The first model, the Mamdani model, is the linguistic model and includes rather pure fuzzy rules. Models of this sort

are based on collections of IF-THEN rules with vague predicates and use fuzzy reasoning. In these models, fuzzy quantities are associated with linguistic labels, and a fuzzy model is essentially a qualitative expression of the underlying system. Models of this type form a basis for qualitative modeling that describes the system behavior by using natural language. (Li, 2006, p. 3)

This model is used in fuzzy controllers, and as Li (2006) explains, “A corresponding fuzzy logic controller is a prototypical example of such a linguistic model, in which its rules give a linguistic expression of the control strategy in the common sense” (Li, 2006, p. 3).

The other model is known as the Sugeno model and is capable of combining the linguistic and mathematical patterns together. In reality, this model is used when a degree of preciseness needs to be integrated in the process of data processing. Li (2006) adds,

The second category of fuzzy models is based on the Takagi-Sugeno method of reasoning [9, 10, 11]. These models are formed by logical rules that have a fuzzy antecedent part and a functional consequent. They are combinations of fuzzy and nonfuzzy models. Fuzzy models based on the Sugeno method of reasoning integrate the ability of linguistic models for qualitative knowledge representation with great potential for expressing quantitative information. (p. 3)

This model incorporates human learning patterns. He also writes “In addition, this type of fuzzy models permits a relatively easy application of various powerful learning techniques for system identification from data and controller design” (Li, 2006, p. 3).

In addition, the Sugeno model will be useful when linearity itself is combined in some subdisciplines and a nonlinear discipline will likely be the consequence. As Li (2006) states,

Because of the linear dependence of each rule on the input variables of the underlying system, the Sugeno method is capable of acting as an interpolating supervisor of multiple linear controllers that are to be applied, respectively, under different operating conditions of a dynamic nonlinear system. . . . Similarly, a Sugeno fuzzy system is suited to model nonlinear systems by interpreting between multiple linear models. (Li, 2006, p. 3)

For example, an airplane may perform differently at different altitudes and speeds. Linear controllers, which manage the performance of the plane as per different isolated conditions, though easy to compute, must be interpolated with other controllers, each of which work in isolation, to guarantee the smooth overall performance of the aircraft.

A Sugeno model is more computationally efficient and hence more compact than a Mamdani model and normally uses adaptive techniques to build up a fuzzy system.

Here are some of the advantages of the two models:

Mamdani	Sugeno
Intuitive	Computationally efficient
Easy to use	Works well with linear techniques
Has broad applicability	Works well with optimization and adaptive techniques
Widespread acceptance	Guaranteed continuity of the output surface
Well suited to human linguistic input	Well suited to mathematical analysis

Table 5.2. Mamdani model versus Sugeno model.

5.7.7 Practical Applications of Fuzzy Logic

Li (2006) explains the development of the applications of fuzzy logic as:

Industrial automation and commercial production have successfully been developed worldwide using fuzzy control. In this regard, Japan has led the way. Its success includes Hitachi automated train operation of the Sendai subway system that has been in daily operation since 1987. The

trains, controlled by fuzzy predictive controllers, consume less electric energy, and ride more comfortably than the ones controlled by conventional controllers. Another Hitachi product is the group fuzzy control operation for elevators. The waiting time and ideal time of the elevators are both reduced during the rush hours; and riding and stopping are smoother. (p. 4)

The most important problem fuzzy is facing in its practical application is the issue of decision making and/or control. Fuzzy controllers form one of the epitomes of the practical application of fuzzy logic in the manufacturing industry. Fuzzy controllers are microchips that use the principles of fuzzy thinking and make the best possible decisions utilizing a fuzzy inference system (FIS), which is preset in them. Many everyday tools, instruments, and electric and electronic devices, such as washing machines, refrigerators, microwaves, fans, sound systems, and digital cameras, use fuzzy logic to improve their performance or the quality of the task to which they are assigned. Building upon others' work, based on what Dubios, Prade and Yager (1993) suggest, Ragin (2000) explains,

Today, fuzzy sets are used in many different fields and technical arenas to address a variety of questions and problems, both mundane and abstract (Ross 1995). The range of applications is ever-expanding, reaching from artificial intelligence to washing machines and the stock market. Much of the literature on the fuzzy sets is concerned with the problem of control—how to develop machines that 'act smart' [rule-based and effective] in the face of ambiguity or complexity [and uncertainty] (p. 2).

Fuzzy controllers are also widely used in cars. A car can have several fuzzy devices to control different tasks or to assist the driver to control or operate the vehicle more easily, efficiently, safely, and conveniently. One system in which a fuzzy controller may be employed in a car is the suspension system. A shock absorber, for instance, may use a fuzzy controller to build up a database of the pattern of the road bumps in a vehicle's daily, weekly, or monthly routines or random trips. This database, when sufficiently built up, will be compared, in real time, to the patterns that have been preprogrammed in the controller by the manufacturer. The chip then decides about the best possible movement pattern of the shock absorbers, in order to let the tires move on top of the bumps and fill the gaps properly while moving up and down as the road changes. This will help the car move as smoothly as possible to give the passengers the subtlest feeling during their ride. Li (2006) also reports,

In the late 1980s, a real-time fuzzy control drug delivery system was successfully developed and clinically implemented to regulate blood pressure in postsurgical open-heart patients at cardiac surgical intensive care units. This is the world's first real-time fuzzy application in medicine. (p. 4)

Surprisingly enough, in technical fields, even with the lack of human factors, experts have started to welcome fuzzy, using the human mind reasoning system, and to improve technical decision making based on what they have learned from this system. To add to this surprise, but in a contrary way, in planning, a field tightly related to human factors, and where there should be constant talk of human factors, the thinkers and scholars try to keep safe distance from this approach. They prefer to use an old-fashioned technical system fully and utterly based on binary formal logic. Very few, however, who try to take into account the human factors do not seem to be seeking for generic solutions that offer the most systemic approach to those factors. Some are simply fascinated by these applications. However, the use of fuzzy sets does not strike close to home for planners, and their impact on planning and theories in planning has been slight. The terminology of fuzzy sets does crop up occasionally, and a few scholars have attempted to apply some preliminary ideas, but for most scholars, the potential of the fuzzy sets to transform planning methodology is yet to be recognized. Part of the problem is that scholars have attempted to integrate fuzzy sets into their existing repertoires of methods without altering their usual practices in any way. In fact, to appreciate the power of fuzzy sets, it is necessary to adopt a broader understanding of data analysis and its place in the process of planning research, with special reference to the decision-making process in planning. In addition he asserts,

Fuzzy control is the most successful and active branch of fuzzy system technology, in terms of both theoretical analysis and practical applications. The primary thrust of this novel control

paradigm, created in the early 1970's, was to utilize the knowledge and experience extracted from a human control operator to intuitively construct controllers so that the resulting controllers were able to emulate human control behavior to a certain extent. Compared to the traditional control paradigm, the advantages of the fuzzy control paradigm are twofold. First, a precise mathematical model of the system to be controlled is not required; second, a satisfactory nonlinear controller can often be developed empirically without using complicated mathematics in. (Li 2006, p. 5)

5.7.8 Limit of Influence

The territories interacting with each other and influencing planning or any other real case problems are not classically isolated. The tradition of investigating involving factors in a phenomenon separately in a linear method will dismiss or overlook some of the correlations and falsely magnify some others. As a result, a linear method should be set aside and a nonlinear method instead should be chosen to have a holistic understanding of the influential factors. The internal mechanism is rather a multidirectional, multilayered interaction that is to cover the minor alterations of the role players' values and to monitor these changes and reflect them in the whole system. This also includes the reciprocal reflection of different factors on each other because a simple increase or decrease in one factor may, and in fact, in most cases will, affect some other factors on the same systemic level as well as those on higher or lower levels. These relations may happen to be positive or ascending, which means an increase in one variable will cause an increase in another, or it will cause a negative change or descent, meaning that an increase will be reflected with a decrease (see Figure 5.11).

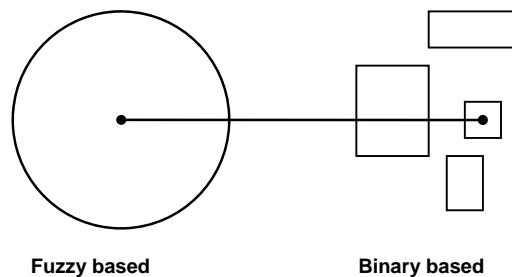


Figure 5.11. Limit of influence.

5.7.9 Thinking

In addition, the methods of thinking underlying the two thoughts are utterly different (see Figure 1.1). This means that talking about a linear system can be satisfactorily fulfilled by a binary method of thinking. It consists of limited and separate areas that can slip over each other and form overimposed layers of relatively connected sets of factors. In a nonlinear method, on the contrary, any factor may influence other factors or may be influenced by them. This makes any factor capable of making a freelance plus or minus relation with any other factor. They are not bound in a predefined set with a series of other factors.

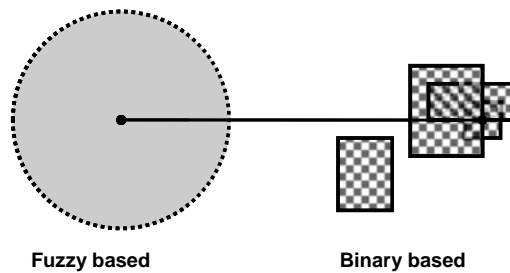


Figure 5.12. Thinking.

5.7.10 Problem Seeking and Problem Definition

Problem seeking follows the same pattern. A problem belongs to a certain area, and its influence is limited. In turn, it can be influenced limitedly by some and only some other factors. The problem, therefore, should be looked for in a frame of the possible relations. Nothing out or beyond the set limits can be imagined or can happen. In reality, however, a minor alteration in just one factor may resonate exponentially and affect the others. This magnifies the problem; there is a repeated multiplication of it. Therefore, tracking the problem is not as easy as it is supposed to be, and the problem cannot be dealt with or cured through a linear problem-seeking method.

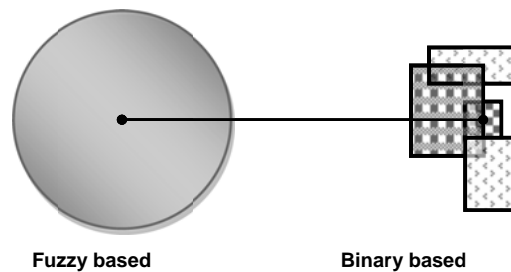


Figure 5.13. Problem seeking.

5.7.11 Problem-Solving Methods

Problem-solving approaches based on classical logic's binary thinking method function in the same way. As there are solutions limited to the boundaries, their effectiveness is limited. A single remedy can, at best, be expected to provide a cure in the very set where it belongs. In most real-world cases, despite the very complicated nature of a problem and its roots and aftermaths elsewhere, the remedy targets only the core of the problem where it is believed to belong or originate. Traditionally, a direct act of removing the cause is understood to rehabilitate the system completely. No in-between linking relations or nonphysical conduct can be taken into account in these linear methods. By contrast, in reality, a system is a thoroughly harmonious and entirely interrelated set of a number of subsystems, elements, and mechanisms. If the system appears to work improperly, an exclusive sole solution cannot and will not reconcile the situation. Nor will isolated investigation help find or prescribe a remedy, for that is deceiving or at least misleading.

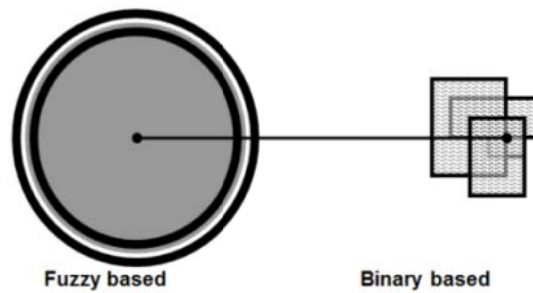


Figure 5.14. Problem-solving methods.

5.7.12 Conclusion

Similarly, the process of “concluding” in a linear method is restricted to a prescription—a precise, one-off, yes/no, do/don’t statement. By contrast, in reality, in many cases, there is no straight answer for a certain question. A question is rather naturally and effectively answered by a spectrum of answers, varying in a full range from 0, being an absolute NO, to 1, that is, a total YES. A series of if/thens implies how any modification in a factor will result in a single or multiple changes in the others. What is proposed based on this thinking is a proportionate decision tool that has the ability to make a decision in reality. Having had this in reality, one will be able to offer a tool that is not a final one-off remedy to any question that arises during the planning process; instead, the goal will be to devise an open-ended decision tool that can continue to evolve to improve the situation. Being open-ended gives this system the capability of being approached, modified, and tailored by the assessors as time goes on and as the circumstances change or if this method is being used in other contexts (i.e., in a planning environment with different outlines).

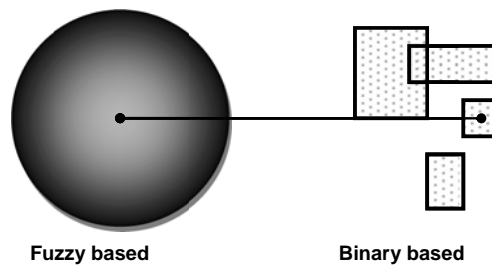


Figure 5.15. Conclusion.

5.7.13 Generalization and Development

Finally, the development system or generalizing will happen in the same manner. In linear methods, the generalization happens by developing the same conditions for other outer and seemingly separate sets that may or may not be of the same nature as the inception context. In a fuzzy rule-based nonlinear method, which resembles very much the real world, the process of generalizing involves development of the findings and remedies using an *expanding* method as opposed to an *extending* method of binary-thinking sets.

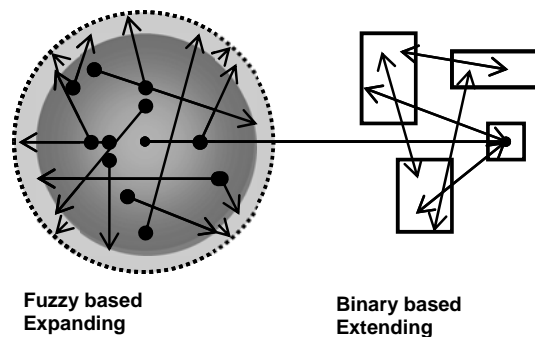


Figure 5.16. Development method.

5.8 Fuzziness in Planning

Planning as an activity entails an intrinsic fuzziness. What is committed in planning as a course of action widely ranges from policy to decision and from plan to implementation. Above that and chronologically subsequent to what has been carried out in planning as a course of action, comes the theorization of planning, which can be investigated from different vantage points, as suggested by different planning thinkers, such as Friedmann (See Friedmann, 2003b, pp. 7-10). Fuzziness, as far as it is concerned with planning, exists in all different activities within the planning discipline. Strictly speaking about fuzziness in planning, it may be scrutinized from two different points of view and therefore at two distinct levels.

To decrease the complexity of the discussion, these two levels may be associated with where planning is taking place, namely, at a practice level or at a theory level.

In practice, planning covers a broad and colorful range of different activities that need to be carried out at different times, by different parties, and with different effects, feedback, and productivity. Those activities, which do not occur in any set chronological order, include but are not excluded to the following: policy making, decision making, proposing plans, evaluation, taking actions, consultancy, implementation, data collection, analysis, interpretation, and prioritization. The supposed aspects of planning, as they are traditionally proclaimed by the established planning schools of thought—whether they are rational or postmodern (empirical), and whether they advocate the *tool-procedure*, the *plan-consequence*, or the *user-client mode of planning* cannot be fully and completely separated (or compartmentalized) from each other. This is where fuzziness first comes into the equation. Those activities almost always have vague and blurred boundaries and cannot be fully separated from one another. This fuzziness is seen not only in terms of the definitions of those activities; it also occurs with regard to consequences each of those activities has on the others. For instance, in almost all cases in planning, when a decision is made, a plan is provided, and implementation is begun, the first minor stages of that implementation have such enormous effects back on the stage of decision making that the decision or even the policy needs to be reevaluated, redefined, and reset in order to be able to retain its validity.

Apart from the boundaries and the relations between the compartments of planning and how they purposefully or unintentionally affect each other at a practice level, a given specific area—for instance, problem definition in planning—also has some internal fuzziness. A problem is not a single problem in planning because it interacts, resonates, or fades as a result of interaction with

other problems at the same level and evolves as a result of internal correlations. This same-level interaction, as well as cross-component interlinks, creates such complex situations that they can seem hardly solvable. An example is in the case of problem definition, when the planning as a process is about to begin and the challenges faced can seem insurmountable. In cases like this, some urban planners and thinkers have put forward the notion of wicked problems, which will be addressed later on in this section.

In addition to what was said about what occurs at a practical level, fuzziness also subsists in theories of (or in) planning. Taking theory as what is superimposed over the practice to model it, to help understand it better, and to provide firm ground for predicting the future in similar or different cases (by drawing upon and making conclusions from what has happened before), planning embeds a high level of fuzziness. This fuzziness, however, is slightly different from what was addressed with respect to the pure practice of planning.

At the theory level, what is deemed a theory in planning or theory of planning traditionally fails to take into account the fuzziness of the planning and decision making at the practice level. No matter to which school of thought a theory belongs, reductionism results from simplicity and, to some extent, the naivety of the theory and its incapability to solve complicated real-world equations when it attempts to superimpose a pattern over the reality of planning. This ends up in a failure to link the theory and practice successfully in general and, more specifically, when it comes to the issue of decision making about controversial subject matters involving uncertainty and complexity. This is basically because the underlying philosophy of theory and what is going on in the reality of planning (and to some extent in the practice of planning, even though it is treated as if it thrives on classical logic) do not comply with each other. At this theory level, ignoring the internal or cross-component fuzziness of planning practice leads to simple and linear all-inclusive remedies whose legitimacy lies in their comprehensiveness and capability to respond to all, forgetting the fact that even one case is so dynamic in itself that passing time, with or without any action taken in the due course, will change the given context in which the problem was first recognized, defined, and targeted for solution.

Many thinkers have come across this problem (or what, from their point of view, may be called a problem, although the current research does not see such an issue as a problem but as an alternative way of looking at planning in general and the decision process in planning in particular). Some urban thinkers have even tried to address fuzzy in planning fairly recently. For example, De Roo and Porter, in their book *Fuzzy Planning: The Role of Actors in a Fuzzy Governance Environment* (2007), attempt to address fuzzy as a remedy down in one of the subcategories of what decision making has to deal with. They discuss the actor-consulting model (ACM) as a tool to assist in dealing with fuzziness in the decision process of planning with emphasis on public participation. But what this research argues is that planning as a discipline and decision making (in its broadest sense) contain fuzziness at their different levels and in their different aspects. Taking one subcategory only and addressing what has been in practice for ages as a tool to handle fuzziness is not what examining and orchestrating fuzziness in planning implies. There are also other relatively inferior problems regarding such new approaches to planning that address fuzziness that are by no means more important. Even the most radical critiques on such approaches fail to consider the premises for their dispute.

In a book review of *Fuzzy Planning*, Briassoulis (2008) asserts,

The planning process is circular ("decision-plan-implementation-evaluation-decision"). Decision makers know a priori the types of planning problems and determine a priori the suitable planning approach, which is "real" and not a theoretical construct identified ex post. Facts are distinct from opinions; that is, data are value-free. (Briassoulis, 2008)

Not only does she simply fail to notice that what makes fuzzy distinctive is that it is an alternative yet more comprehensive logic than classical logic, but what De Roo and Porter do not consider is that, frequently, the relation between the compartments of planning is nonlinear, or, as Briassoulis cunningly defines it as the closed cycle of processes in a "circular" way. The book focuses on

user participation, which is merely one aspect of decision making, in the form of ACM down to the level of detailed decision making and within the framework of sustainability. This down-to-a-particular-level approach cannot apply, through generalization, to the whole decision-making process. In addition, the very basic premise of a book that claims to advocate fuzziness in planning has been based on reductionism to limit its scope. From another critical point of view, although sustainability is a very fashionable selling point, fuzzy is far too complex to need that kind of spin to be of interest to planners. This brings a very cautious consideration forward as to whether the book has enough content on its main subject matter (i.e., fuzzy planning) if it needs to cling to another broad subject such as sustainability.

Quite interestingly and most likely unknowingly, Briassoulis (2008) also picks up on what has been coded in this research project as “fuzziness of planning at the theory level” when she criticizes the authors on their failure to link theoretical and analytical reasoning to define degrees of complexity practically:

Although central to the book's theme, the discussion of “fuzziness,” “complexity” and “uncertainty” . . . is often loose, incoherent, unclear, confusing, unnecessarily repetitive, based on questionable assumptions and lacking rigorous theoretical and analytical reasoning. The extensive literature on complex systems thinking and its application in the social, policy and planning sciences is not used to define the “degree of complexity” that serves as an indicator of fuzziness . . . as well as a measure of uncertainty Confusion arises as the statement “‘complex’ planning issues . . . [should] not be interpreted as the so-called ‘complex systems’ referred to in ‘complexity theory’” . . . is followed by “‘complexity theory’ is . . . a form of conceptual thinking that embraces fluidity, fuzziness and uncertainty.” (Briassoulis, 2008)

Not only is this the problem of De Roo and Porter's text, but it also has existed in the whole planning discipline for a long time, as there is a big gap between the theory and practice. Several reasons for failures to link them interactively were discussed before in this section.

5.8.1 Noncrispness of Planning

Apart from the two main very limited domains that were pointed out above, all of the meanings, definitions, values, methods, and approaches used in or denoted or employed by planning imply the notion of ambiguity. They each do this to some extent, whether in domain, territory, definition, understanding, interpretation, or justification. Noncrispness of the sets of values or concepts, a direct result of the state of ambiguity, implies fuzziness. Fuzziness can occur as an effect, but regardless of its respective direct or indirect causes. Evidently, how this fuzziness affects different processes in planning in general and the process of decision making, in particular, is subject to many different parameters. Attempts have been made to deal with some of these parameters using established (or to some extent innovative and emergent) approaches to planning, while other parameters have simply been ignored or treated as though they do not exist at all.

5.8.2 The Issue of Wicked Problems

Rittel and Webber (1973), in their seminal paper, suggest

If you work in an organization that deals with long-term social, commercial or organizational policy planning, then you've got wicked problems. You may not call them by this name, but you know what they are. They are those complex, ever changing societal and organizational planning problems that you haven't been able to treat with much success, because you haven't even been able to define and structure them properly. They are messy, devious, and reactive, i.e. they fight back when you try to “resolve” them. (1973)

The concept of wicked problem was formally introduced by Horst Rittel and Melvin Webber in 1973. It was then put forward a year later, in “Re-designing the Future” (Ackoff, 1974), as a “mess” and later became a “social mess” (Horn, 2001). “Wicked problems” refers to problems that are difficult or impossible to solve. This might be because of partial, contradictory, or

changing information or preconditions of the problem. This might also happen as a result of the complexity of the interdependency of the involving factors, which might result in altering the preconditions or the emergence of new problems. Fishman and Cobarrubias, later in 1983, put “tamed problems” against “wicked problems” and describe them as:

“‘Wicked problems’ in contrast to ‘tame problems’ are those where the goals of planning are difficult to establish because of the complex network of cause and effect” (Fishman and Cobarrubias, 1983, p. 338).

Ritchey (2005) cites 10 criteria for wicked problems, as first mentioned by Rittel and Webber in 1973:

Rittel and Webber characterize wicked problems by the following 10 criteria. (It has been pointed out that some of these criteria are closely related or have a high degree of overlap, and that they should therefore be condensed into four or five more general criteria. I think that this is a mistake, and that we should treat these criteria as arising from 10 more or less specifically encountered “frustrations” the authors have experienced in dealing with complex social planning issues.)

1. There is no definite formulation of a wicked problem.
2. Wicked problems have no stopping rules.
3. Solutions to wicked problems are not true-or-false (right-or-wrong), but good or bad (better or worse).
4. There is no immediate and no ultimate test of a solution to a wicked problem.
5. Every solution to a wicked problem is a “one-shot operation”; because there is no opportunity to learn by trial-and-error, every attempt counts significantly.
6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
7. Every wicked problem is essentially unique.
8. Every wicked problem can be considered to be a symptom of another [wicked] problem.
9. The causes of a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
10. [With wicked problems,] the planner has no right to be wrong. (pp. 2-4)

The important point to bear in mind about wicked problems is that they first emerged in social planning. No longer, however, is the case the same as it first appeared in social planning. Although it is still almost equally if not more importantly in place, the issue of wicked problems is driven by pushing planning as an entire discipline to pronounce the significance of working more on its social side (i.e., involving individuals and communities more in the planning process).

As Fishman and Cobarrubias (1983) assert,

The lack of evolution of the results is related to a number of problems. Perhaps the most important problem is that the very nature of language and social problems is different from that of problems of a more technical nature. (p. 338)

Despite all these uncertainties involved, the point is that even in the case of wicked problems, planners should never give up doing their best to approach the most viable solution to those problems, and they always can, and should believe that they can, do better. They also add,

“Wicked problems” have other characteristics: there is no stopping rule, whereas in solving a problem in a game such as chess the problem-solver knows when he has done his job. But with “wicked problems,” there are no criteria to ensure sufficient understanding and no ends to the causal chain; the planner can always try to do better. (Fishman and Cobarrubias, 1983, p. 339)

Hence, “there is no immediate and no ultimate test of a solution to a ‘wicked problem’” (Rittel and Webber, 1973, p.163).

It is very important to keep in mind that what has been called a “wicked problem” is the problem that has been defined on a large scale containing many integrated variables and their relations in a fuzzy way. This means that these types of problems are engaged with fuzziness in different senses: fuzziness of goals, locations, intervening fields, and so forth. Therefore, the analyses or solutions for them cannot be as simple as the title of the problem seems. For instance, “How do we solve the issue of the gangs?” is a seemingly simple problem, but this single question has a very large set with a great deal of fuzziness within it (see the section “Type of Fuzziness”). And if those who ask such a question mean, “How do we get rid of the issue of gangs, vandalism, etc.?,” there is no final answer or finite prescriptive method for the problem in all cases in its binary sense. This can be seen as the symbolic certain truth of binary logic in planning, which has no relation with the nature of the practice of decision making in an urban setting and is therefore not useful.

The aim of the current research, if the wicked problems are supposed to be the case, is not to help approach the best possible solution for them or even to discuss whether approaching them with any defensible strategy is justifiable. Nor is the aim to determine which one of the solutions is more likely to be the best, as there might or might not be an ultimate solution to any of those problems. In addition, the ever-changing complex nature of cause and effect in wicked problems makes any of those solutions subject to a continuous scrutiny to establish their merit. The aim of this project is to show that devising a solution ought to contain the shares of various decision-making parties who were influenced by, and hence, should influence, planning and the built environment.

5.8.3 The Response of the Planning Discipline

Despite employing the general strategies from case to case, planning as a major discipline with its own dimensions seems to have its very own responses to the problem of uncertainty where a decision needs to be taken. Here the authentication and validity of those responses will be challenged.

Uncertainty, which may (or may not) lead to acknowledgment of the notion of fuzziness in planning, has different levels of application in planning. De Meyer, Loch, and Pich (2002) classify uncertainty in four different types, based on which the current research addresses the planner's role, planning tasks, and planning relations.

Type (Level) of uncertainty	City planner's role	Planning tasks	Planning relations
Variation	Trouble-shooter and expeditor	Simulate scenarios, incest buffers; set control limits; monitor deviation	Identify, communicate, and monitor performance criteria
Foreseen uncertainty	Consolidator of planning achievements	Anticipate alternative paths to project goal; identify foreseen risks	Increase the awareness for changes in form and motive
Unforeseen uncertainty	Be flexible in orchestration and networking as well as in being an ambassador	Build in flexibility; plan iteratively	Mobilize new partners; maintain flexible relationships and strong communication
Chaos (incremental learning)	Entrepreneur and knowledge manager	Gradually select final approach; verify goals on the basis of learning	Build long-term relationships; replace contracts with partnerships; solicit direct and constant feedback from markets

Table 5.3. Characterizing uncertainty in planning. Inspired by “Managing Project Uncertainty,” by A. de Meyer, C. H. Loch, & M. T. Pich, 2002, *Sloan Management Review*, 43

The most notable finding regarding this classification is that, despite its invaluable classification of uncertainty (which may indicate the level of complexity), and despite how it admits to the importance of communication, awareness, relationships, networking, and monitoring between different parties, no firm ground is provided to make sure that a defensible and methodologically justifiable solution will be guaranteed. In other words, despite the good start to address the issue of uncertainty (and complexity) in planning, no further attempt has been made to epistemologically carry on the problem to the next level for problem solving. The tasks and the relations defined could have provided a good support for carrying the subject of uncertainty into the stage at which fuzzy as a tool that embraces uncertainty, builds upon it, and develops solutions based on it could have been approached.

Besides the account of uncertainty by De Meyer et al., which remains to some extent epistemologically inconclusive, other thinkers have also acknowledged uncertainty widely across the planning discipline for a long time. This has been known to be due partially to a lack or explosion of information (a full account of this argument has been given in the earlier decision-making chapter). More detailed discussion can be made when the goals and the approaches to those goals are separated in planning based on the level of the decision maker's acquaintanceship with them. Christensen (1985, p. 67) discusses four possible combinations of factors in situations: well-understood technology and agreed-upon goals (which is when optimization is called for), unknown technology but still agreed-upon goals, well-understood technology but no consensus, and finally, what she calls problematic knowledge and no consensus. Christensen (1985) suggests,

Instead of trying to predict as many consequences of a potential action as possible, the planner acts first and then waits to see what consequences actually occur. If they are acceptable, then the action is deemed workable and may be repeated. If the consequences are unacceptable, the planner tries a new variation. . . . Over time, this process tends to generate knowledge of workable means and thus reduces uncertainty. In this incremental, adaptive process, the planner is a pragmatist and adjuster. (p. 67)

Faludi summarizes Christensen's suggested approaches for each combination that may occur. Under planning for unknown technology and agreed-upon goals, Christensen envisages a "trial-and-error" and a "planning-as-learning" approach. The former is the opposite of the classic rational response to uncertainty (Faludi, 1987, p. 106).

The model suggested by Christensen can be perceived as one of the basic specifications of the human reasoning system—learning by doing and learning from experience—which forms one of the underlying bases of fuzzy logic. However, no direct reference has ever been made to the human learning process or fuzzy logic; instead, the emphasis has been put on classical rationality in handling uncertainty (which requires a selective reductionism as per the given premises and is very much dependent on the individual personality, preferences, dimensions, or knowledge of the decision maker).

Faludi (1987) goes on exploring Christensen's next proclaimed approach:

As regards uncertainty caused by lack of consensus, Christensen quotes Davidoff (1965) and Friedmann (1973), the latter for his emphasis on the interpersonal dimension of decision-making. A second approach "derives from a more scientific tradition that tries to discover means more self-consciously. . . . (It) treats uncertainty . . . with conscious experimentation." (Christensen, 1985, p. 67, quoted in Faludi, 1987, pp. 106-107)

Following the discussion, Faludi builds on Christensen's ideas to address the last combination as the most complicated case. The remedy, however, as it is couched in her book, remains an approach that is not defensible for the decision-making process. What is important here is that, if she had incorporated fuzzy logic, her remedy could have been justified much more easily than one that tries to fuse a classical rationale to it where there seems to be little, if any, solid ground upon which to build the discussion. Christensen states,

Planning for unknown technology and unknown goals [(Rittel and Webber's wicked problems)] presents the greatest challenge. It asks for compelling formulations so as to provide stable motivation for resolving problems. This may come from a single planner or from an interactive process. Such problem finding . . . may require planners and participants to reformulate the problem: casting the problem in a new light so that people can agree that it is the right problem to tackle. To do that planners need insight both into the nature of problems and into political forces to ensure that participants agree as to what the problem is. When reformulation is successful, it reduces uncertainty about goals and simplifies conditions so that planners and participants can focus on technical aspects of how to solve the problem. (Christensen, 1985, p. 68)

Faludi then addresses another dimension of uncertainty as a result:

One is reminded of Harris's disagreement with Scott and Roweis. Harris would regard this problem-finding as a political task. Be this as it may, if successful, problem-finding thrusts us into the area where only the means are uncertain in. (Faludi, 1987, p. 107)

Complication seems to have had its bearing on the planning discipline, where it has finally been shown a green light to take reductionism on board, something that has been approached in other disciplines more cautiously and more consciously. "Alternatively," Christensen (1985) writes, "problem finding may require planners and participants to sift through and articulate confused, vague goals to show how debate could focus on competing goals that already have effective technologies. This way the problem is articulated as conflict" (Christensen, 1985, p. 68).

Faludi (1987) then examines her fourth combination and compares it to what was advocated by IOR:

With her strategies fitting different situations, Christensen takes in effect the contingency approach. In attending to uncertainties she follows the line also of the "IOR School". But, neglecting uncertainties caused by the interrelatedness of various areas of choice, she does not specifically address what Friend and Jessop identify as strategic choice, or planning. Rather, her argument concerns problem-solving generally. . . . So the parallels to the "IOR School" in the literature concern adaptations of the concept of planning, and the rejection of the rational planning model. But that model is not based (a) on the assumption of there being certain knowledge; (b) nor on that of a pre-existing consensus. Like the "IOR School", the authors quoted do not seem to appreciate this point. (Faludi, 1987, p. 107)

With no intention to undermine the complexity of the subject matter, and of course with no intention to imply that fuzzy is a simplistic alternative, the current research asserts that easier ways can be deemed viable in addressing the problems. There seems no stamina left to deal with the problems practically, as recognition and portraying them take too much effort to be done on a wider bases. New theories, therefore, may be assumed to emerge much more frequently. Faludi also detects,

They have one other thing in common. Their approach represents what Rittel and Webber (1973) have already been quoted as describing as approaches of the "second generation", relying on argumentation. Rafter (1983), quoting Wildavsky (1979) and Lindblom and Cohen (1979), describes it as a revised theory of policy analysis. It employs interactive methods (e.g. bargaining) and bases solutions on the "ordinary knowledge" of decision-makers instead of the scientific knowledge of experts. "In other words, policy relevancy, social interaction, and qualitative data are key features of the 'new theory' of public policy analysis." (Faludi, 1987, p. 367)

This does not end here with new theories emerging every now and then but with claims for the alternative logic and thinking to have happened or have commenced at a faster pace than ever. This will be addressed later in this chapter.

5.8.4 An Example

Whether or not current approaches to planning admit this, they are utilizing what is conveniently used by normal language to describe and segregate the vague boundaries of the overlapping sets of values to carry out different tasks in their course of action.

Even those bodies who advocate quantitative methods, in many cases, have to use qualitative methods to be able to illustrate and justify their action. This issue is not brought forward so long as those qualities are quantifiable using ordinary methods of qualitative approaches. In reality, however, in many cases, the problems they are facing are far beyond what is manageable by the ordinary quantifying methods, and by no means could a defensible justification be given for them, even by the most qualitative methods. The blurred boundaries between the values and definitions can be handled only by what is advocated by fuzzy sets, by applying fuzzy logic and fuzzy thinking.

For instance, the ordinal data on *Geographic Information System* (GIS) in general and specifically on what the European Spatial Planning Observation Network (ESPON) uses in their definition for mapping overall “accessibility” and its relation to “economic performance” of different locations embed a high degree of ambiguity that cannot be dealt with by any means but a rule-based, many-value approach (i.e., fuzzy) (see Figure 5.17). In other words, even if they start advocating rationalism, which builds up its bases on the pure quantitative methods, they are dragged into embracing qualitative methods. Nevertheless, even using those methods, they admittedly cannot provide a firm ground for their acts because the level of vagueness (not in the sense of disapproval but as a fact) is far beyond being manageable even by the most radical qualitative methods. In fact, they can be dealt with only using the notions of fuzzy logic. They did not at first acknowledge their need for and dependence on qualitative methods but then went on use and stick to them to further their queries.

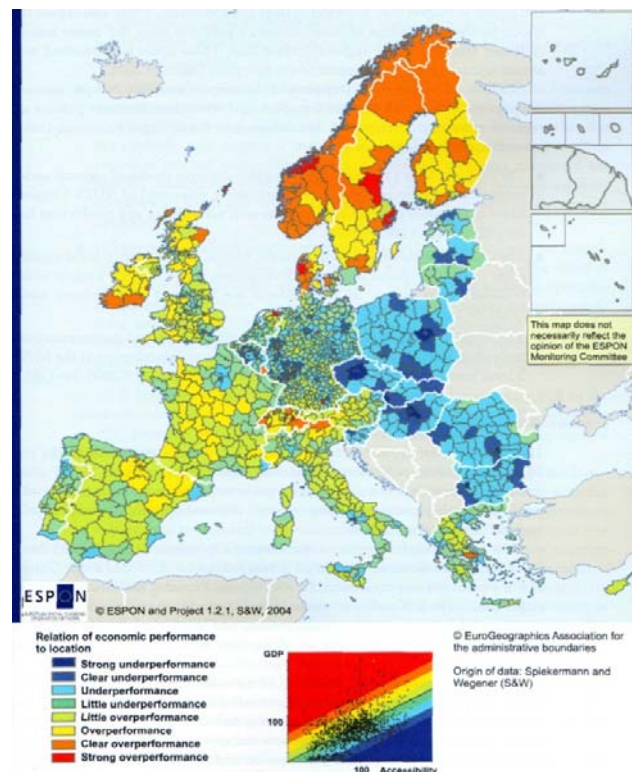


Figure 5.17. Accessibility versus economic performances. Note. From *Transport services and networks: Territorial trends and basic supply of infrastructure for territorial cohesion (Final report)* (p. 22), ESPON 1.2.1, 2004, Tours, France: University of Tours

In the given example, these agencies use the following to define different levels of performance in relation to locations within Europe:

- Strong underperformance
- Clear underperformance
- Underperformance
- Little underperformance
- Little overperformance
- Overperformance
- Clear overperformance
- Strong overperformance

By no means is a bivalued logic able to draw a clear line between any two of the above sets.

Although ESPON, like many other planning organizations do, dramatically try to stick to the quantitative analyses (for more information, see the full report) , but the truth is that not only there are many qualitative cases of inquiry in planning, but, after data mapping stage, the work should be mostly followed by using qualitative analysis. Quite expectedly, ESPON is not the first or the only planning body to do so. In fact, they are heirs apparent of a long-lasting legacy in planning. The importance of their failure is that, unlike many of their predecessors, they belong to a generation in which the call for change is almost a common outcry, as a result of problems initiated by the established methods of planning.

5.8.5 Fuzziness

Fuzzy sets and fuzzy logic were initiated by a general notion of fuzziness applied to the existing concepts in the sets theory and in formal logic. Li (2006) writes, "Zadeh's proposal of modeling then numbers, led to the introduction of fuzziness into systems theory and to the development of a new class of mathematical systems called fuzzy systems" (p. 6).

Quite evidently, there is a need to make this connection and the data transition between the two mainstreams work. There might be some personal understandings even between the fuzzists about the notion and how it relates to the prevailing paradigm. Yet, as Zadeh has recognized on various occasions and in different papers, "a fuzzy logic, FL, may be viewed, in part, as a fuzzy extension of a nonfuzzy multi-valued logic which constitutes a *base* logic for FL" (Zadeh et al., 1996, pp. 240-241).

Other most recent thinkers seem to have gone too far, as Li (2006) does here: "we shall refer to fuzzy systems as those resulted from fuzzification of a conventional system" (p. 4). Their rather nonphilosophical viewpoints, like these of Li, remain, however, highly valid:

A central characteristic of Fuzzy systems is that they are based on the concept of Fuzzy coding (partitioning) of information. Fuzzy systems operate with Fuzzy sets instead of numbers [then it is not only mathematical]. Each Fuzzy set has more expressive power than a single number. The use of Fuzzy sets permits a generalization of information. This generalization is associated with the introduction of imprecision. In many real problems the imprecision is admissible, even useful, because the categories of human thinking are vague ideas which are very hard to quantify. In essence, the representation of the information in Fuzzy systems imitates the mechanism of approximate reasoning performed in the human mind. The precision of conventional systems theory is obtained as a limiting case in the continuity of varying levels of abstraction. (p. 5)

The concept of fuzziness, regardless of its applications and implications, which are deemed to be emergent and equally challenging, has established a new general order. It has defied a traditional notion of opposites. As Barker (1993) declares, "Order and disorder, order and change, are no longer presented as irreconcilable opposites but as dimensions of the same process. Order generates chaos and chaos generates order" (Barker, 1993, p. 27, cited in Westwood and

Williams, 1997, p. 52, See also Baker, 2007). In this sense, the symptom and the remedy are homogenous.

Interestingly, the notion has been long present in planning—more generally and more implicitly than in pure engineering disciplines—when it is acknowledged as an intellectual action. Faludi (1987) points out that, “like Webber, Friedmann regards planning as an ‘attitude of mind’” (p. 108). Thus, as an attitude of mind, it should be pursued with all kinds of complexity, uncertainty, and fuzzy-based decision making.

Faludi (1987) states, “Planning for unknown technology and unknown goals (Rittel and Webber’s wicked problems) presents the greatest challenge” (p. 106). Here, the concept of unknown goals is associated with vagueness of the goal(s), whereas it needs to be associated with fuzziness of the goals; they are clear in the fuzzy sense with natural fuzziness but not clear in the classical sense. The goals that might contain inherent contradictions are not known, but they are the goals (with consideration of the other juxtaposed goals) that have a degree of trueness—they are semi-true. Therefore, Webber and others who criticize those who look for certain answers try to characterize the unanswered problems as the problems without answers. In a binary sense (within a binary system driven by binary logic), lack of certainty equates to lack of existence. In other words, if something has no certain answer, it has no answer at all. However, if the logic changes, the new system can have infinite answers.

5.8.6 Types of Fuzziness

There are different ways through which fuzziness can be classified. Two of these accounts seem to be more important than the others. The first one is significant for the interrelationship of the meaning of words (semantics) with the theory of language. This is based on different sentence compartments, or so-called parts of speech; types of words like *justice* (which can be a noun too), *good* (adjective), and *condemn* (verb), whether they are being studied semantically or structurally, which is the fuzziness to be pursued in semantics. The second important account is the fuzziness of the epistemic approach to knowing the concepts (Fisher, 2000).²⁴ Both semantics and epistemic fuzziness shape our conception of every phenomenon, including planning and its decision-making process. The fuzzy notions within these two types of fuzziness are transfigured in qualitative, normative, descriptive, and discursive forms.

5.8.6.1 Simple Fuzziness of Words (Qualitative Fuzziness)

With regard to the concept of justice and the justification of actions Rawls (1982) simply brings up the fuzziness of a crucial value: “there are ‘many conflicting and incommensurable conceptions of the good’” (p. 160).

This type of fuzziness is the consequence of the fuzziness of the words. It is natural to use language in a fuzzy way. Words like *good*, *well*, *bad*, *true*, *truly*, *false*, and so on, which are mostly adjectives or adverbs, are engaged with a fuzziness inherent in language and the logic behind the words.

For instance, where it is claimed that “planning was conceived as the means by which the *best* use of land could be secured irrespective of market conditions and this required unreserved acceptance of the need to subordinate private interests to the public interest” (Expert Committee on Compensation and Betterment, 1942, cited in Campbell and Marshall, 2002, p 168), the word *best* is used in a fuzzy sense. However, in this case of the word *best*, there is also the problem of comparison with the other cases that would be characterized in the sets of *better* and *good*.

²⁴ Giving a brief introduction to semantic and epistemic fuzziness, in his paper, Fisher examines the issue of vagueness in geography and categorizes the vague areas of geography into three sections: geographical relations, geographical objects, and geographical processes. Focusing on *Geographic Information System* (GIS) as a spatial decision-making support system, however, the paper does not mention the general category of epistemic fuzziness as causing the vagueness and impreciseness of decision-making processes or operations in GIS, whose ability is usually considered an important advantage.

Basically, the differentiations come out of this type of fuzziness rooted in the differences of personalities of people and their personal backgrounds, tastes, habits, interests, and understanding of values as well as their degrees of tolerance. Shortly, they are based on a scale of personal values and understanding.

This type of fuzziness can take place in three different situations. First, it can occur where there are fuzzy words, such as *large*, *short*, *many*, and *practical*. In any of these cases, the word itself entails a degree of ambiguity. Although it might be a matter of hard talks in philosophy, ideology, or ethics, in the everyday usage of any of these terms, this ambiguity of vagueness in meaning, and the extent to which it is stretched, usually does not pose a serious obstacle in the course of discussion, even at a technical level.

Second, this kind of fuzziness exists wherever there is a comparison between two (normally opposite) fuzzy concepts (binary fuzzy sets), such as false versus true. It is, however, important to bear in mind that where the question itself is designed in a binary way, the fuzziness will vanish. For instance, “Will the world population increase or decrease in five years?” is a question designed with two and only two available opposite answers. (When it is asked by what percent the world population will change in two 5-year periods in a row, the answer is statistical and quantitative. If, however, the amount is questioned, as when one asks how much the world population will change in 20 years, the expected qualitative answer will denote fuzziness.)

The third situation with this type of fuzziness is where there is a comparison in multisector sets, such as the set of the expansion of cities, including qualities such as very small, small, average, large, extremely large, and huge. As is apparent, there is no statistically crisp limit between these qualities, and also, quite evidently, the assigning of these qualities depends on the background and understanding of the persons who answer questions about the cities.

5.8.6.2 Fuzziness of Framed Sets and Phenomena (Normative Fuzziness)

This is a very basic notion for understanding the differences between fuzzy and nonfuzzy sets. As explained before, all around, in everything from everyday life to scientific applications, are fuzzy concepts: large or small, utilitarianism, enhancement, and so forth. There have been two traditional ways to tackle these problems: first, through the adjustment of the sets so that the final answer is between two options (see the previous section) and, second, with clarifications.

The clarifications, usually, contain the sets of limitation(s) that belong to the domain of the concept through reductionism. This may be the case because the size of the concept to be defined has been reduced (by excluding, diminishing, or obliterating the aspects of the issue). Alternatively, new terms may have been set that imply smaller areas and are located in between the existing terms. For instance, *village*, *town*, *city*, *metropolis*, *metropolitan area*, and *suburb* are among those terms that are assigned to particular types of urbanization. On the one hand, the terms’ definitions have been clarified and modified to apply to a particular single concept or phenomenon. On the other hand, some new terms (such as *urban sprawl*, *edge city*, *suburbia*, *hyper-urbanism*, and *urbatecture*) are being generated to clarify the phenomena in a more precise way. This tackling method is engaged with fuzziness for four reasons.

First, it is not feasible to generate a specific term for every phenomenon. Second, the differentiation (and fuzziness) of the variables within each phenomenon do not allow for such complete clarification of the terms that each signifies only one object. Hence, the third reason is that the terms generated have overlaps with each other, and finally, there is no broad agreement on the clarifications, either in theoretical or practical aspects.

Therefore, the second type of fuzziness and fuzzy notions is recognizable—the fuzziness of the framed sets and terms such as *green*, *sustainability*, *planning*, and so on.

We ought to note that this analysis does not intend to downsize or decrease the importance of generating the terms, categories, and subcategories (in the traditional way) within an ever-expanding world, but it attempts to remind the skeptics (about the notion of fuzziness) of the fact that, in spite of any attempts to make things clear(er) (as opposed to the concepts of vagueness and ambiguity), fuzziness and fuzzy concepts will continue finding new applications. This means that the reductionist process of clarification cannot result in the exclusion of fuzziness from this activity and its related fields and processes.

5.8.6.3 Composed Fuzziness (Descriptive Fuzziness)

The third type of fuzziness appears where, either the first and second types are combined together in a notion—for instance, large city, safe area, good planning—or two (or more concepts) of the second type are juxtaposed with each other—for example, comprehensive planning or systemic or modernist decision making.

A composed concept of fuzziness will combine two or more fuzzy notions that usually belong to different areas. The degree of fuzziness of the final combination and the complexity involved are functions of the degree of complexity of all basic realms combined together. This does not work as a result of arithmetical summation or multiplication. Nor is it a union or Cartesian product of two sets, as it is in classical sets theory. In many cases, the resultant is far more complex than the sum of its components. Furthermore, higher complexity in fuzziness is expected when more fuzzy concepts are being composed; examples are the fuzziness entailed in substantive planning theory or in a successful postmodern decision-making process.

Composed fuzziness is established and developed from a composition of two or more fuzzy concepts, either subjective or objective. It typically contains what is usually called ambiguity. Fuzziness of this type is rather descriptive. Fuzziness of this type is rather descriptive for several reasons.

First of all, it deals with how a fuzzy embedded system is expected to act. In other words, a normative measure for each participating basic notion cumulates, and then, out of that combination, a reading emerges that aims to describe that combination based on the norms involved. Second, this type of fuzziness draws upon some precedent experience. In this sense, it has a knowledge-based nature and builds upon a collective experience from the past. This has nothing to do with prescriptive approaches. Lastly, being descriptive for this class of fuzziness means it very much lends itself to how it is comprehended or interpreted in different contexts. This means that a certain combination in distinct contexts, being semantically, culturally, geopolitically, etc. different, is understood utterly differently. These factors can independently cause to produce other types of descriptive fuzziness, in each of which one of those characteristics is predominant.

The composed or descriptive fuzziness contains the least amount of reasoning, and it does not aim to dictate, prescribe, or even assert what should be done. It simply references what has been done and comparatively concludes based on the most similar previously recorded experiences. This is much like what happens in normal human reasoning, the approach that has been in practice for years and has been working very well. In this sense, fuzziness normally provides the basis for further reasoning in the reasoning process, which itself may or may not be subject to fuzziness.

5.8.6.4 Fuzziness of Evaluations, Conclusions, and Interpretations (Discursive Fuzziness)

The last category of descriptive fuzziness, if developed accordingly, can lead to a new category that is equally important and comparable to the previous classes of fuzziness, if not more important. However, this type is not merely the outgrowth of the last type of descriptive fuzziness.

It can be developed as an independent ontology that is very helpful wherever a discussion is involved. This type of fuzziness, which the current research has named “discursive fuzziness,” usually happens when pure negotiation takes more credit than other phases in the process of reasoning. In addition to the statistical and mathematical analysis of data, in research, other phases, such as evaluating, assessing, and reasoning as well as concluding (and any type of decision making, in its broadest sense), are severely interfered with by linguistic and technical fuzzy concepts. It should be borne in mind that what is meant by evaluation is not any of the conventional mathematical or statistical methods normally used in the established theory and practice of planning. Quite to the contrary, here, evaluation is what takes place when a preferred or privileged choice is to be made about a number of equally validated policies, plans, or decisions.

However, this does not overshadow the fuzziness involved in rather technical layers of the planning process. When dealing with the most technical aspects of science (e.g., social, natural, physical, etc.), evaluation, interpretation, and interim conclusions drawn upon the basics of human reasoning systems are very much in use and subject to discussion. For instance, when in hydraulics in the car industry, the suspension system of a car and the shock absorbers²⁵ are supposed to be designed employing the basics of fuzzy logic (i.e., using a fuzzy controller), the most technical side of mechanical and product design must use the most interpretative side of language, considering the physical comfort conditions of the passengers. How this comfort is understood, interpreted, and translated into fuzzy rules for the fuzzy controller is a matter of discussion. This discussion certainly has some dimensions and needs to include some premises not only with regard to comfort itself but also in terms of how it is defined, favored, and expected in different contexts. Those contexts may well vary from the most cultural ones to the most geological ones (even here, the terms “the most cultural” and “the most geological” and the degree to which they are combined with each other imply fuzziness). An off-road car such as an SUV has or needs different comfort conditions from a sedan or a sports car. The definition of comfort itself varies from culture to culture and from country to country. The discussion also needs to preclude some factors and needs to provide a solution that is achievable and financially viable. Each of these concerns denotes a type of fuzziness in which agreement upon evaluation, interpretation, and conclusion (to different extents) is expected.

As another example, when a fuzzy controller is used in a digital camera to help make a combination setting between the speed and aperture in an automatic mode (or to suggest a more improved combination of the two in a manual mode), it may use different strategies. In a wide range of those strategies, the chip compares the given condition to a set of preset conditions to arrive at the best combination of speed and aperture. Those preset conditions may be in the form of a knowledge base in the RAM/BIOS of the camera or in the form of preset rules with different combinations of contextual features, for instance, the lightness of the background and lightness of the subject (if a portrait is supposed to be photographed) or the overall white balance of the frame (where, for example, the best shot of a landscape is the aim). In the first strategy (where preset conditions are being used as a knowledge base for the given condition to be compared against), although the main fuzziness type is somewhat descriptive, it becomes more of a discursive type when, after a comparison, the decision or suggestion is to be offered, for it involves the process of conclusion. In the latter strategy, which might happen more slowly compared to the former strategy, the entire process of fuzziness is discursive. This strategy involves a process of using different predefined sets of rules, each set of rules entails the process of interpretation and conclusion.

As mentioned earlier, planning as an activity entails many ever-changing factors, of which some, like tastes and interests, are vague, unclear, or subject to change even for their beholders. Those factors and their subcategorical values cannot be fragmented to the crisp sets. Not only does this overlapping happen between the different factors (both in terms of their meaning and the degree of preference or desirability), but it also occurs within each with regard to the values involved or

²⁵ “A piece of equipment connected to each wheel of a vehicle to make travelling on uneven ground more comfortable” (Summers, 2003, et al., “shock absorber” entry)

desired. In this sense, planning entails a double discursive fuzziness in many respects (see Foglesong, (2003, pp. 103-104)).

5.9 Justification of Operations in Fuzzy Environments

Whenever an act is to be performed or an operation is to be undergone within a multijudgment, multivalued, multiobjective process or environment, it needs to meet certain specifications of the fuzziness in that environment. An environment with a multiobjective, multivalued, and multijudgment nature needs to take into account the influential or intervening factors and to give them a share in its equations. Otherwise, it will be accused of eliminating some influential factors from the list of those intervening on an arbitrary and selective basis. And this compromises its legitimacy and justifiability.

This is inclusiveness different from that of classical logic and even pragmatism, which attributes the truth and falseness of a proposition relatively to a condition (such as time, place, or society). This means that, in taking into account the intervening factors in an operation, true and false are not absolute; those intervening factors are contributing in the formation of the final condition, each to an exclusive extent. This occurs as per the existing knowledge regarding the intervening factors, so it differentiates from what is intended by comprehensiveness, although it constantly attempts to improve the existing knowledge about each participating factor wherever possible. In other words, what is available in terms of the knowledge should intervene (or be taken into account) fully in the process of that action.

Therefore, the planning operations cannot and should not be seen in a linear longitudinal (or vertical) relationship. This means that they do not need to surpass or outdo any other parallel parameter to prove themselves true or false. This is first of all because this surpassing is a means of including or excluding a parameter from a given equation, which is a reductionist strategy. Second, it is because there is no true or false in their absolute meaning. Each and every parameter has a relationship with the rest of the parameters and is unable to eliminate them. It also cannot intervene in the process or condition of the existence or nonexistence of the others. Each of those factors should contribute in the whole process to its individual degree, not vertically, but horizontally. This is because, if such a relation is taken vertically, as it is in the conventional methods of decision making, each factor needs to pass a true/false filter to be qualified to participate or to be eliminated from the equation. This is not simply the case in a fuzzy-based environment. Those parameters are cross-linked. Each has its intervening role, to some degree, and all together comprise a whole, which does not thrive on the correctness of its individual parts.

Therefore, to summarize, the justification of an operation in a fuzzy environment is achievable through inclusion of the role players in that operation to the best knowledge of the operator, proportionate to the level of their importance, and taking into account their influence on the whole operation and on the other role players while avoiding bivalued true/false reductionism in the process.

5.10 Fuzziness of Decision Making

Considering the nature of the decision-making process regarding the idea of fuzziness in planning, the decision-making process engages with fuzziness in two different senses:

- *the fuzziness of process*—This involves the various technical criteria (in the broadest sense). The objective outcomes are the plan-making process and the plans.

- *the fuzziness of degree of membership*—This concerns the degree of membership of every influential group within both plan making and final decision making on the plans provided and the way that every (interest) group's share is seen accordingly. This is the matter of the subjective justification of ethical consideration of and in the process.

The first type of fuzziness defines the fuzzification and defuzzification of the methods containing different processes, from data gathering to analyses of further implementations and implementations to having the possible feedback to provide for further developments to decisions. The latter type of fuzziness works by providing various membership degrees of influential groups in a multijudgment atmosphere of decision making for planning. This can be understood in relation, for example, to a situation in which there are two political and economic factors in a democratic system (as an abstract extreme) and a free-market economy (as another abstract extreme). Based on the research framework, as was mentioned before, the decisions in the course of action (in reality) cannot be made based either on both extremes at the same time or on only one of those two extremes by ignoring the other one. If we suppose that this idea is achievable even in practice, and even with limited and specific conditions, the ignorance about one can damage the other (Planners, politicians and economists look at achieving one of the extreme—the one comprises their ideological premises; the one they would be loyal to— as an ideal to arrive at the related promised planning statue). Therefore, these two extremes arose from two different spheres. Though they are not contradictory, actually concerning some of the same matters, they have some divergence. This divergence generates the sets of contradictories in spite of the existence of the set of common values. The sets of contradictories exhibit that, in the course of action, all values from distinct areas are not completely achievable. As a result, they need to be synchronized in a way that the degree of membership of the values is proportionate to the type of the decisions to be made.

Therefore, two types of defuzzifier are needed in any decision-making process. The first one is the defuzzifier that targets the technical side of the work and involves different professionals from various disciplines. This means that in an environment like planning, in which many fields are trying to tackle the problems, each field ought to have a portion of this multidisciplinary environment. These portions are dynamic variables that must be set based on values attributed to the plans. Thus, this multivoice scheme (or pattern) depends on the degree of importance of some factors within every plan, the plan's specifications. These specifications let the planner or planning institute make the adjustment proportionate to the required premises. Then the (dynamic) adjustments should be considered as the guidelines of the defuzzification.

The defuzzifiers for the second type are those that cope with the degree of membership of users and owners of the urban spaces and their influences on decision making. These parties are rarely professionals, and even if they are, their professional affiliation is not what acts in this equation. Some may tend to reason that, according to this model, every citizen is the user and owner of all—their own property, town or city, region, state, and country. This statement is moderately correct. But with a small modification, the current model works on the membership of the clusters of users who are influential only if they have a *greater* degree of influence than users who would be characterized merely as *“being influential”*. This parameter itself (which is not constant) is determined by those characteristics such as *scale of plan*, *level of interference of plan*, and *type of plan*, the three crucial factors used to build up the fuzzy model of decision making and that will be explained later in more detail. This type of defuzzifier is directly involved with the matter of the justification of legitimizing the decision-making process. It can then be concluded that a decision-making process that can work proportionately with the share of decision makers in the process can be legitimized.

5.10.1 Fuzziness of the Term *Decision Making*

In addition to the fuzziness embedded in the notion of planning as a process of decision making and the fuzziness in the term *decision making*, there are different levels of ambiguity in the factors of decision making and the mechanisms by which those factors interact in the process.

This ambiguity results from noncrisp definitions, territories, and roles, and it, in turn, results in fuzziness in almost every single feature of planning, from the data gathering to making or providing plans.

The noncrispness in planning regarding the subject matter of the current research—decision making—starts with the meaning of the term itself. In *decision making*, in its broadest meaning ever, at least four utterly different and apparently separate concepts are involved: policy, decision, plan, and (the course of) implementation. Strictly speaking, decision making, as far as very specific cases are concerned, cannot be treated in isolation. It has some links to what is going on in upper scales as a point of reference for it, and it also interacts with or affects what is going to happen at lower levels as its resultants in further stages during the planning process. In one sense, what is deemed a *decision* at one level may well be a *policy* at the respective upper level and can be imagined as nothing but a *plan* for the successive lower level. In other words, when different parties are provided an identical act, what it appears to be very much depends upon the act's relative closeness (or size) within each party's context. The scale (of a project) might be assumed to be the point to be addressed here but it is not the only significant concept. How, from which viewpoint, and for which purposes a project is looked at are some, but not all, of the other factors that determine what the terms *decision* and *decision making* may actually denote.

In this sense, the term *decision making* is interwoven into at least two other notions, policy-making and plan making, the former being more subjective, while the latter is more objective than the decision making itself. Policy making is to deal with goals, objectives, and targets, whereas plan making is supposed to be handled by distinctive methods, institutions, attitudes, groups, and so forth. Evidently, a great number of distinctive decisions are to be made in each of these practices. Therefore, decision making is not a process that starts when a precedent process finishes or finishes when the successor process starts. Even in the so-called implementation process or evaluation, there exist different types and models of decisions. Although these are not widely acknowledged as pure decisions as means of the decision-making process, they lend their existence to making a choice.

For instance, while speaking of targeting a more sustainable built environment, policy making means explicitly deciding towards meeting a goal or objective. At the next level (perhaps at a more local level), when a strategy is chosen—for example, the elimination of waste as opposed to the choice of a more sustainable public transportation— a decision should be made to prioritize one action over the other (this is not carried out merely in the decision-making arena). This explicitly contains a decision and includes a plan that allocates resources to the selected priority. It goes further to show how those resources should be allocated. At a lower level, for example, having bins with separated cells for disposing of recyclable materials such as paper, glass, and cans is another form of plan making in which a decision has been made to choose this course of action over other possible ones, and it is a form of plan making that sets its own goals. From these examples, it can be concluded that there is no clear boundary between the decision-making process and the other related stages of planning. It is not possible to distinguish when the decision enters the realm of policy from when it turns to a plan. This indicates the fuzziness of the term *decision making* (see Figure 5.18).

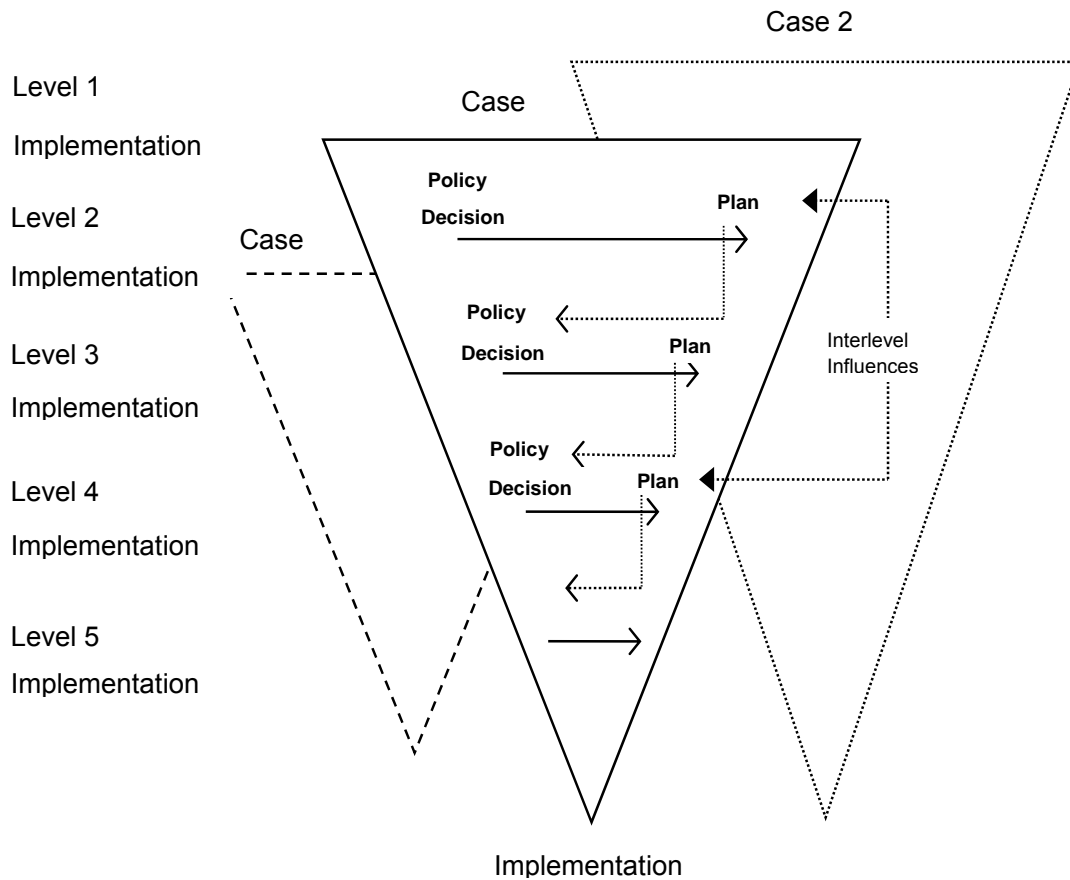


Figure 5.18. Fuzziness in decision making.

The main focuses of the current research, however, remain as follows: how the different role players should get involved in the decision-making process to make sure that the democratic nature of a free society is most reassuringly guaranteed; how and to which degree their votes should count in the decision-making process; and which mechanism should be used to include dynamically every role player, each to the appropriate respective extent and each exclusively to a specifically tailored case. To further clarify this method, it is necessary to expand general knowledge about fuzzy thinking, fuzzy logic, and fuzzy sets.

5.10.2 Fuzziness of Process of Decision Making

In the previous chapters, it was shown that decision making is working as a multiobjective, multivalued, multijudgmental process. It is, therefore, an operation in which the major actions should be justified based on what happens in a fuzzy environment. This means that, whatever the focus of a mindset—whether the consequences, procedures, or methodologies—meeting the core focus of each mindset individually cannot on its own justify the process of decision making for (or on) each type of planning case. This is because, if this is supposed to happen that way, in fact, in a fuzzy decision environment, there would have been an attempt to attribute a certain truth to a single role player within a cluster of role players and decision-making parties whose truth/falseness was interdependent on those of the others'. If the dual separating of the dimensions of decision making and putting them against each other is supposed to be valid, those dual values, such as procedure versus consequences, political versus apolitical, rational

versus empirical, bottom-up versus top-down, and so on, within modern versus postmodern decision processes will have to be governed by the above premises, which have all been formed based on the principles of duality. In other words, none of them can be definitely true nor definitely false to justify the decision making. Therefore, this fuzzy set of elements for decision making will require a fuzzy process using fuzzifiers and defuzzifiers proportionate to the process.

5.11 Defuzzification of Decision Making

Iglesias, Lowen, and Verschoren (2005) explain,

Defuzzification is a necessary tool to make a fuzzy control system interact with real-world models. This is in its strictest sense contradictory to the idea of fuzzification, which extends the notion of crisp sets with a degree of uncertainty. But nevertheless defuzzification is unavoidable when a crisp output is denied, as is the case in many practical applications. A defuzzification can be seen as an operator [we do have the lack of this operator in planning]. (p. 37)

Basically, what a fuzzy system does is transform a set of crisp data or numerical values into fuzzy results. This happens through the application of a set of fuzzy rules that resembles the very basic rules of the human reasoning system. These rules are usually linked (or combined) using logical connectors. In this way, a process of fuzzification usually occurs, processing the crisp input variables and transforming them into fuzzy results. Also Pedrycz (2001) states,

Defuzzification is an important operation in the theory of fuzzy sets. It transforms a fuzzy set information into a numeric data information. This operation along with the operation of fuzzification is critical to the design of fuzzy systems as both of these operations provide nexus between the fuzzy set domain and the real valued scalar domain. We need the synergy of both these domains to solve many of our ill-posed problems effectively. (p. 143)

Although those fuzzy results are in accordance with the rules that act as the syntax of a fuzzy grammatical system, they can hardly be utilized when a decision is to be made. This does not indicate any inefficiency in fuzzy systems. Those fuzzified results, which have been through a processing stage, need to be interpreted into crisp concepts to be usable again in the binarized world. This process is called *defuzzification*. The term *defuzzification* is typically attributed to the process of producing quantifiable results using some methods exclusive to fuzzy logic. However, in a broader sense, all types of processes that are applied to the existing options in order to reduce their number (or to narrow down the course of action) to make the ultimate decision among many (in a many-objective system) or between two (in a binary system) can be named defuzzification. In the case of binary systems, defuzzification is also used prior to the final step of limiting the options to only two choices. Zimmermann (2001) claims,

Since technical processes require crisp control actions, a procedure that generates a crisp value out of one or more given fuzzy (output) sets is required. These defuzzification methods are very often based on heuristic ideas, such as "take the action that corresponds to the maximum membership", "take the action that is midway between two peaks or at the center of the plateau", etc. Of course, these methods can also be characterized by theory formal (mathematical) properties. Also, defuzzification is not only relevant for fuzzy control but also for other types of problems, e.g. multi criteria analysis . . . and other areas in which fuzzy sets have to be transformed into crisp expressions (real numbers, symbols, etc.). (p. 232)

This means that where the defuzzification, which is applied to a decision, follows the rule of fuzzy logic, this term is limited to its application in fuzzy sets; otherwise, the reductionist (based on classical logic) rules with classical epistemological features utilize a method similar to defuzzification but with a more general purpose.

In order to defuzzify the results of a fuzzy system efficiently, the most established techniques need first of all to add up the results of the fuzzy rules together, using some particular methods. When those resultant rules are applied to the most common type of fuzzy memberships (i.e.,

triangular membership graphs), those triangles will be cut somewhere between their tops and bases. Then the result of the application of each rule will add up together to form a total resultant graph for the summation of the rules involved. This total resultant needs then to be decoded or defuzzified. Defuzzification can be carried out using several established methods, of which the trapezoid and centroid are the most practical ones. In the trapezoid method, the total resultant will be cut to form a trapezoid whose top side's midpoint will form the numerical amount for defuzzification. In the other of the most common methods, centroid, first, the total resultant is devised (usually in the form of a trapezoid as well), and then the gravity center of that trapezoid will be picked as the defuzzified outcome.

5.11.1 Implications of Fuzzy Thinking

What is almost always understood by fuzzy, whether it is fuzzy thinking, fuzzy logic, or fuzzy sets, is somewhat bound to the human (or high-level) languages. The fact of the matter is, however, more delicate and needs more deliberation. The most important point to bear in mind is that fuzzy as a way of thinking is not just an agreed-upon premise or disputed definition. It is an attribute given to an existing fact out in the real world that has been in existence for as long as humankind has lived. Not only is the human language or human reasoning inspired, influenced, or even formed by it.

For instance, when a spectrum of a particular color, green, is being seen by an observer, although all the greens within it are not actually exactly green, they still are all green. Olive green, asparagus green, fern green, forest green, jungle green, moss green, myrtle, pine green, sap green, shamrock green (Irish green), tea green, and teal as well as hundreds more variations on green are all different colors with natural or artificial sources, but fuzzification in visual perception results in all of them being perceived and categorized as "green." Admittedly, there might be nonconsensus on teal's being green, but this does not defy the validity of this discussion. Quite to the contrary, this openness to any challenge within the range of the fuzzy notion of the color green is to support the existence of the thinking concept of fuzzy as a thought and as a fact, well beyond all its applications in or within the semantic domain or logic arena. More specifically and regarding the decision case in planning, a range of different actions may be understood as decisions while they are quite evidently different from each other. Although those decisions have no clear boundaries to which they are confined, they can be segregated from each other one way or another. However, this separation is not precise and crisp enough for them to be classified as per principles of classical logic. Being blurry and having overlaps does not mean that any of those decisions are less valid even if they might belong to different levels in a decision procedure when being looked at from different perspectives.

Another example can be a person whose ultimate materialistic limits do not end where their physical entity ends. In other words, the person continues well beyond where his or her physical molecules appear to come to an end. This is because, as per the quantum physics accounts, the molecules of a solid substance still move freely quite far from it. The only difference is the density of those molecules, which differs exponentially between where the substance admittedly exists and where it allegedly does not. Another, simpler example with the same denotation involves the case of smell. Individuals have exclusive scents. These may be boosted when people wear perfume. Even an identical perfume smells slightly different on different people. This is because the biological odor of each individual—the body's natural odor, the person's eating or drinking habits, or even his or her bathing routines—is slightly different from that of others. Individuals can be recognized, or felt, from their combined odors, how they smell. In this sense, the presence of a person is not limited to physical presence, as it might be felt from his or her smell even long after he or she has left the premises. These examples, both the complicated and the easy one, highlight the fuzziness of the notion of existence. They also indicate the fuzziness of the human perception receptors, organizing the senses of seeing and feeling and, hence, of perceiving the reality of existence by smelling, feeling, and simulating or imagining someone's existence.

The case of smell also speaks to planning and the decision case in planning. A decision, in addition to having overlaps with other similar decisions, has marginal boundaries, as in the case of the "small." A decision, as in the case of smell or the case of substance, never ends at a certain point. The effects of a decision, like the molecules of a substance that will expand beyond the substance itself, can well resume beyond where the decision purportedly dissolves. In this sense and as per epistemological reading, a decision will continue as long as its consequences go on. This means that the notions of on/off, exists/does not exist, 0/1 are not valid anymore. In other words, the concept of decision in planning involves fuzziness not only in the areas in between but also at the extreme end boundaries of where a decision stops subsisting.

In one word, there is a quality in the real world that has been labeled fuzziness, no matter whether some may argue that it is subjective, while its advocates may adversely reason for its objectiveness. Whatever the case, the most important implication of believing in fuzzy as a method of thinking and, subsequently, in fuzzy as a school of thought (valid equally for looking at the subjective or objective phenomena) is to become closer to the actuality of the world. The thinking based on actual attributes that contain concrete complexity even in its epistemological sense is a more feasible way of thinking of the real rather than of imagining the abstract. Therefore, the goal of the logic, instead of being to simplify decision making, is to model the sphere of planning to be as coherent to the concrete reality of the world as possible. This means, before getting into the practical level, that the fundamentals of thought have been set in proportion to this reality. In fact, the way of thinking of a phenomenon epistemologically and ontologically as it happens (or exists) in the real world and of which degree of certainty it involves contains fuzziness. This method of thinking has been named fuzzy thinking.

This grand theory of epistemology was later followed up by respective logic and then its mathematical tool, the fuzzy set. In fuzzy thinking, as a grand theory, the complexity is welcomed, whereas in the established classical logic, the common practice is to simplify everything and then add the complexity to the reduced (and reproduced) system. Interestingly enough, reductionism as an all-purpose premise has been permeating even into the specifications and dimensions of reality. For instance, there have been efforts to simplify even the principle notions, such as complexity, as much as possible. Through these approaches, the acquired system, which has been supposed a system covering actual events, could turn into a system that would be selectively and arbitrarily dealing with reality as much as it desires and to the extent to which it can manage.

Therefore, the models given by binary thinking work merely theoretically. Regardless of some failures, they have also been practically applied. But by considering only the failures of the defuzzification method of classical logic during its use, one will be able to imagine how many times the defuzzified decisions may have been correctly justified and how many times they have failed to provide a clear and defensible justification.

In light of the above discussion regarding planning, it can be concluded that the decisions shaped through classical logic have little validity in planning, if any. Provided fuzziness in general, as a way of thinking of the real world and how phenomena are taking place, evolving, and transforming there, one can understand that planning contains the quality of fuzziness too. The reasons given above are not the only reasons that planning has a fuzzy nature. First and foremost, planning entails no certainty, as there is no general theory attributable to it. Second and equally important is the fact that the compartments (or components) of planning (and decision making) have no definite boundaries. The set of the involved compartments is not a crisp set. Not only does this noncrispness exist at the upper levels between the major disciplines involved, but it also continues down to the members of the subset of each participant discipline. In addition, different domains in planning have intersections with each other. But where these intersections lie is subject to scrutiny and depends on which theory is used to study planning and where the emphasis is supposed to be in the process of planning.

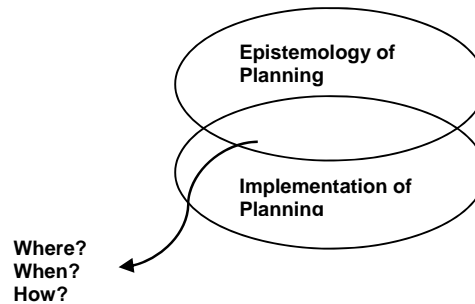


Figure 5.19. Borders between epistemology and implementation of planning.

Third, and very importantly, when an agreement is made, it is not usually as a result of a clear consent or approval by all parties. By contrast, it most often is a result of general consensus that is usually arrived at with compromise, negotiation, and reconciliation. Last, planning is not a linear process. Neither is it a bottom-up process or a top-down procedure.

5.11.2 The Reality and the Theory

Popperians always admire Popper because of his objection to classical justification, his inductivist account of the scientific method, and his replacement of them with critical rationalism and empirical falsification. In a closer look, Popperian falsification is the principle of science. Being falsifiable does not mean that a scientific theory is false. Quite to the contrary, Popper believes that being falsifiable attributes the quality of being *scientific* to a theory. As per a Popperian account, a theory, which cannot be assumed as reality, has only the capability of matching the real world, because a proposed or a structured theory is not *true* but only fits the truth that already exists in the actual world.

From another perspective and as the theory should be able to explain, justify, or match to a reality, it needs to be able to model that reality that exists in the actual world. There are at least three fully distinguishable types of modeling reality: iconic, analogue, and mathematical. The iconic model is what resembles the actual reality but on a smaller scale. Any model, in the broadest sense of that term, that is mimicking a real artifact—for instance, an airplane model or a model of the solar system—is an iconic model of reality. By contrast, analogue reality is what is set or defined as a measure for an outside reality. For instance, the meter as a measure of length or the equation proposed by Sir Isaac Newton to indicate the gravity pattern are both analogue models of reality. The last category is the mathematical model. A mathematical model is a model in which a tool is used to compare actual reality or to reproduce or to simulate it for further in-depth study. For example, when the height of a person is measured using a measuring tape or when a computer simulation is used to model a reality, a mathematical model has been used at different levels of complexity and with technology applied.

In fact, according to Popper, theory, as a model of reality, differs from the actual world, just because analogue and mathematical models do not correspond (as iconic models do) with actual reality. As per Popper's account, the proposed or devised theories are not real. Nor are they true (they are not true as the falsification principles apply to them; this, however, as mentioned before, does not mean that they are false either). These theories just fit the reality, and when falsification occurs as a result of testing those models against the problems, a process of error finding and error elimination will be carried out, with an adjustment thereby taking place that will help improve that model (or theory) to match better with the reality of the actual world.

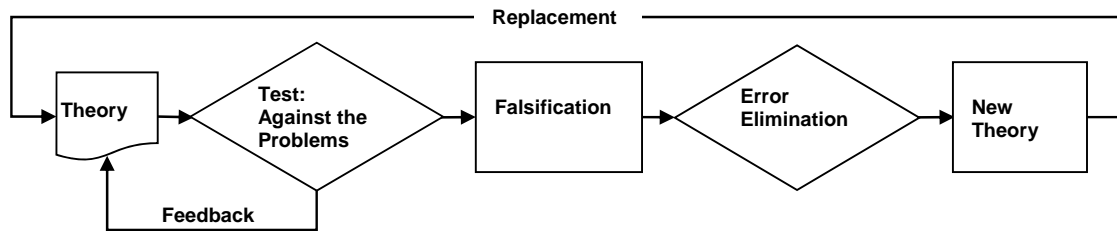


Figure 5.20. Linear process of theory development in planning.

In this account, a problem is the result of an action carried out by an actor, within a specific time frame and in a particular place. As a consequence of the above process, the new theory will be fitter than the old one. The difference, when it comes to planning, is that planning, like many other fields related to humanities, is by no means a science, and therefore, the principles of empirical falsification or critical rationalism do not apply to it. Dendrinis (1992) asserts,

All major contributors to the nature of scientific knowledge and its development, evolution or revolutions, from T.S.Kuhn (1962) to K. Popper (1963b), W. Salmon (1967), R. Miller (1987) and others, failed to note the speculative nature of social science formation. Such a shortfall is particularly acute when the intrinsic link between the theorist and the system under investigation is so pervasive in social science. Social (present and expected future) events render themselves open to multiple interpretations on which agents take bets and therefore, through betting, affect their perceived outcome. (p. 332)

Planning, in fact, is an activity rather than a science. In planning, as a fuzzy entity, there is no fixed pattern in general or for the cost-benefit equation in particular; hence, no concept of fitness is applicable. Here it has been argued that, despite the fact that the core concept put forward by Popper is right, the reason for that mismatch is not what Popper points out. The reason for the mismatch is that the logic underlying those models (merely analogue and mathematical ones) does not match the logic of the real world. It will be explained in the following section that the logic of the latter is a result of believing in fuzzy as a method of thinking.

5.11.3 Implications of Fuzzy Logic

Despite the fact that fuzzy thinking is no doubt as old as the documented history of the human race, there is no long record of fuzzy logic. To theorize and formulize the basics of fuzzy as a method of thinking, there was a need for the respective logic. Fuzzy logic was, in fact, formed as a result of fuzzy thinking. It was born as a tool to facilitate this need. Before fuzzy logic came into existence, the supporting tools for classical logic had long been establishing themselves both to develop practical applications of formal logic and indirectly to reinvigorate the position of classical logic. In this logical domain, lots of binary sets had been “defined.” Those sets were the produce of creating contradicted duality by contrasting two allegedly opposing (or at least nonconforming) tasks, meanings, domains, values, and so forth with each other.

For instance, when A comes into existence, B has to be created to contrast with A, because for an extreme notion of A there should be an extreme opposite of B (and this is nothing except what is advocated by fuzzy logic but in its specific condition). Likewise, B as a notion will have another contrasted notion as C. C, as a result, may have something in common with A, as they both contrast B. But in reality and in many cases, C might have the least in common with A, if not being in full contrast with it. This, in fact, represents a many-valued logic, of which one of the most outstanding representatives is fuzzy logic. Nevertheless, classical logic has always tended to ignore or undermine what could or would have happened between A and C by limiting the case

to specific conditions. This carries on by introducing D, E, F, and so on, with each being the opposite of the former and thus spreading the notion of multivalued-ness even more.

One of the greatest implications of developing logic as a philosophical tool for fuzzy as a method of thought is that the nonconformity between the real world and the models representing it can potentially be tackled. Planning theories (or planning models) and planning logic should not be iconic, for the models they offer are not capable of including all the dimensions, correlations, interactions, and incidents that are taking place in the real world. They are not iconic, as their underlying logic is not fuzzy logic. Their supporting logic is binary logic, while the real world's logic is fuzzy. This major difference causes the difference between the nature of the model and of reality, the former being iconic, and the latter being either analogic or mathematical. This is quite evidently because the embedded thinking of those theories has not been fuzzy. In best scenarios and mostly in mathematical models, the attempt is to create a quasi-iconic model, which counts as remarkable progress in the theory of modeling but yet suffers from some major failures in terms of the basics of the scientific approach. Quasi-iconic models, despite all the benefits they have to offer, still heavily rely on simplification of the actual reality. This happens through different methods, such as elimination, reduction, or contrasting (phenomenon B to phenomenon A).

As mentioned before, in empirical falsification, a process of error elimination brings improvement of the theory every time it is tested against the given reality. Another implication of thinking fuzzy and developing a fuzzy logic is that doing so means that there is nothing such as wrong or error. All that happens within a fuzzy environment is a trade-off between the cost and the benefit, which is achievable by moving within a spectrum of continuous (or consecutive but intercorrelated) values. Every adjustment in the theory (or more precisely, in the model), although it might help to come closer to what happens in the real world, is achieved through reducing (reductioning) or elimination.

5.11.4 Implications of Fuzzy Sets

To further develop the rediscovered fuzzy as a method of thinking into a reasoning system supported by fuzzy logic, the latter domain, like any other type of (classical or formal) logic, needed to have its mathematical tool to facilitate its practical applications. This resulted in the establishment of fuzzy set theory. As for fuzzy thinking's major principle and what was advocated and represented by fuzzy logic, the fuzzy set theory was formed around the very evident yet most controversial principle in fuzzy: noncrisp sets. This, in turn, concluded in the redefinition of the concept of membership in sets as per fuzzy's concept of the gray spectrum between the mere white and the mere black, or the continuous variable linking the absolute 0 and absolute 1 as the main and only indicators of membership in the classical set theory.

As was discussed, fuzzy set theory is, practically, characterized by two different meanings: first, the sets in which values are not divided into two values of true or false, 0 or 1, or black or white (binary fuzzy sets) and, second, those sets in which values are to be divided into more than two values. An example is the set size containing values such as very small, small, average, large, very large, and huge. In fact, fuzzy set theory sets up to retrieve all the knowingly or neglectfully forgotten linkages among those supposedly opposite As, Bs, Cs, Ds, and so on as a result of opposing each to the previous one and artificially creating a desired simplistic binary condition in each case.

The former notion, where the values are not constrained to only two, can be seen as a serious obstacle to dualism (at either an epistemological or a practical level). By contrast, the latter notion, in which a continuum of quality ends up with linguistically and conventionally separable notions that are more than only two is a break to reductionism even in a multivalued and multiobjective environment. This means that in the former notion, the reductionism acts as an instrument to reduce the values to two (usually) contradictory values, and in the latter one, there are more options to defragment the values and distribute them in different categories. On the contrary, fuzzy sets (as infinite-value sets), instead of defining new terms (between the existing

ones) by using linguistic tools, define a degree of membership to each side of an *axis of decision* (to determine how much a phenomenon belongs to each side of the axis and, therefore, where it sits on the continuous line linking those two ends to each other) by using mathematical tools. Not only do these sets provide for an infinite number of values—a task that language is hardly able to do—but they also change the atmosphere from a single dimension of contradiction to a multi-interrelated dimension space. Therefore, this system will be able to hold both many-value and many-objective sets simultaneously. This is practicable through re-recognizing and reacknowledging the lost or eliminated correlations between the dualized concepts in formal logic, thereby relying on the same rule as the formation principle of classical set theory.

Therefore, the process of defuzzification, which is an inevitable part of every decision, is conducted more precisely without the omission of influential parameters and values in an arbitrary manner. Now, one can imagine how much better the analysis of previous levels would be and how much more reliably further steps could be built up if defuzzification were applied in more than one cycle of repetition.

5.12 Decisions in a Fuzzy Environment

Bouchon-Meunier and Yager (1987) state,

There exists a number of taxonomies of the ways in which humans approach problem solving tasks. One particularly useful taxonomy according to Rasmussen (1983, 1986) conceptualizes three distinct types of problem solving, or reasoning which we describe as:

Formal knowledge based behaviour

Rule based behaviour

Skill based behaviour

The choice of which type of reasoning to employ is made by the problem solver on the basis of experiential familiarity with the task at hand, and the environment into which this task is imbedded.

Often, there is a mismatch between the problem solving behavior that a particular human will use in a given situation, and the behavior that a machine might be programmed to emulate.

(Bouchon-Meunier & Yager, 1987, p. 11)

Evolution in decision theory and its related field is what has formed a major field in fuzzy logic as a rule-based theory. The *fuzzy inferers*,²⁶ like scientists in other disciplines, are too concerned with the decision and how it interpolates itself to theory on one hand and how it correlates to the practical decision-making process on the other. Zadeh (1996) writes that the 1970s and 1980s decades “have witnessed many important theoretical advances in decision theory as well as in such related fields as mathematical programming, statistical analysis, system simulation, game theory and optimal control” (Zadeh, 1996, p. 261).

There is a lack of what can be perceived as a solid ground for decision theory to be sensibly and scientifically applied in practice; it seems to have a long way to go. He also adds,

And yet, there are many observers who would agree that it is by no means easy to find concrete examples of successful applications of decision theory in practice. What, then, is the reason for the paucity of practical applications of a wide-ranging theory that had its inception more than three decades ago? (Zadeh, 1996, p. 261)

Implicitly acknowledged by social scientists including planning thinkers, the impreciseness of the natural language started being incorporated in both the theory and practice of social sciences, including planning. There have also been attempts to incorporate some other strategies, first developed systematically through fuzzy systems, into the basics of decision theories. Bouchon-Meunier and Yager (1987) claim,

²⁶ Those who use fuzzy sets theory, logic, and thinking in its practical or theoretical applications to infer given data from a fuzzy set to come to real-world decisions or conclusions.

The stress based model of choice due to Janis and Mann (1977) is one particularly useful model that explicitly incorporates these considerations into a descriptive model of judgment and choice. This model suggests that judgment "style" will range from unconflicted adherence to a present pattern or change to a new but familiar option, to hypervigilance or panic, to decidophobia, to the vigilant information processing of the economically rational actor. The dominant variables influencing this choice of style are experiential familiarity with the task, the significance of the decision, and the time allowed to exercise judgment and choice. (p. 10)

This indirectly refers to pattern recognition, comparing the given situation with what has already been most similarly experienced, along with experimental familiarity, which are normally and naturally (and to some extent instinctively) developed and used by human beings when a complicated decision must be made.

Yet no one up until fairly recently seems to have been willing to take seriously on board approaches tailored to incorporate impreciseness and uncertainty systematically, regardless of source, type, or their degree of complexity. However, Zadeh (1996) has a more radical point of view, generalizing the case with regard to decision theory and excluding the discipline in which the decision is to be made. As he explains,

Although this may not as yet be widely accepted view, our belief is that the limited applicability of decision theory to real world problems is largely due to the fact that decision theory—like most other mathematical theories of rational behavior—fails to come to grips with the pervasive fuzziness and imprecision of human judgment, perception and modes of reasoning. (p. 261)

Building upon his assertion, he goes on to explain how fuzzy introduces the degree to which a member belongs to a set and how an approximate inference can be made to cover this multivalued membership:

An important part of the linguistic approach relates to the treatment of truth as a linguistic with values such as true, very true, not very true, more or less true, etc. The use of such linguistic truth-values leads to what is called fuzzy logic which provides a basis for approximate inference from possibly fuzzy premises whose validity may not be sharply defined. As an illustration, an approximate inference from (a) x is a small number, and (b) x and y are approximately equal, might be (c) y is more or less small. Similarly, an approximate inference from (a) (x is a less small) is very true, and (b) (x and y are approximately equal) is very true, might be (c) (y is more or less small) is true. In these assertions, small is assumed to be a specified fuzzy subset of the real line $R \Delta (-\infty, \infty)$; approximately equal is a binary fuzzy relation in $R \times R$; and true and very true are fuzzy subset of the unit interval $[0,1]$. (Zadeh, 1996, p. 262)

He extends his reasoning directly into the decision making by application of the impreciseness inherent in the human language onto the decision and its relative validity, asserting, "Insofar as decision analysis is concerned, the linguistic approach serves, in the main, to provide a language for an approximate characterization of those components of a decision process which are either inherently fuzzy or are incapable of precise measurement" (Zadeh, 1996, p. 262).

Giving examples, which are, in most cases, applicable to decision processes in planning, he explains two different scenarios for such situations, indicating the unknown probability of an expected outcome and the relative preference of one choice over the other(s):

For example, if the probability of an outcome of a decision is not known precisely, it may be described in linguistic terms as likely or not very likely or very unlikely or more or less likely, and so forth. Or, if the degree to which an alternative α is preferred to an alternative β is not well-defined, it may be assigned a linguistic value such as strong or very strong or mild or very weak, etc. Similarly, a fuzzy relation between two variables x and y may be described in linguistic terms as " x is much larger than y " or "If x is small then y is large else x is approximately equal to y ," etc. (Zadeh, 1996, p. 263).

Giving a classic example of belonging and comparing it to the meaning of probability, he highlights that, when the human language is used, in fact, no probability distribution is implied:

a linguistic characterization such as 'x is small' may be viewed as a fuzzy restriction on the values of x. What is important to realize is that the assertion 'x is small' conveys no information concerning the probability distribution of x; what is meant, merely, is that 'x is small' induces an elastic constraint on the values that may be assigned to x. Then, if small is a fuzzy set in R whose membership function takes the value, say, 0.6 at $x=8$, then the degree to which the constraint 'x is small' is satisfied when the value 8 is assigned to x, is 0.6. (Zadeh, 1996, p. 263)

In this paper, he finally sets out to address what he calls the "linguistic approach" and how it can be applied in decision analysis. He cunningly highlights the fact that those applications are still in a booming process and that new findings may lead to fundamental changes in their application, stating,

we shall outline the main feature of the linguistic approach and indicate some of its possible applications to decision analysis. It should be stressed that such applications are still in an exploratory stage and experience in the use of the linguistic approach may well suggest substantive changes in its implementation. (Zadeh, 1996, p. 263)

5.13 Fuzzy Negotiation in Planning Decision Making

The process of contemporary planning involves a great deal of coordination, modification, justification, and reconciliation. The large number of stakeholders and beneficiaries as well as the vast number of involving factors makes almost every initial plan, planning decision, or even policy subject to reconsideration. This reconsideration rarely occurs only behind closed doors. Even if it happens there, the final outcome is still subject to careful scrutiny by traditional decision takers, by politicians, or recently, by the public, by the interest groups. More often, the procedure of planning, no matter whatever the form, entails negotiation. Negotiation basically forms an inevitable part of the process of planning, especially among contemporary accounts of planning.

It forms the core idea in some of most recent concepts or movements in planning, categorically known as *emancipatory planning*, such as Davidoff's "advocacy planning," Friedmann's "transactive planning," "equity planning," and "communicative planning." The term *emancipatory* does not, however, necessarily imply that those approaches or movements are political; they well may or may not be.

By contrast, political theories of planning, stemming from its political aspects, definitely involve negotiation in the process of decision making. The crucial issue, however, is whether the members of the public are subjects in those negotiations. The simple answer, given by the advocates of those theories, is yes. But the more precise and more realistic answer to that question is that participation of the public is understood to be practiced through their selected representatives in the democratic body of the once selected government. How big a majority that government stands for and whether its political view really reflects the general public's opinion are matters of dispute.

Although those planning theories known as political certainly involve negotiation, they are not the only category in planning to do so. All those so-called emancipatory planning theories, whether they are political or nonpolitical, highlight the necessity of negotiation when it comes to decision making. Despite this fact, however, they usually only emphasize the importance of negotiation rather than successfully integrate it into the decision process in planning. Nevertheless and despite all these deficiencies, they are still a step in front of those so-called technical (or, in the term's broadest meaning, apolitical) theories, which totally failed to include negotiation anywhere near the decision-making process of planning.

In the late 1960s and early 1970s, rational planning in general and technical accounts of planning in particular tried to integrate users in the process of planning. This happened as a result of heavy criticism of those planning theories for undermining the users' role and neglecting them in the planning process. A very important point to bear in mind is that those theories accentuating

technocratic aspects tried to imply that they were taking into account the role of the people as the final users in their process of planning, but this mainly happened only in the process of data gathering by consulting a large number of members of the general public. Although this guided the ways in which the data was gathered, the type of data, and the general public's concerns, needs, desires, and preferences in the process of planning rather indirectly, one of the important questions was how and to what extent. The more important questions were whether the result was satisfying the purpose of the taken course of action and whether the general public thought the plan (decision, policy, action) was prepared to best serve their needs and preferences and comply with their benefits while costing them the least.

Regardless of the source, underlying philosophy, or supporting ideology for negotiation, some thinkers in and writers on planning have asserted that this knowingly highlights the importance and tries to respond to fuzziness in planning. Or an opposite assertion is made, the other way around, that fuzziness has nothing to offer to the planning realm but "a time-old, but always timely and important, technique, consulting planning actors. It proposes the actor-consulting model (ACM) to 'tackle uncertainties in planning that are not always recognized as such'" (Briassoulis, 2008). That sounds interesting but regrettably rather simplistic and naïve. ACM, as cunningly picked up by Briassoulis, is a "time-old . . . technique." Needless to repeat, ACM takes into account the general public but only very subtly in the data-gathering process, and there is no guarantee that the users' participation actually plays a significant role, if any at all, in the process of decision making. The matter of uncertainty will not be cured by shifting the focus away or distracting the attention from the subject of uncertainty itself by trying to imply that consultation will compromise uncertainty, when, in reality, consultation, and consultation only, will just add to the degree of uncertainty. The remedy is to make this participation work in a functional manner, on a fair ground, transparently enough for everyone to be able to observe it, and open to negotiation yet firm enough to be democratically defensible. This is what is intended to be addressed by a real multivalued approach in general and a fuzzy rule-based approach in particular.

The other important critique of such a simplistic point of view is that, despite the advocating some of the new (or old) approaches in planning as including fuzziness, this is simply not enough. Fuzziness might be the underlying concept of many human activities, such as reasoning or decision making, but to develop it as a rule-based tool that can systematically handle a case with respective degrees of complexity, ambiguity, and noncrispness of the basic participating sets, more than just implying fuzziness is needed. What is needed is a method of thinking, certain logic as well as a sets theory developed based on the notion of fuzziness: fuzzy thinking, fuzzy logic, and fuzzy sets. Attributing fuzziness to whatever has been traditionally in use or rediscovering whatever has been an established trend or widely accepted practice in planning as fuzziness semantically is nothing but deceptive intellectuality in the planning profession.

Back to the traffic light example and its binary-framed (or trinary-framed) values, when it is a single traffic light, the case can sufficiently be represented by a bivalued system. When it comes to a set of traffic lights, however, the case will be totally different. Supposing that the case is in downtown New York and includes a number of traffic lights in a grid network of streets, it requires more than a binary-framed set. The traffic lights cannot be operated by an equal number of independent binary-coded systems or be controlled by separate operators, not even by those working with fuzzy logic, because they work separately. Appointed independent operators for each traffic light may well refer to the simple rule of on/off when there are/are not enough cars in each direction. But as the congestion builds up at the consecutive traffic lights in each direction, the self-ruling controls for the traffic nodes do not work. An overall control system able to take into account all the nodes at any time is required to manage the traffic smoothly. Not only will this control system control every node singularly, but it will also control the whole system in a bigger picture, adding the secondary conditions to its time allocation for each traffic light's turn from green or red.

The above case is far simpler than what in reality happens during a decision process in a planning case, simply because the number of the involving factors in the traffic light example is fixed and constant, which is rare in a real decision-making process. In reality, the determinants of a decision-making procedure are changing both in terms of the number and their influence. Second, in the traffic light case, because the traffic network is a grid system, everything is fairly obvious and straightforward. This is again hardly the case in reality in a planning process. Finally, traffic lights individually have a very simple working pattern. In other words, their value set is a binary set when reviewed independently. In a real decision case, each of the participating factors usually follows a very complicated behavioral pattern that hardly complies with any definite-valued set of values. In addition, operators of a traffic light are electrical boards with no other contextual identity involved, whereas the participants in a decision, whether they belong to political bodies, to the general public, to interest groups, or in another category, are, as human beings, a combination of logic and emotions. In this sense, they all are fuzzy-embedded agents.

There is another account that needs to be investigated regarding the notion of negotiation in the planning process. Decentralization is a fairly recently emerging debate in planning. As per discussion, the reasoning behind decentralization is not justified because the political and economic defragmentation, which it brings forward, defeats the notion of holism and entails reductionism. Back to the example in which the network of traffic lights operates independently, problems arise when the network is downsized to its participant nodes, forgetting the linking streets between the nodes; their length; the traffic flow in them; the number and locations of bus stops, taxis, and private cars; and any unforeseen incident, like a passenger crossing a street and causing an unforeseen breakage in the traffic flow; and so on and so forth. Decentralization, as a very attractive incentive that brings about autonomy and apparently promotes democracy by giving the centrality to the citizens (or to relatively very small communities) as nodal points, ignores the linking arms between those societies and adds exponentially to the degree of complexity.

5.14 Paradigm Shift Versus Alternative Way

It is argued that paradigm shifts, in its modernist, linear sense, (have been claiming to) have been occurring for a relatively long time in the planning discipline. The current work may be seen as a paradigm shift in the logic of planning. But this section argues that what has happened to planning has not had the dimension of a paradigm shift and also questions whether the term *paradigm shift* can be assigned to a human activity like planning, which has a fuzzy nature.

Classical thinking has dominated the whole notion of planning. With classical thinking as the basis, various ideas have been seen through this thinking. There is no exception for an issue such as a paradigm shift in planning and decision making. The process has been seen in the way that, before establishing a new paradigm, the dominating paradigm should be abandoned. Based on this thought, Taylor suggests that no paradigm shift has taken place in planning (see Taylor, 2009). With a review of the nature of planning, it is evident that planning for the city (design-based view), planning for people (system-based view), and planning with people (person-based view) can none of them be fully abandoned with any single planning theory. In fact, the superobjectives of planning, including the built environment and cities, the outcomes of planning, and the role of people in planning cannot be seen as disaggregated aspects that can be discarded in a period of time to achieve a paradigm shift.

Actually, the major problem has been the misreading of the initial idea of Kuhn's paradigm shift, which was originally designed for scientific disciplines, and the adoption and direct application of the definition to planning with no proper modification. Planning as a continuous activity that has many objectives to achieve and a large number of decisions to make cannot be fundamentally adapted to what Kuhn suggests as a paradigm shift. The mindsets of planning, however, have been changed and modified many times.

Nevertheless, every little development has been magnified and seen as a paradigm shift by some thinkers. In 52 out of 170 papers, articles, and book reviews in the *Journal of Planning Theory* between 2002 and 2009, the word *paradigm* is used by authors. And more than 30 of these 52 pieces of writing talk about a possible paradigm shift in planning. However, almost all of them have focused on a much smaller area of planning than what can have the proper dimension of a paradigm in which such a shift could have happened.

Therefore, two types of binary thinking are distinguishable here. The first is the one that, by downsizing research and limiting the horizon of knowledge, based on the reductionist tradition, would reduce the paradigm shift to the domain in which research works and on which it focuses. And the second is the idea that arises from very traditional binary thinking (i.e., drawing neat lines between events) and tends to pretend that no paradigm shift has happened in planning, because the previous planning mindset is still valid and, without giving up the previous paradigm, one would not be able to embrace a new paradigm, to witness a paradigm shift.

Although the process of knowledge production has gotten faster, by clinging onto the former idea, one should expect a couple paradigm shifts every season and that paradigms would shift so frequently that, even before the last one matured, there would be no choice but to replace it with another. This would happen in every small section of planning and related disciplines. And by accepting the latter idea we would never see a paradigm shift in planning. Because of the inherently integrated subspecialties of planning, there would be no general huge changes at the same time that could change the planning objectives, goals, procedures, willing outcomes, methods, and so on. Therefore, moving to the extremes of the definition for paradigm shift is not reasonable.

Barker (1993), who defines the notion of a paradigm shift as “a change to a new game, a new set of rules” (Barker, 1993), points out two different prerequisites for a paradigm shift to happen: “change to a new game” that will be played using a “new set of rules.” With this definition in mind, it is also evident that within the planning discipline, no major change has taken place that can be taken as a new game that requires new rules. What has happened is playing on the same ground with the same basic rules but selectively choosing some subrules wherever appropriate and where they best suit the selected set of premises based on the principles of reductionism.

However, if the discussion about planning responsibilities, methods, and outcomes is moved to a higher level of foundations, such as the logic of planning, planning theories, or theories in planning, the influences of this change can be vast. This can result in that can arrive at the scale of presenting an alternative way of thinking and logic instead of claiming a paradigm shift.

Therefore, as in many other disciplines to which fuzzy logic and fuzzy sets have been applied, the proceeding research has tried to take the activity to this realm. However, as was explained, all of these considerations will happen in an already binary-based defined planning decision making where attempts can be made to apply the newer logic as a new activity but not with an utterly different set of rules.

5.15 Conclusion

First, the current research argues that planning interested in discovery must relinquish many of the homogenizing assumptions that underlie conventional quantitative analysis. These homogenizing assumptions structure how planners view decision making, cases, and causes, thereby constraining the dialogue between ideas (in a pluralist way) and evidence (in an elitist system) in ways that limit discovery. The research argues that planners should instead focus on diversity, using analytic strategies that are more common in qualitative inquiry. These strategies are easy to implement when the number of factors are small and values are extremely unrealistically clear. Planners do not usually intend to focus on the portion of each group of decision makers. Therefore, they prefer having the maximum authority of interpretation of

diversity by using more argumentative approaches and finally coming up with their own ideas to be assigned as the best solution of all possible assortments. Since this method is not justified to give the necessary voice to different stakeholders, the current research argues that the idea acknowledges diversity and its significance but fails to suggest proportionate diversity-oriented techniques to investigate the large numbers of factors involved and their relationships.

Second, the research argues that it is possible to use fuzzy sets to extend and deepen diversity-oriented decision making that attends to heterogeneity and difference, especially to differences in kind, using what Ragin (2002) calls a “configurational approach” to the multiobjective and multivalued field of planning:

This approach searches for heterogeneity within “given” or preconstituted populations and conceives of “difference” in terms of kinds and types of cases, replacing the conventional view of differences as variation (i.e. as deviation from the mean). Fuzzy sets augment the configurational approach by allowing degree of membership in type and kinds. Thus, the incorporation of fuzzy sets allows for “variation” without forsaking the core and data emphasis on types and kinds of cases. (p. 5)

Third, by examining the issues of fuzziness in planning and fuzziness of planning, this research argues that the link between theory and the practice of logic in planning, and in decision making in particular, can be greatly improved using fuzzy sets for the simple reason that fuzzy sets can be carefully molded to fit theoretical concepts.

In his book *Fuzzy Set: Social Sciences*, Ragin (2000) gives an account of fuzzy sets when strictly speaking about decision making:

A conventional (or “crisp”) set is dichotomous. All object (e.g., a survey respondent [or a normative consensus]) is either “in” or “out” of a set, for example, the set of Protestants [or specific stakeholders in decision-making process]. Thus a conventional set is comparable to a binary variable with two values, 1 (“in,” i.e., Protestant [or effective]) and 0 (“out,” i.e., non-Protestant [or non-effective]). A fuzzy set, by contrast, permits membership in the interval between 0 and 1 while relating the two qualitative states of the full membership. Thus, the fuzzy set of Protestant [or Effectives] could include individuals who are “fully in” the set (fuzzy membership = 1.0), some who are “almost fully in” the set (membership = .90), some who are neither “more in” nor “more out” of the set (membership = .5, also known as the “crossover point”), some who are “barely more out than in” the set (membership = .45), and so on down to those who are “fully out” of the set (membership = 0). It is up to the researcher to specify procedures for assigning fuzzy membership scores to cases, and these procedures must be both open and explicit so that they can be evaluated by others scholars. (p. 6)

The goal, however, remains the acceptance of fuzzy as an alternative logic. After a long time during which fuzzy has been denied as a worthwhile subject and its originality has been questioned in pure mathematics and even philosophy, now it is time to make it as clear a new concept as necessary for it to be understood and accepted by those practitioners in other disciplines whose main purpose is a rather purely practical one. Ragin (2000) suggest, “While it might appear to most social scientists [and planners] that a fuzzy set is merely the transformation of a binary variable into a continuous variable, this understanding is not correct” (p.6).

This implies that the scientists and planners need to recognize instead that observing the sets through the binary method is a specific type of observation in which there are merely two values, 0 and 1, and the other values are ignored. In fact, by omitting the values between 0 and 1 in a fuzzy set, we can achieve a binary set of the same initial fuzzy set. He adds,

Indeed, this common misperception of fuzzy sets may explain why planners (both modernist and postmodernist) have been so slow to grasp their analytic power and significance. A fuzzy set is much more than a “continuous” variable because it is much more heavily infused with theoretical and substantive knowledge. Despite the adjective “fuzzy,” compared with the conventional variable, a fuzzy set is more empirically grounded and more precise. (Ragin, 2000, p. 6)

Despite all these efforts, the problem, however, is that those settled views of the world have become so fundamental to people's whole conceptual scheme of binary logic that it would become extremely difficult for most people to think of logic as being different. That, indeed, is why such views are fundamental.

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6

Analysis

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6 Analysis

6.1 Introduction

This chapter aims to give an overview of the entire research by analyzing three major points:

1. the common philosophical contradictions between the decision-making styles;
2. the analysis of two major approaches to planning decision-making theory, namely, the system-based view and the person-based view, and the issues with which these approaches are associated; and
3. based on the fuzzy nature of decision making and the fuzziness continuously flowing in different stages of this process, what is given by these approaches and what they are suffering from in terms of both concepts and methods in theoretical, epistemological senses.

All three of these points, and hence, their analyses, will be pursued through the analytical approach based on the rationality that needs to dominate the planning sphere and, specifically, the decision-making process for decisions to be justified in implementation. The conclusion of these analyses is provided in the next chapter, which is the last chapter of the research and conveys the conclusion of the thesis as a whole. However, some points here cannot be without a conclusion in their broadest sense.

The current chapter will provide an overview on three various views on the decision-making process and will analyze two major preceding decision-making ways as well as their methodologies in theory. This part addresses the major issues of justification (i.e., dualism and reductionism), which are undeniable notions of decision making based on classical logic. These two exhibit the very nature of decision making under classical logic and its problems as well as spreading bivalued logic within the processes.

The key point to open the discussion here is that dualism is usually applied to the intellectual and theoretical side, where most of the traditional dual contradictions have been set up by thinkers. On the contrary, wherever there are more options, because of the presence of real-world problems, which are more practical and physical (in the course of action in its broadest sense), reductionism, as a tool to decide on a variety of answers, solutions, objectives, and so forth, is brought into the equation to reduce the existing options. However, in many cases, the process of reducing the real cases would result in two options. And the final decision would likely be taken between the two.

6.2 The Premises

Decision making did become more complex not only because of the built environment's complexity (discovering the new factors intervening in ecological changes) but also on account of increasing the complexity of the justification of the process and the level of uncertainty within it. The intervening variables of the process, whose relationships are not precisely predictable, have been discussed for a long time in order to achieve any justified approach. This is along with the philosophical decentralization with political notions of a democratic society that might cause planning to move toward using more decentralized methods. However, decision-making theories have been engaged with methodological and practical challenges during the same time.

In light of the above statements, three styles of decision making in planning are separately recognizable. First of all, more than any other period, the era in which everything was based on traditional experiences emphasized visual and physical attributes of planning and followed aesthetic concerns with a spatial approach. Outcomes of planning in this era were end-state blueprints and master plans. In the current research, this is called a design-based view of decision making. Second, having considered the expansion of planning and new outcomes of the systemic approach, decision making in planning shifted to a systems analysis paradigm in which different aspects of planning with a systemic approach were involved in decision making. In this era, the dominant style of decision making with a modernist control managerial attitude tried to study the phenomenon of the city on the one hand and to examine the known specialties of planning in the structure of the built environment on the other hand. This was all based on technical outcomes and scientific methods of planning in a general sense. And third, with emerging postmodern accounts, in contrast to modernist rationality, and by reinventing the complexity of human communities, the decision-making mode is transferred to a broader sense with the rejection of grand theories in planning. The questions here are what the three styles' premises are, what types of implications should be expected by using these methods, and why these methods cannot be justified separately.

Rothman and Zald suggest that "one characteristic of modern society is the systematic attempt to use tools of rational analysis to lay out pathways to achieving future-oriented goals. As organizations, both private and public, have become larger and developed professional staffs, and as the environments they deal with have become more complex, planning and decision making have become full-blown enterprises" (Taylor and Roberts, 1985).

Although freedom, democracy, and equity in decision making are factors as important as rational analysis to the identity of modern society, are we allowed to sacrifice the future to the vote of today? If, today, only 51 percent of the voters would vote for an environmental planning system that is not responsible toward the next generations, would we be justified in implementing it? This is the issue of rationality that arose from the profession in a dialectical relationship with the democratic decision-making system. The current planning has been more concerned with the human sciences in planning than with the technical side of the work. As a result, most professionals in planning (should) have set aside the planning based on merely rational technicality (except for some subdisciplines like transportation planning) or functional, which attempt to deal with future effects in exchange for democracy, or have treated (or have forced to treat) them as secondary issues.

6.3 Design-Based View of Planning

There are two design-based eras of planning generally recognizable in which the planner-designer tries to solve the urban problems (mostly in the cities). The first is what has been inherited by planning through architecture and the architectural approach to planning, getting back to the early stages of establishment of planning. The second cannot be considered as the first major era but was carrying out the revitalizing urban fabrics due to problems recognized

during the 1990s. This was initiated by urban designers who widely acknowledged their own role in the glorification of the physical dimensions of the cities.

6.3.1 Analysis of the Design-Based View of Planning

The design-based view of planning has for decades been marginalized as a view with an artistic approach (see Birch, 2009, Chap. 9). Mostly challenged by recent postmodernist attempts, it has been seen as the tradition of the architect-planner based on observing planning as large-scale architecture. Therefore, the attempts in this regards can be considered within what is widely accepted as urban design. It is worth mentioning that in shifting from the first (and major) period of design-based planning to rational planning, the first view has never been abandoned or forgotten completely and, as Taylor (1998) suggests,

The revolution in town planning thought of the 1960s did not involve the complete replacement of one view of town planning by another. The real revolution was in making a distinction between two levels of town planning, one strategic and longer term, and the other "local" and more immediate. (p. 160)

Therefore, considering the design-based view of planning, not as an approach to planning but as a subspecialty within planning (with the role of organizing the spatial arrangements in line with planning in its general sense), it is not outside the imagination and does not seem utterly wrong. That the design-based view was marginalized as merely a part of planning, because it was not what planning was assumed to be in the modern era, and that its postmodern attempts went unrecognized can be understood in light of Taylor's statement.

Urban planning involves many factors to provide better urban areas, for instance, with towns and cities. However, the general containment and concentration of the scope of this activity on town planning and its commitment to provide blueprints and master plans, is the major issue that brings us to question seriously the effectiveness of this approach for planning theorists and practitioners who work as planners. However, a vast responsibility of planners in planning institutions is still defined by this type of work in which they need to convince physical planners, architects, and designers.

This approach has been mixed up with and enriched by social sciences and psychological analysis in recent years and has somehow been revitalized by the new generation of postmodern urban designers. But it is still categorized as an art-based method of organizing space and as an action completely engaged with pure aesthetics. This is because the decision making in this subprofession of planning can be thought to be based on nothing but an aesthetic and functional view of the city that can, in turn, mean a devaluing of certain built environment issues, of public concerns, of decision-making process, and of economic problems of the works.

Therefore, it is desirable that this view benefit from fixed goals, objectives, and targets, both in intellectual and physical accounts in the framework of urban experimental facts and beliefs, rather than through imagining that the decision-making process should be justified through other participatory notions. This approach, even in sociocultural issues, can be considered as a mere taste-based form of decision making for space, even though it cannot be an effective tool to deal with, plan for, and heal the sociocultural issues rooted in very different factors. Therefore, inherent ignorance of factors, which is presented by this method, is far from a specification of a justified decision-making method for a multiobjective planning environment because, as a result, some objectives of planning will be missed. However, still, in many cases, end-state plans are needed and can be pursued using this view, but from procedural and technical consequential points of views, the outcomes could not be justified for the plans to be implemented.

Therefore, as also Taylor (1998) mentions, "The emergence of the systems view of planning in the 1960s can be explained in part as a rational response to the alleged deficiencies of the traditional design-based theory of planning" (p. 65), it is understandable that, in order to tackle

the problems experienced in both the practical outcomes of and the intellectual discussions about the design-based view, this view was mostly replaced by other views after the 1950s.

6.4 System-Based View of Decision Making

Perhaps the first system-based style of expressing and defining urban problems and decision making for planning can be located in nonarchitect socioeconomic activists' works of the late 19th century, years before the systemic approach was applied to planning. In this view, the economic issues along with social inequalities (which were at the center of attention for many thinkers in the 18th as well as the 19th centuries) were brought to discussions related to planning. Although, for about half a century, until the 1950s this view was largely avoided, the development of system theory along with modern rationality has resulted in the reinforcement of those initial ideas.

The system-based processing style that has been used in the current research is not equal to the systemic view of planning shaped in the 1950s and perhaps later. The current view is broader than that view and envelopes the early system theory used by planners and thinkers at the time as well as any other methods of decision making developed by using other fields in which the systemic analyses of the planning phenomena are used. Thus, this can contain a variety of fields, from political sciences to ecology, and many different operations, from study to decision making.

Perhaps it can be truly claimed that the expansion of planning and decision making (themselves) as a whole through the study of their compartments and intervening variables, which stemmed from other fields, was the consequence of the systemic study of the activity. Despite this strong possibility, the process has been introduced by other names, mostly in recognition of economic, social, and political aspects of planning, as opposed to earlier assertions of planning people, for example, Keeble's attitude (see Abercrombie, 1959). However, later on, with the expansion of systems theory itself, this view was established in different fields, and continuingly, in theoretical and practical planning. Taylor (2009) states,

the systems and rational process theorists suggested that town planning was a science. For, on the one hand the analysis of environmental systems (regions, cities, etc.) involved systemic empirical—and hence “scientific”—investigation and analysis of interrelationships between activities at different locations. And, on the other hand, the conception of planning as a process of rational decision making was also commonly equated with being “scientific.” (Taylor, 2009, p. 100)

This implies, first, that the systemic approach used to study the phenomena (observing phenomena through systemic-view glasses) has the modernist tradition of a scientific approach and, second, that the systemic approach has been applied to both objective and subjective aspects of planning within different subspecialties of the field.

One of the most prominent aspects of the systemic approach is to know, realize, and illustrate any phenomenon by its components in a way that the whole is more than the sum of its components. This can be carried out knowingly or unknowingly. This means that the systemic approach belongs to a wider notion of so-called reductionism, but it is pursued to study a particular subject. Therefore, it is deemed that reducing any framed set to more detailed sets can help the analyst but with the inductive method in which the whole (which should be viewed as more important) cannot be seen. In fact, many problems are not caused by an aberration of the analysts' methods but are rooted directly in the underlying logic.

Plenty of research works, studies, theories, and plans carried out using the systemic approach and systems theory might have had misconceptions or wrong results (here, finding out the reasons is not crucial). For example, such a view of planning led to the fourth volume of Peter Hall's report (1974) “The Containment of Urban England,” in which the conclusion on planning problems in the United Kingdom is

that the post-war planning system had had three main effects down to the 1970s: “urban containment”, “suburbanization”, and an inflationary effect on land and property prices. The first two were characterised as essentially “physical”, the third as “economic”. Furthermore, the first effect—urban containment—is arguably the most fundamental in that the two other effects flow from it. (Taylor, 1998, p. 99)

After the analysis of Hall's report, Taylor asks a fundamental question that implies his doubt about the nature of the method used by the report: “but was it true that the planning system was responsible for exacerbating existing inequalities?” (p. 101). This is not a single question from a problem carried out in a systemic way that is still pursued in various aspects of planning.

The set of financial solutions presented by the U.S. government in 2009 (including purchasing 60 percent of General Motors, taking control of Fannie Mae and Freddie Mac, and helping different credit institutes by using federal tax money) is a sample of the systemic view tackling the economic problem in large-scale planning. The components of the system were carefully studied, and the solutions were presented based on political economic rationality and experiences (which have improved the systemic view themselves) in ways that may even cause some conflict within the U.S. economic system. But, more importantly, no one can guarantee the success of such plans, decisions, and predictions achieved through a system-based study of each field. Then, the problem is that if these decisions, in either the short or long term, are either unsuccessful or about to intensify the inequality, the matter of the justification of such a decision-making process can be brought into serious question, where a democratic system with public interest is the political system.

6.4.1 Analysis of Attributes

The system-based view of decision making based on rational premises is still vastly applied by a number of planners, both those who are employed by private sectors and those who are with governmental planning institutions. The former group aims to give rational reasoning for further developments carried out by the private sector, and the latter, using almost the same method, attempts to plan for people. The rational approach utilized to handle the epistemological problems of legitimization seen in the early modern designed-based view of decision making gives more weight to various aspects of planning, but it has not been successful for the reasons discussed below.

6.4.1.1 Unrealistic Model of Decision Making

This part is the final conclusion of the entire section, but it is worth mentioning that, with the reduction of planning to a system, many space users are seen as “blackboxes” who have no role in making the space. Although professionals might point to what can fairly be called the users' lack of knowledge about many aspects of planning, this dismissal of the people results in a very unrealistic notion of fair planning for the built environment.

6.4.1.2 The Rigid View

The whole view tries to work out a homogenous system, with inspiration from modernist rationalism, by providing very logical and undeniable axioms and developing them for every aspect of decision making. By using the idea of the objectivism and universalism of decision making and by ignoring of regionalism, it also tries to be more genuine (in its rational sense) than the other methods. This happens along with accepting scientific accounts of decision making (in its general sense) and using them in planning decision making. These notions, regarding the ever-changing nature of decision making in planning, change this process into a rigid and inflexible operation. With this view, efforts are made to establish a collective single method for all cases, regardless of intrinsic differences of distinct sites and various fields of action.

6.4.1.3 Vertical Order and Systems Steps

In this view, every aspect is put in vertical order with the others. With reference to McLoughlin and others' chart of decision making, which is cited in Hall (2002), the decision-making parties have been prioritized in a vertical order. Some of the parties are completely justified to take the decisions based on a technical, political, or economic view of the work, and some would be put in the lower levels of decision making. Again, this means some are deemed able to make decisions for others. Not only can this vertical order cause the omission of some vital aspects of the process, but it can also reinforce an elitist dictatorship in the decision process.

6.4.1.4 One- or Two-Way Linear Order(s)

Another trait of the system-based view, linearity, relates to the last point about the vertical order. In some fields in which the issue of nonlinearity is irrelevant, the linear nature of the systems theory can work to fulfill requirements. On the contrary, if it is already accepted that decision making in planning and the city is reducible to a system, there is another misconception that claims that the decision-making process is a linear one. This has proven to be right when changing one of the components in a supposedly systemic process, with clearly expected results, actually brings unpredicted results.

6.4.1.5 Systems Within Systems

It is accepted that the modernist view of decision making has sought comprehensiveness to decide on cases in a comprehensive way. Then, establishing multidisciplinary or interdisciplinary approaches is the logical outcome of this school of thought because this thought tends to separate every aspect of work and establish separate fields in order to address more details. This reductionist system-based process always results in the omission of some factors even within planning itself. This causes more separate arenas whose relations are not clarified, and therefore, the multidisciplinary decisions whose scientific relations are not clarified cannot be carried out in a clear way.

6.4.1.6 Incoherent and Incompatible Logic

The system-based view of planning, including the rational planning model itself, is not justified enough for dealing with planning problems because it is not using the tools, the languages, and above all, the logic compatible with the nature of planning as an activity. Therefore, to take even the first step in revising this view, it is essential to add many-value logic to this system of thought; this addition is necessary for the sake of coherence between nature and the tool used in the activity, method, and logic of study. Adding many-value logic can be counted as the development of rational planning. Alternatively, if more value is given to some other actors and perspectives in the built environment, rather than maintaining the original version of the rational planning mindset, the addition could be seen as creating a new paradigm.

6.4.1.7 Lack of a Reliable Method

In spite of the existing assertion based on rationality, there is no unified or comparable weighing system in which different aspects can be juxtaposed next to each other to be compared. Beside the uncertain prediction of the consequences provided by this view, there are some technical problems that have not been solved yet. In the cost-and-benefit calculation system, many parameters and factors are of different natures and are not comparable to each other. The parameters and factors cannot easily be added to or subtracted from each other. The methods remind the critics of some type of intuition instead of deductive rationality.

6.4.1.8 Planner as a Technicalist

The emphasis on the planner and planning institution through the technicalist view of problem solving turns the employee of the general power structure into an apolitical figure and makes the planners dominate the councils (at the local level). The planner is then to be a technical calculator responsible for any political considerations and discretion that can cause many people pleasure and pain. However, based on the advanced system-based view, some political aspects have been taken into account in planning, but there would be some differentiations between planners who work in different scales.

6.4.1.9 Incrementalism Underneath Comprehensiveness

If the incrementalist operation is the opposite of comprehensive, it is widely accepted that many operations, especially those taken into account in the course of action and implementation, have incremental dimensions. This means that, in the real world, even on a small scale, comprehensive implementation and operation is not feasible from an ontological point of view. Therefore, this view has characterized by some inner contradictions at the theoretical and practical levels.

6.4.1.10 Rationality and Democracy

As was discussed before, in different models of ruling and controlling the decision-making process, the system-based view can limit democratic notions both in planning and society. This can be translated into a dictatorship of rationality (which is not justified itself) based on utilitarianism. However, some may assert that a very recent version of the system-based view tries to consider the various aspects of decision making, for instance, by accepting the roles of different citizens through public consultation. But it is evident that the citizens have no definite membership in this process, and moreover, as explained in 6.4.1.3, this approach has a vertical order that is not designed to give citizens an acceptable role in the decision-making process.

6.4.1.11 Traditional Reasoning and Determinism

Determinism and the uncertainty principles are logically in contradiction. The modernist attitude, whose deterministic stance was crucial to its core axioms, was challenged so rigorously by uncertainty that a new position resulted, although it was not widely accepted.²⁷ This subsequently challenged the traditional reasoning method. The consequentialist decision making on planning cases with unique dominating complexity has the most complex uncertainty; hence, this form of decision making is far from scientific determinism. Therefore, what are considered systemic and scientific attempts to determine the consequences of decisions are not reliable anymore.

6.4.1.12 Discretion and Consensus

This view inevitably operates through the use of technicalist discretion in decision making. However, the scientific aspects are seen, by some, as facts that can intervene in the planning process. But where these aspects come from semiscientific fields cannot be taken into the course of decision making in a justified way. The system-based view fails to provide a way to do this, even though it should be possible.

6.4.1.13 Scientific Facts and Multidisciplinary Decisions

As was explained, the decision-making process is not merely engaged with facts derived from scientific outcomes. On the contrary, many different ways of deciding on cases in which different groups could be affected in unknown ways change the process to a multivalued activity. In

²⁷ "I am convinced that He [God] does not play dice," a very famous declaration by Einstein, represents the opponents' idea against uncertainty and for traditional reasoning.

addition, some of the planning facts can come from different technical fields, such as ecology, geography, and so forth, based on scientific inquiries. In establishing scientific facts from different nonscientific notions of planning, the system-based view relies on unjustified ideas and insupportable claims. Therefore, some notions coming from the aforementioned types of scientific aspects do not result in final scientific decisions for the entire planning sphere, and many other values should be taken into account in other ways to avoid an outcome that is unjustifiable.

6.4.2 Dimensions of the View

This is the technical and politico-economic elitist view of decision making. The system-based view of decision making can contain all attempts in which decision making is pursued through various fields or through an amalgamation of some fields. In line with this style of decision making, the technicalist view of problem definition, solution finding, and policy making in its technocratic sense is considered merely the process of decision making. This type of decision making (and planning as the outcome of the decision making and general policies) is seen in the frameworks of planning for people and planning for the city. Therefore, what people need and what is right or wrong should be determined by planners through a technical cost-and-benefit calculation, although some related data or information is gathered by considering people's needs, requirements, and preferences.

In such a process, responsibility for the cost-and benefit-calculation can be shifted to the planner (or planning authority). The planning institutions choose what the controls, preventions, and initiatives are and what they should be through their planners. Thus, the matter of complexity and uncertainty is considered part of the nature of the work that can pose some inherent threat to the work in policy making, foresight, decision making, and implementation.

Some planning processes, such as zoning and land-use planning, which are upgraded and modified from time to time, resulted from this system and exhibit the decision-making style in which the planner plays the central role based on his or her knowledge in a centralized way. This type of decision making does need the approval of the people (for example, for the large-scale zoning of a city), but it still is shaped based on the technical view of the profession. This can be seen as the amalgamation of the ideas behind the person-based view of planning and the current views to answer some questions that were posed about this centralized and technicalist approach.

6.4.3 Envelopment and Inclusiveness of Decision Making

It was explained that in a centralized planning system, the planner (or the committee of decision takers, which includes the planner) has more power in plan-making and decision-making processes than he or she should have. Although the planner's tools include trial and error or a cost-and benefit-calculation, because of the multiobjective nature of planning, the former is not justified, and the latter is utilized when there is not enough effectively developed support for this purpose. Basically, in addition to all other difficulties, the method (which serves people with rational justification) follows empirical trends. Because, as was discussed, a single objective is impossible to envision, decision making in planning is not taken as a science in which scientific methods are applied. But what happens to the same concepts of people's approval proposed by the decentralized planning within a centralized atmosphere? There are two possible methods for handling this problem: first, rejecting and ignoring the notion represented, which needs to be justified, and second, inclusion of the notion.

What the citizens' role is in decision making is a crucial question raised by supporters of the person-based view of decision making. On one hand, this crucial issue cannot be fully ignored by supporters of the system-based view because it damages their democratic vision of planning (even if they assert or accept that they run a form of centralized planning), but on the other hand, this undeniable requirement of a democratic society cannot be central to the system-based view by its nature. With explicit admittance of and subsequent succumbing to the necessity of

decentralization, the solution is then inclusiveness. To be justifiable, the system-based view, or any other type of decision making, therefore needs to include some points on which the majority agrees.

This inclusiveness is usually pursued in a way that can be seen as made-up. It has no roots in and no fundamental influences on the process (if it is supposed that it has, a paradox is created). This type of inclusiveness, which goes along with the basic idea of the system, is seen as envelopment. The whole system envelopes a notion proposed by its proponents—in this case, public participation in plan and decision making—in such a way that it has the minimum effect on the existing criteria. The envelopment usually comes along with the issue of methodological selectiveness and arbitrariness.

Therefore, with inclusiveness of this type, proportionate weight is not given to additional operations, which brings justification of the system-based view into serious question. There are many questions about the effectiveness of the systemic public consultation (or public hearing) for the same reason. Public consultation in decision making can be considered to answer the critiques made by the person-centered view. But in the form in which it is pursued and utilized in the system-based view, it is not justified. This is the matter of exclusiveness within the envelopment of different aspects of the decision-making process carried out in the system-based view. In this process (see Figure 4.1), public participation is the last part of the planning chain. This is, again, the linear and simplified method that underlies the systemic approach, in which the participatory practice stands at the lowest level of the system and in a vertical order, in spite of being enveloped. In this view, the value of decision making by people and with consideration of public concerns is not equal to the other aspects of decision-making procedure. Nor is it proportionate to its role and weight in the decision process of planning in this view. Consequently, the “strong” reasoning behind the technical and politico-economic parts (in which people have no effective role) has different weights with the spatial parties and interest groups of planning.

6.4.4 Subjective Reductionism and Exogenous Model

Despite the fact that some still think of the system-based view as a clear model for making decisions, it entails no structured and reliable method, especially for where the plans need to be implemented. This was picked upon by many scholars including Taylor where he argues that: ‘protagonists of the rational process model also gave little attention to how plans and policies were, or might be, implemented’ (Taylor, 1998, p. 111).

This is not because of the lack of system(s). This is because of the unjustified calculation for the reductionist process. On the one hand, it was shown that the system-based view of decision making and planning as a whole, with the centralization of actions, comprehensiveness in the view, and its components, has tried to see the planning phenomena, and hence, decision making, in a comprehensive way. This is not feasible (at least for now) because of the complexity of the parameters. But by emphasizing the interregional influences, this view attempts to keep the physical comprehensiveness as the central idea for the processes. On the other hand, because of the complexity of the influential factors and the built environment phenomena, this view would reduce the decision-making criteria to a practical and manageable size. However, with the emphasis on the new concept of uncertainty, any assertion about the future consequences of uncertain factors would be abandoned in this view. As a result, what this view highlights will be an “exogenous model of decision-making forces,” along with the subjective reductionism that is inherently followed by supporters. By prioritizing some aspects over the others, this linear model not only enforces different types of reductionism and dualism in the decision-making process, but it also obstructs the horizontal way of dealing with intervening forces.

6.4.5 Imported Fuzziness in the System-Based View

The system-based view is and should be based on scientific methods and a rational mindset. Whenever it does accept value-based consensus, nonuniversal empirical outcomes, and even

quasi-scientific disciplines or results or so forth, based on either pragmatism or any other similar concept, the view's axioms, principles, or criteria become engaged with fuzziness. Evidently, this may happen in theoretical and practical notions of the work.

Beyond all reductionist operations that have taken place in the system-based view, some inevitable fuzziness is added to the systems, and the systemic views in their best condition cannot split the systems into their components. With reference to chapter 5, this means for every little intellectual change, it is not possible to make a new name (for infinite differentiation of membership) and work out the new area's dimensions and its relations with previous analogues' categories. In addition, from a physical point of view, obviously, wherever there are many parties with many members (considering the human members of the system as separate subsystems) involved in the process or system, it is not operable with all its complexities and uncertainties.

It is evident that the systemic observation of phenomena in different fields has been employed to increase knowledge. But in the multidisciplinary fields, and among them, those in which human factors play crucial roles, it is not simple, reliable, or very realistic. Looking at human users (agencies run by humans with different interests) of space as black boxes within the system on the one hand and, on the other hand, reducing the politico-economic values to unitary instruction in order to make a system from them, planning is conducted at the highest possible level of abstraction. However, the optimization method of criticizing the systemic view itself has been revised many times.

6.5 Person-Based View of Decision Making

Above and beyond all other characteristics of person-based decision making lies the very conflict between the two schools of thought; modernism and postmodernism. This was believed to be a major turn by postmodernism in some of substantial principles of modernism:

Postmodernism also struck at the heart of the modernist planning project. Two related themes are particularly important in this respect. These are, first, the recognition of difference, otherness and the dynamic nature of situations and, second, the rejection of universalism and the supremacy of scientific reasoning. (Campbell and Marshall, 2002, p. 172)

After the 1950s, comments such as those below arose mostly because, having invigorated procedural importance, rather than consequential significance, there have been concerns about citizens' rights in the Western democratic system and about the dictatorship of rationality in planning that was exhibited in the definitions of the roles of the planner and other parties in plan and decision making:

Where action and planning are fused, the role of the planner changes fundamentally. The planner formed in the image of the classical model was primarily a technician, an analyst and a model-maker. Relatively isolated from the vital forces of change in society, he saw the world in symbolic abstractions such as figures, graphs, charts, and maps. . . . But a new breed of action planners, oriented to a different professional image, is moving forward. . . . To be involved in action is to interact with others who contribute skills and knowledge that are different from those of planners—such as politicians, administrators, influential persons, “gatekeepers,” representatives of interest groups, technical staffs from competitive institutions, and many more. . . . In action-planning, then, the planner moves to the foreground as a person and autonomous agent. His success will in large measure depend on his skill in managing interpersonal relations. . . the planner has to learn to live with conflict . . . and to exploit conflicting forces for constructive action. Only rarely will the planner have his way; he will have to bargain, compromise, and learn to accept defeat without being crushed by it. (Friedmann, 1969, pp. 316-317)

Newer views of planning emerged in the late 1960s with vast attempts through planning theories to favor more practical and realistic methods. Although, the concept of such development of postmodern ideas in planning, in its early stages of emergence, was instigated to tackle the problems that arose from rational planning, and developed later on in different ways, later it was

pursued with a larger list of Dos and Don'ts with some progressive claims. This steered discussions on a hot topic of decentralization and distantiation between the modernists and their fellow postmodernists:

This changing idea of urbanism can be seen as a move from the rational to the post-rational city. If cities are more and more decentralized and distantiated, emergent and networked, full of automatic activities and surface manifestations this works against the rational city in a number of ways. Postmodern planners suggest that the decentred and distantiated city works against a planning rationality that seeks to conceive of the city as a whole with coherent, specialist sub-districts that contribute to the overall efficiency of the urban system. (Beauregard 1989; Dear 2000; Sandercock 1998)

Subsequently other issues were raised as a direct result or indirect implication of this move. This started right from the citizens' right of choice and preference: 'If cities are emergent and networked this works against an idea of urban citizens as having given preferences from stable identities which come into conflict and are argued over in the urban political arena' (Laclau and Mouffe, 1985, cited in Bridge, 2005, p. 9).

In light of the above comments, the abandonment of the systemic and rational view of planning can be seen in the latest mode of planning thought, postmodern planning. In the absence of a grand theory, the concept resulted in the decentralization of planning phenomena in both practical and theoretical senses and decision making in the framework of performativity. It was in addition deemed that the fundamental idea of a systemic approach based on reductionism would also come seriously into question, but the opposition of a new account to comprehensive planning logically has revived reductionism in its new mode. Therefore, it can be derived from this that shifting the mode from system-based to person-based in whatever the idea was not a change from a logical point of view. In fact, the same logic that was used in the system-based view was again used in the person-based view of decision making. The changes were somewhere else (see chapter 4, "Changing the Mode of Planning").

Having been inspired by postmodern accounts (in the sense of schools of thought), the planner then moved from a monotonous order to a diversity of ideas. This is where when what had been traditionally avoided by modernism was embraced by postmodernism as a fundamental principle. Young (1990) asserts that 'instead of the modernist emphasis on simplicity, order, uniformity and tidiness, postmodernists typically celebrate complexity, diversity, difference, and pluralism'.

What Habermas (1981) called the "project" of modernity was in fact a technological development of the Enlightenment, and the idea that cities could be made better by rational thought and action—by "planning"—was thus part of this project. With the rejection of the rationality (in its modernist sense) of planning, the methods, tools, and types of outcomes needed to be reconsidered and modified. This rejection, in its broadest sense, can be considered as a "dissensus" that is. Thus the scientific interpretation of planning has changed the new rationality based on postmodernist accounts. Then the scientific view of planning changed to a critique of the modernist reliance on science and even reason itself (e.g. Rorty, 1989, see also Anderson, 1995). Dear (1995, p. 28), for instance, believes that postmodernism's principal target has been the rationality of the modern movement, especially its foundational character, its search for universal truth (cited in Healey et al., 1995).

Therefore, it could be concluded that all these attempts were translated into observing planning through "users' eyes" and "planners' glasses." Public participation (based on giving voice to users), within all the uncertainty and complexity of societies, facilitated the postmodern planning as a tool of this mode.

Thus what was proposed by postmodernist accounts was a person-centered style or public-based view of decision making and planning with emphasis on the diversification of the decision-making process. Why decision making, and why planning?

This was because, in their historical attempts, postmodernist accounts discovered two types of diversification, first, through the process of educating people about planning matters, along with learning from them, and, second, through “public participatory” in decision making that allowed people and different interest groups to have their independent votes. However, both processes have been seen as giving voices to different stakeholders and actors of space. The latter, the form of public participatory, was the one that was incompletely employed by many planning agents and institutions (even those would employ rational planning) to answer to the critique of the public’s lack of participation in its own future. This can also be considered what could have transformed planning, as a whole, into a more practical form—but only if effective tools had been proposed by the school of thought. The process of education people and learning from them can be used within other levels of planning, such as plan making.

6.5.1 Analysis of Attributes

Some major problems in this view stem from the lack of consensus on decision-making components, methods, and dimensions, and overall, on any axiom of rationality. However, the rejection of consensus, which prevents planners to come to the similar decisions, is paradoxical and controversial. Therefore, everything should be controlled and decided by planners that can change case to case and person to person.

6.5.1.1 Central Role of Human

In the design-based view of decision making and even in sociological study, which was started within the system-based view, the responsibility of the planner has never been so vast. At the same time, citizens with the idea of citizens’ control had not been taken into account before in the decision-making process. These two human forces are central to the person-based view of decision making, although the interest groups had already been engaged with the process through the politico-economic structure of power and control.

6.5.1.2 Dissensus and Rejection of Grand Theory

Based on the postmodern school of thought, the very nature of a person-based view is engaged with the rejection of any “grand theory”. This results in the rejection of any consensus in the decision-making process and planning as a whole.

6.5.1.3 Decentralization and Isolated Areas

The person-based view of decision making decentralizes planning. Decision making therefore occurs on a small scale, and the built environment is parceled into sizes as small as possible. In fact, in this view, it is deemed that through the shrinking of the decisions area, decision-making processes become more localized and under the users’ control. However, as a result of this view, the built environment is fragmented into separated and isolated areas among which there is no relation, or and if there is, it is not important because the whole planning should be dedicated to the decentralization process.

6.5.1.4 Exogenous Vision

This means the sources of the forces are seen as unknown and will remain unknown and usually outside of the system affected by them. And there are no general cause-and-effect relations among decision-making forces. The view would regard the determining forces of decision making as exogenous. It is usually deemed that some forces come from outside the model and are unexplained, but in practice, the person-based view tries to seek enquiries from the users who are inside the model. This means that, ignoring exogenous forces, the planners try to control the

situation by setting endogenous parameters to make the decisions. This view typically pays too much attention to the context and forgets the common points and aspects of planning.

6.5.1.5 Personal Discretion

In the course of action, with the managerialist view of decision taking, the planner exerts him- or herself tirelessly on behalf of governmental bodies in the framework of the planning institution. In this view, the planner is the final decision taker who decides which aspects of the work (plan) need to be considered and how much, although it is usually believed that he or she should operate as a manager to moderate the different interest groups, discussions, and their values without representing any specific group. He or she also would be the last person to decide when, where, and how people should be involved in planning, which interest groups should benefit, and why, because there is no consensus on the criteria. This can be seen as the exercise of personal discretion.

6.5.1.6 Differences

In light of the previous point, there are some differences from case to case based on the planner's background, taste, ability, preferences, and so on. Changing the planner, therefore, can result in serious changes in decisions on individual applications or about public enquires. This difference can be more tangibly observed where methods of emphasis on the commitment to public discourse are not defined even if, based on some controlling criteria, the quantity is dynamic and uncertain.

6.5.1.7 Turbulence of Values

There is no interlink among postmodernist accounts, because it is supposed that there is no need for a grand theory to be followed by most of them. The only common factor, which is very rare, is not accepting any other notions, accounts, theories, and so forth. Not only does this disagreement exist in reaching common values about decisions, but it also affects the processes such as data gathering and defining problems, causing serious turbulence within the accounts that brings the reliability of methods into serious question.

6.5.1.8 Lack of Proper Tool(s) in a Diverse Atmosphere (Lack of Proper Defuzzifier)

When analysis (of planning) is conducted in a nonrational way, the distraction caused by the lack of a rule-based approach to the process of decision making and implementation makes the whole process scattered. The negotiation downgrades the decision process to a tool in the hands of the planner, social activist, and decision-taker institution to interpret the voices into what the decision maker will intend to do. This vague method, along with the vagueness of traits of the profession, will help generate fragmented ideas and will contribute to making the whole sphere a taste-based, value-making process and planning system. The confusion of the decision maker, within the process, may also support the idea that planning and its tasks, responsibilities, instructions, and methods of data gathering and data analysis are so vague that there is no need to carry out planning. Person-based turbulence in the dualist and reductionist process of decision making is obvious.

6.5.1.9 Unrealistic Role of Planner

Unreasonable, infeasible, and unrealistic expectations of planners may take different forms. Planners might be expected to "fearlessly and impartially exercise their independent professional judgment to the best of their skills and understanding" (RTPI Code of Professional Conduct, 1994, p. 1) as people (moral superheroes) who need forever to leave their tastes and personal

ideological perceptions outside their office doors. Alternatively, planners might be imagined as individuals with their own customized understandings of decision making that have nothing to do with their employers'. Their acts and they, as people who have been left without any effective tools or protections (requiring them to be ethical, moral and intellectual superheroes), can easily be misrepresented and criticized.

This approach also contains some idealistic notions about public contributions (which are not justified in different scales of plans in democratic ways). In the accounts supported by this view, people from different groups need to participate in plan making with unrealistic numbers (as in quantitative utopianism).

6.5.1.10 Unrealistic and Idealistic Environment

With the rejection of grand theories or guidelines, planning decision making is transferred into a utopian atmosphere in which the planner and people both have to have enormous amounts of knowledge they cannot realistically possess or obtain (a state of qualitative utopianism). The planner's knowledge and the people's knowledge, even if supposed to be achievable, do not necessarily agree with or conform to each other. In this view, it would be deemed that resources and time are unlimited and the only important issue is the democratic account and public participation. Noneconomical and impractical principles would be offered by this view, as the incompatibility of the type of project with its budget dominates such a view and makes it idealistic in many respects and, above all, in its expectations for the people's coalition.

6.5.1.11 Incompatibility

The incompatibility of the degree of public participation with the type of plan and the inappropriateness of the methods in which that participation is practiced are the attributes usually traded for gaining a broader justification for this view. This can also assure the planning authorities or politicians that what was called envelopment can be achieved with the lowest level of alteration (or damage) to the decisions that have already been made, usually clandestinely before the users become aware.

6.5.1.12 Misconception

In the person-based view, the lack of systematic concern with the dynamics of change, nonlinearity, indeterminacy, incommensurability, variance, diversity, and complexity, along with the lack of intentionality in theoretical development, will cause selectiveness. The result will be arbitrariness in the selection of problems, solutions, and regulations and in a picking and mixing of theory in relation to the practice of decision making in planning. Cullingworth (1997, p. 63) refers to the planning ideal of flexibility as 'anathema' to protectionist home owners, and suggests, in return, that rigidity provides a degree of certainty and security. This is a misconception embedded in the person-based view. In the person-based view, the nonlinearity, indeterminacy, incommensurability, variance, diversity, and complexity, as well as the lack of systematic concern with the dynamics of change and with the lack of intentionality in theoretical development, will cause arbitrariness in the selection of problems, solutions, and regulations and in a picking and mixing of theory in relation to the practice of decision making in planning.

6.5.2 Objective Reductionism and Endogenous Model

By considering all the variations and multivoices of the planning environment, the person-based view of decision making attempts to distance itself from comprehensiveness. Then, the question is how, with all the differences, proper solutions to cases can be approached if there is no comprehensive knowledge of the possible options. This is more like a trial-and-error process than a firm and rigorous methodology. However, in practice, most of the accounts devoted to this idea consider themselves to involve comprehensiveness in two ways. First, they regard deciding for

large-sized plans (and what is large is a controversial issue and needs consensus) as symbolic comprehensiveness, and second, they believe that deciding on many variables and their relations at the same time requires comprehensive knowledge about a complex environment. Yet neither of these ideas includes comprehensiveness as intended by critics of the person-based view. This is where 'consultation' as means of getting a wider community engaged in the governance of urban projects faces the dilemma of democracy vs. strategic action as Healey suggests with reference to Latour:

The costs of "democracy" are then often set against the need for quick strategic action, to take a key economic opportunity or to safeguard an environmental asset. It is also suggested that people do not have the time to be continually engaged in governance. Issues cannot be contested all the time (Latour, 1987). This is to misunderstand the approach. It is often the case that full consultation on an issue is not possible. Political communities may wish to delegate areas of decision-making to smaller groups—of community leaders, or officials, or experts. (Healey, 2006, pp. 238-239)

Therefore, these types of accounts would reduce those factors or shrink the courses of action. As a matter of fact, they follow the "objective reductionism" to limit the "areas, variables and relations" in which they would intervene or with which they are expected to deal.

Then it can be concluded that there are two crucial problems in following the idea. First, the variables and relations of a physical region are supposed to be detached from those of the surrounding areas. Although in some cases with a rule-based method this can be possible, in all cases with different sizes, scales, and levels of intervention, this is not feasible at all. This can also lead to the reduction of exogenous forces of decision making that are crucial for specific regions in the future. This idea enforces the *endogenous model of force-recognition* for decision making, which is not realistic for the plan-making process. Second, the lack of embedded knowledge of the possible methodology (in its broadest sense) cannot justify the act of a planner (or planning institution). This means that unstructured judgment in choosing the best method among many for decision making is of questionable justification and can be seen as a type of methodological reductionism.

6.5.3 Envelopment and Inclusiveness in the Person-Based View

As Schön (1983, p. 207) observes facts started lose their merit even their validity as the planning problems grew as a result of the conflicts created:

'planning problems' came to seem more like dilemmas made up of conflicts of values, interests, and ideologies unresolvable by recourse to the facts' (in Campbell and Marshall, 2002, p. 170).

As a result the person-centered mode of decision making was advocated based on the concept of planning with people. By this newer view of decision and plan making, the public contributions to the built environment have been increased. In addition, the older basis of planning under rationality has been rigorously influenced by the (decentralized) methodologies offered by postmodern accounts and the idea of consideration values in planning theory and action. Campbell and Marshall (2002) cite, "In the face of the plurality of competing interest groups the idea of an overarching public interest receded and planners searched for new roles given that centralized comprehensive conceptions of planning could no longer be sustained (Schön, 1983)".

It seemed, at first, that in a decentralized atmosphere, postmodernist accounts pursuing diversification policies were commensurate with such a complex environment, but later on, many serious questions and critiques of methodology turned up. If such a grand theory (the grand theory of the rejection of any grand theory) would have been presented to other aspects of planning, because of the lack of (practically) effective methods, it could have been imputed to this mode of thought. Then there is an actual need of presenting methods (proportionate to requirements) along with theorizing the axioms of the school of thought, and suggesting purely empirical methods cannot offer a set of analyzable data to the planner.

The planner in such an atmosphere is advised to have more ideas of what citizens need to have, what citizens know, and what different (private and public) agencies want to see around them. Yet there is no effective way to determine where, at whom, and how a planner should look or, more importantly, under what circumstances and why this might be justified as a method of decision making. What percentage of population of which groups should contribute and in what scale and with which type of plan to assure that justified decision making is achieved? There is no reliable justification for the lack of these types of information or for the disproportionateness of the logic of definitions with values and methods. In this environment, in comparison to with the system-based view, the planner (or planning committee) has endless authority in data gathering, problem seeking and finding, model making for effective planning, determining relevant concerns and also decision making, with all intellectual elements that belong to this model of planning. Thus, this model of planning, with all the divergence in methods, strictly links the decision-making process to the planner's personal abilities, background, and tastes and, more importantly, to the daily concerns flowing in and from the planning atmosphere. Then, in this model, the intervening factors in decision making and their relationships are defined by the planner through the managerialist view with a cover of democratic aspects of work, and the scope towards which he or she tends or is inclined is determined in keeping as closely as possible to a semblance of democratic values and accountability.

With the emphasis on the citizens' participation in decision making, the percentage of effect of "unknown envelopment" of technical aspects is brought into question. This means that the technical concerns have remained without answers in terms of methodological approach and their situation within the method's framework. At the same time, however, some supporters have talked about the necessity of planning authorities who can control these aspects, and they have expressed to the planners and other critics ideas such as the opinion that the person-based view is appropriate for decision making on the local scale. This can be seen as opposite the nature of the postmodern school of thought.

Firstly therefore, this model's strength lies where the process of diversification of planners' mindsets is mapped out. Secondly based on planners' capabilities, and avoiding a unified method, the model thrives on pursuit of diversification of ideas. Since this model empowers the planner, from a methodological point of view, with such massive scope to make decisions, it enslaves the concept of planning with people, making the planning follow the planner's will in deciding on premises and scopes. This means that even though the planners are guided in the data gathering stage of work by some semistructured methods provided by theories, at other stages, they are encouraged, by the matter of selectiveness and arbitrariness, to choose the methods and priorities based on their personal initiatives, which may or may not be seen as personal discretion. In fact, avoiding any structure of method, results in the use of arbitrary inclusiveness to complete the decision-making process. Therefore, the type and rate of the coverage of the methods applied come into serious questions for the school of thought that would reject any rational bases.

Although some critics emphasize the ability of diversification in this style of decision making, three issues about which there have been misconceptions or faulty presumptions need to be mentioned. First of all, the planner's (or planning committee's) ability to deal with decision making has been supposed to be dramatically idealistic. Second, in such a complex atmosphere, avoiding abiding by a unified method will not necessarily result in a better method, let alone a justified one. Third, discrepancies rooted in separate values, objectives, locations, and times cannot interpret or explain the arbitrariness of the method used to determine the portions allotted to each actor, group, or stakeholder in the planning decision process.

6.5.4 Unstructured Judgment

A simple analytical conclusion must be borne in mind: the shortcomings of a particular decision-making view cannot justify the operation of the opposite view, as the contradictions of classical logic would insist. The classical either/or notion belongs to classical logic, which searches for

certain truth, but in a more realistic view, the integration of the two contradictory views, even though they are contradictory, can cover some gaps in between that cannot be filled by either of them separately. However, the integration of the proceeding methods might not always guarantee a full epistemological justification because there might be other deficiencies that have not yet been pointed out or covered by either of the contradictory views in the first place. This can be either because of some inherent shortcomings in those methods, which have not yet been deemed substantial to be pointed out, or for the fact that combination of the two contradictory views is by no means providing a full account of what will be needed to fully and completely cover all the possible gaps. Therefore, the comprehensiveness, in its modernist sense, even in the methodological aspects, is not the matter of justification, but accounting for (the) ignored notions is the first step in the justification of the process, even if these notions are among the contradictions. Thus, there is a new approach of epistemology, in which a classical comprehensiveness of the variables is not the central point. Here, consideration of the barriers of the modernist comprehensiveness (i.e., complexity and uncertainty) and the whole concept of certainty of the values (i.e., true or false) come into the equation. Although this looks like a pivotal idea for the postmodernist accounts, it is different from two points of view. First, the localization proposed by postmodernism results in many problems within planning, especially where there are connections between small and large scales. Second, the dissensus provided by this school of thought caused serious problems in justification and legal issues in the course of action; these problems arose from the lack of a justified method in decision making mostly because of the reliance on human-based dimensions and unstructured judgment.

Therefore, in a dissensus-based environment, planning operations are not free from the charge of a lack of justification. Within many different tendencies of postmodern planning, attempts to invent or provide relevant methodologies are easily traceable. In the current literature of planning, postmodernist thinkers, in spite of their assertions, try to achieve methodologies to clarify the dissensus, to give the planners some guidelines that are traceable and defensible.

6.5.5 Reductionist Action

During this process, in light of the above comments, and in the lack of instruction, the planner is faced with situations in which it is necessary to reduce the factors and elements of decision-making procedure using his or her own idea. Consequently, the reductionism (as a process used to facilitate the decision-making process) is not optimized in a way that the diversification of ideas, proposed by postmodern accounts, is guaranteed. Moreover, this unjustified reductionist process itself is engaged with personal reductionism; therefore, the arbitrariness of reductionism multiplies, possibly growing even at an exponential rate.

6.5.6 Imported Fuzziness in the Person-Based View

Because of the recent critiques from rivals, the rational mindset of planning and decision making has tried to take into account different aspects that were never before on the agenda for such schools of thought. Among these new considerations, what has affected the process of decision and planning dramatically is confession or admittance to the defects that resulted from ignoring the people's role in the decision-making process. Practitioners of the rational school of thought have tried to deal with this by accepting the public participatory role, which has been an important step in getting as close to reality as possible. This implies that the system-based view implicitly acknowledges the fuzziness acquired by accepting people's rights and shares in democratic planning. Marshall refers to this idea but doubts its applicability and provision:

However, the idea of the public interest as something definable and knowable he [(planner)] casts as a chimera. The dominant contemporary view within the planning academy is therefore dismissive of the public interest either because it is too vague to be useful or because it is an elitist and potentially anti-democratic idea (Campbell and Marshall, 2002, p. 173).

On the contrary, the person-based view of planning and decision making welcomed the fuzziness in planning from the very first step. This engagement can be categorized as three different types.

First, there is an acceptance of fields such as politics, economy, and sociology in which values and humanistic factors play a central role and technical subjects are more colorless than in the other trends. Second, with the rejection of a grand theory, as was explained, the fuzziness of various processes was increased. Third, the person-based view relied on the planner's power and on public contributions through various forms of participation. Efforts are made to learn from, educate, and give a voice to the people. Using these three strategies, planners tried to conduct decision making at the highest level of fuzziness. This was not, however, problem free, as it seemed to be at the start.

6.6 Conclusion

Thus the system-based view, in line with the nature of planning (concentrating on balance among many objectives, stakeholders, and actors) must take into account all these aspects at the same level (with different extents of contribution) and must maintain the presence of different (types of) stakeholders at different levels of plan making, policy making, and decision making to be justified. Although, as was mentioned, the recent systemic views contain inherent fuzziness of planning, there is no fuzzy logic (no fuzzy set or rule-based approach) in their methods commensurate with the expanded vision. They still benefit from classical logic-based tools because not only are the reductionist operations and dualist values more coherent with the systems of such tools, but the traditional methods can also be kept as they are. Therefore, they try to deal with one type of complex phenomenon with an intrinsically different and simplified logic that is not proportionate to it and hence cannot be justified.

Although the person-based view is somehow engaged with fuzzy phenomena (rather in its general sense), in which planning or even fuzziness of values (in the binary fuzzy-set sense) is also involved, it is inherently incapable of offering a rule-based method to deal with those types of diversity proposed or required by planning. This means that the diversification of the decision-making situations is abandoned, that there is not the proper logic with which to deal with it. As a matter of fact, what is proposed by postmodern accounts is about to be a descriptive model of what is available, but at the level of prescription for the action, there is no justified method because of the nature of the thought itself. Therefore, it is seen, in practice, that any action faces the questions of "Why this?" and "Why not that?"

Thus, this mode of thought is under critique not because of the acceptance of *fuzziness* as an inherent factor of planning but for these reasons: the rejection of the technical view of planning; the lack of proportionate tools to control the vagueness dominating the whole process, welcomed by many fuzzy phenomena, and proposed by this view; and finally, the lack of a justified defuzzifier. As far as this research is concerned, there is no fuzzy logic (including fuzzy sets or a fuzzy tool or even many-value logic) used by the postmodernists to tackle the fuzzy problems. This causes the production of a dispersed and vague atmosphere with divergent and numerous factors and actors with nothing more than a vague tool to defuzzify the operations. The current attempts in decision-making theory indicate a methodological turbulence in a nonlinear atmosphere that does not have a justified method in hand.

6.6.1 Common Problems, Problem of Logic Underlying: Consequences of the Lack of Attention to Fuzziness in Planning

These two discussed forms of decision making, with all counted difficulties and their differentiations from each other, have some epistemological problems in common.

They are both characterized by unjustified methods of reductionism and arbitrariness of choice. Both views benefit from a single order of values that prioritizes some values over others. Using this order, they try to outline solutions that are applicable to all problems and plans at different scales and of various types and regardless of the level of intervention. However, they are not flexible (or very flexible) in the reductionist mode and cannot take into account the different

aspects or factors of decision making at the same time and with different shares or distinct levels of contribution.

The value-making systems of both views benefit from absolute values—true or not true (false)—whereas it is asserted that they deal with different values. They search for *truth* in planning where it can be far from *justified* in various courses.

With reference to the “Changing the Mode of Planning” section in chapter 4 and the “Crispness of Planning” section in chapter 5, the proceeding section is dedicated to analyzing the major problems coming out of the dualism and reductionism at the practical and theoretical levels, problems related to the lack of attention to the fuzzy sets and their applications in decision making. These problems, among many others, can compromise or spoil the whole process of decision making and its underlying insight through the dominating logic.

6.6.2 Dual Intellectual Contradictions Versus Fuzzy Binary Sets

6.6.2.1 From Focused and Centralized to Dispersed and Decentralized Decision Making

The first point to start the discussion on the move from a centralized to a decentralized decision system is the underlying theoretical framework of planning; a shift from rational to actual planning which, as mentioned by Cullingworth, can potentially create conflict of interest:

Rational planning is a theoretical idea. Actual planning is practical exercise of political choice that involves beliefs and values. It is a laborious process in which many public and private agencies are concerned. These comprise a wide range of conflicting interests. (Cullingworth, 1997, p. 5)

It is evident that, during the 20th century, two major changes occurred in planning whose effects on the decision-making process are considerable. The first is power conversion, which is the transferring of more power from higher to local levels and widening the scope of power exercised at the local level and, the second is task transformation, providing services for different people. Pointing out a number of added tasks to their agenda, Goldsmith draws a comparison between the typical British government in 19th century and its modern equivalent, but also highlights town planning as a paramount:

The whole scope of nineteenth-century city government in Britain was much narrower than its present-day counter-part: functions such as housing and education came to local government late in the century, while the town planning function is entirely a twentieth-century phenomenon. Many services, such as libraries and parks, owed their origins to the generosity of industrial entrepreneurs, who, as part of their ideology, saw it as their duty to provide some cultural comforts for their workers as well as housing them. (Goldsmith, 1980, p. 18)

These changes have led to new relationships between local authorities and decision making and between decision making and many different aspects of planning. Many aspects of planning are constantly expanding or becoming increasingly the responsibility of parties at the local level: from data gathering to analysis, from providing the plans for manipulating the physical environment (Bailey, 1975, p. 5), to supplying blueprints of social changes and control, and from making the decisions to providing the possibilities for the people to participate as decision makers as actively and effectively as they can. This extended list of tasks and expanded tasks needed a huge number of people, including, obviously, specialized experts to serve this system in a variety of sections of the works. Evidently the first and foremost leading entities in managing those tasks are governments. In this regard, Goldsmith suggests that the business of government, both national and local, has both increased in scope and become much more complex in nature. One measure of this is the vast increase in the army of people employed by city government (Goldsmith, 1980, p. 18).

It is widely accepted that the built environment is not built merely within the local level. Neither is the planning decision making limited to the local levels. The multilevel nature of policy making and policy applying compel the establishment of different layers of decision making. However, Cullingworth asserts that despite good theoretical grounds which support this argument, there is a practical concern about people's day-to-day life which is equally important, if not more:

The example of metropolitan government is a case in point. Such a tier of government could rise above local interests and take decisions for the benefit of the region as a whole. There are some good theoretical arguments in favor of this, but the practical point is that people live locally, not regionally. (Cullingworth, 1997, p. 10)

It is quite evident that the decision-making mode cannot be shifted utterly from intellectual (and theoretical) to practical (and applied) sets of the aspects of planning -that each set is on one end of an axis- as everything is happening in between in reality. This means that, even on the axis between centralized and decentralized forms of decision making, showing the set, there are infinite values of commitment for either one, but these values are not necessarily exclusive to one: they may belong to both but in different amounts. Therefore, if decisions are taken within one of the above modes, the technical controversies are inevitable. This means that if there is no rule-based coalition between the two modes, they need to be kept alive in separate islands. The supporters of elitist and plural models, then, would persist on their sole and exclusive legitimacy, while, in fact, neither of them can be singularly legitimized and justified to rule the whole decision-making sphere.

6.6.2.2 Relying on Technicalist or Public Participatory Aspects

Reliance on merely the technical (rational) side of planning based on what elites of the sphere theorize and propose (as plans and solutions) puts planning in danger of being taken to the highest level of abstraction with virtually no use to the course of action in planning practice. Over the long period in which this sort of method has been developed, the result has been a distancing from the reality of people's everyday lives.

On the contrary, perceiving planning through a merely pluralist approach (in the sense of public participation as the source of making plans and making decisions) limits the planning sphere to solving current problems through unsophisticated methods (applied only to the type of deficiencies that can be detected by the general public) without considering many other intervening aspects of the work. This method defines ways that are disproportionate to planning (which contains plans with different scales and levels of intervention and types) and the entire planning.

6.6.2.3 Planning with People or Planning Without People

It was discussed that plan making can be done with public contribution, but it does not seem reasonable to imagine that the people can have their own plan when they do not have at least enough time to spend on the issue (if it is not said that the people do not have enough professional information to make a plan).

How about the second subject related to planning with people? If planning is seen in the context of a democratic society first, and in such a free society justice is defined within the utilitarian mindset, rather than a radical, determining and controlling free market, then the matter of decision making will be justified merely with people's contributions to the decision-making process. However, this system can change.

The above system can be replaced by other definitions of justice (free-market, socialist, or even a local governing system). However, applying certain kinds of premises, such as a free-market pattern of ownership, to shape the planning sphere for all type of plans, which are taking place at different levels, will replace or remove the other intervening factors of decision making, such as public participation and people's votes, that has been defined as a priori to the others. And this is not justified because when the decision-making process is taking place on a plan, the first decision makers (there are also plan makers and those who offer plans) would have made their decisions well before the other groups have had their chance to contribute or have their says. In this case, either the other (secondary) groups should vote for one of the prepared and presented plans in order to reflect their specific interests, or the whole process should change to a show of democratic performance.

The idea of absolute, constant, and rigorous premises will shape determinism and absolutism of values. This type of absolutism (which is strengthened by clarification of values in reductionist and dualist ways) with prioritization (in horizontal order) of certain values can result, first, in theory that goes to the highest level of abstraction and, second, in the minimum level of flexibility, which is in intrinsic contradiction with the nature of planning as a dynamic activity happening in a vibrant environment due to its ever-changing characteristics.

This should not be carried out to two senses of planning, planning merely with people, which is not feasible, and planning without people, which is not justified. Therefore, the amalgamation of these two can be an alternative solution to the problem.

6.6.3 The Unjustified Reductionism for the Fuzzy Environment: Reducing the Decision-Making Parties

As was shown, the forces that are trying to govern the planning dimensions can be categorized into six different parties. But the proceeding views tend to reduce those to merely two domains, those who benefit from outcomes of applied sciences (by using technological developments), such as ecology, and those who benefit from the social sciences and humanities (based on empirical sciences), such as economics, geography, sociology, and psychology. The main stakeholders of these forces are then those engaged with the technical side of the planning (such as scientists, technicians, and planners who take part in the technical body of planning) and those engaged with the operational-technical side of planning, the structure of power, and the issue of management of the resources (such as politicians and planners who are parts of governmental bodies and power institutions). These two groups will then somehow compete, apparently to serve those engaged with the planning outcomes (such as private sectors, entrepreneurs, NGOs, and people who are the users of the planning and its outcomes), each group by demoralizing the other and sticking to its own principles only. However, the members of the third group, on so many occasions, campaign to upgrade themselves to become direct voices, influences, or determinants in the decision-making processes or use lobbying or other means of influencing the decision processes indirectly to change them for their own benefits.

Therefore, all these groups (i.e., planners, institutions, institutes, organizations, and so on), based on their different concerns, can try to influence planning by affecting the decision-making and policy-making processes to achieve (a) their own groups' interests or those of other groups (for example, when the government tries to maintain the free market or when one specific group votes for the other one because they have analogous interests and might indirectly benefit from the outcomes of a specific plan for which the elected party would possibly vote) or (b) the interests and benefits of other groups or people who usually have no voice in decision making or policy making from a quantitative point of view from which they could be seen as the majority. This can be done by increasing public knowledge through educating them, encouraging planners to learn from people (at the local level) and to know more about the spatial users, or even by directly advocating for them in decision-making processes. (The first and second groups usually are involved in politico-economic issues from one side and sociocultural ones from the other side.

The third group's concern is the issue of the technical side of the profession and normally is tied up with technical aspects of the works and the built environment as a whole.)

Therefore, reducing, restricting, or downsizing the decision-maker and decision-taker entities to each of the above groups (those who consider either the procedure or the consequences of the decisions) can cause some problems. This means that those who emphasize the rational approach to decision making reduce the parties to those who are involved with planning from the technicalist point of view. They directly or indirectly omit the political nature of the decision making and the necessity of public participation and of interest groups' roles in the processes.

On the contrary, the planners and thinkers who point out the political nature of decision making on one hand and open the planner's way to unjustified "discretion" by prescribing an undefined relation between public participation and political bodies on the other hand, damage some aspects of decision making while ignoring the technical accounts. There are some practicality concerns if the decision process is going to be put up to collaboration in its literal sense. This, as Healey argues, changes in nature, even though it is still understood to be a collaborative process:

If collaborative processes become a "normal" way of doing governance work, then citizens and stakeholders generally will demand and expect to be involved in any governance initiative which significantly affects them, especially where it changes the environments of day-to-day living. There is much evidence that such an expectation has been steadily growing in Europe and North America in recent decades (Dryzek, 2000; Schlosberg, 1999). This does not mean that citizens seek to be involved in all government decision-making. Instead, they seek evidence of the quality of the attention being paid to them. (Healey, 2006, p. 335)

In which aspects they should play a role is therefore a crucial question (see the issue of selectiveness), and it can be deduced that reducing the role of parties in a multiparty environment in general and without consideration of the conditions of planning cases cannot be justified at all. Then the justification of the decisions taken using either way can come frequently and seriously into question.

6.6.4 Turbulence and Difficulties of Envelopment: Unreliable AND

The system-based view of decision making is extremely linear, single ordered, and centralized, whereas the person-centered style of decision making is excessively decentralized and turbulent. The field in which all variables, relations, and theories can be covered in order to organize the planning mindset is the *enveloping field*.

There is no doubt that as time passes, a theory can and will be reconsidered from different points of view, unless it is not compatible and dynamic enough to evolve and adapt to the changing dimensions of the context to which it relates. It will be revised, changed, or metamorphosed in some ways, and it will borrow other aspects of work in other ways in order to answer the questions that come up after its initial development and to fill the deficiencies and gaps even with a "defensive move." It is because a theory is not perfect and, at least, due to changes that come with time that it needs to be dynamic enough to be modified effectively. Generally speaking, any formulation, in either the framework of a theory or a mindset, moves towards a more exhaustive concept. The planning theory, when it specifically comes to application, is no exception. Taylor draws attention to its links to a wider context which in return necessitates responding to the requirements of that context:

Theory about implementation could therefore be seen as highly specific, practical theory; it was about practical reasoning. However, both bodies of planning theory accepted that town planning was not an autonomous activity operating in a vacuum, separate from the rest of society. (Taylor, 1998, p. 126)

Therefore, the descriptive or explanatory theories with either an empirical basis or a rational principle with a tendency towards a certain notion or arising from a specific area (such as a specialty or subspecialty) tend to deal with planning through a specific type of presupposition. That is why they try to explain the entire discipline of planning through their own window rather than having an equally balanced method. Referring to Pickvance, Taylor also emphasizes that:

Hence Pickvance's (1977, p. 69, in Paris, 1982) thesis that "the determining factor in urban development is the operation of market forces subject to very little constraint" ... 'outside' public sector planning, and especially private sector developers operating within a competitive property market, which was central to an understanding of the problem of implementation in planning (Taylor, 1998, p. 126).

Therefore, these theories try to manifest a theory that is rather general, in the sense that it can be applicable to all planning problems at different levels to tackle the planning problems, even if they carry a multilayer approach.

Then the most controversial discussion of theories in planning and decision making comes up: the issue of the envelopment of contradictory and fuzzy notions. Any binary-based decision-making view faces technical facts or undeniable values that cannot be ignored. But, methodologically, the mindsets have already been set so certainly and precisely that opposition cannot be taken into account where the theories and methods face with fallacies, paradoxes, and unexplainable contradictions put forward by fuzzy phenomena. The binary logic to explain the planning and decision-making theory position is not effective enough and leaves no room for coexistence with the opposite ideas, meaning that, epistemologically, true and false notions cannot live side by side.

6.6.5 Comprehensiveness, Inclusiveness and Selectiveness, Arbitrariness

Comprehensiveness in its modern sense, as it was pursued in the design-based view of planning, is one of the most controversial issues in planning. It has been criticized and known to have been compromising many other qualities starting right from the decision process of planning down to the finest possible detailed decisions in design. This was pointed out by Taylor:

By all means, we may reject as undesirable and unrealistic the pursuit of comprehensiveness in town planning, whether in relation to the actual practice of replanning cities comprehensively or in relation to the process of making planning decisions. . . . the pursuit of rationality is distinct from the question of whether we are required to be comprehensive. (Taylor, 1998, p. 165)

Once the mode of the architect-planner persisted in designing a city in as much detail as possible, in "Le Corbusian way" (in its architectural and authoritarianist sense), this issue came under serious question. Since then, with the defining of uncertainty as a deterministic indeterminism (see chapter 4), comprehensiveness has been picked as a nonrealistic mode of thought, despite all its rational bases.

The question of how achievable comprehensiveness is in planning has been the center of discussion in this arena. Among planning theories, there is a collective agreement about the fact that comprehensiveness is not completely achievable. However, in the whole planning profession, there is a common tendency to move towards it.

Parallel to this issue, there exists another question that has directly led to the matter of the legitimacy of planning actions: If there is no way to achieve comprehensiveness (which, at least now, is imagined to be the case), how can the decision-making process be justified? This is why some may assert that the matter of selectiveness (as opposed to the concept of comprehensiveness) can bring the planning process into arbitrariness that can by no means be justified. This latter issue, which repeatedly arises in postmodern planning, is widely accepted, acknowledged, and approved to be utterly entangled with arbitrariness in regard to planners' decisions.

Although in the person-based method, the planner tries to communicate with actors in the space in order to know their ideas, the decision maker eventually makes the decision with barest minimum, if any, consideration of the communication which was carried out. This shows that even the pursuit of a specific method (such as communicative planning or advocacy) does not necessarily imply that the issue of arbitrariness has or could have been tackled. This is because, even though the planners seem to have been trying to tackle the problems as byproducts of systemic planning or as if they have been the inherent problems of the systemic approach, they have had to sacrifice some aspects of the work, which means that there is a degree of selectiveness, and with this, comes arbitrariness. But this association between the systemic view and arbitrariness also exhibits that the conceptual framework of activating the methods (and theories) has been limited to a specific area in which the process of selecting the subject, area, and scale of concentration are still vague. In one sense, the person-based view claims to have come to tackle the problem of the systemic approach. However, internally, by representing itself as a means of dealing with local (small-scale) planning, this person-based view first implies that it complies with a systemic view of planning. Second, because it disjoins the problems on the local and national scales, arbitrariness in selecting the problems occurs. This person-based view also needs to disconnect the local level from its original context at the national level in a reductionist manner. This rupture from context and where and how it might happen is the other problem with this approach. Understating such a controversial issue as comprehensiveness thus brings up the matter of inclusiveness. The ratio of inclusiveness (in defining and/or finding problems and in observing the interlinks between a specific urban problem and its relevant issues) needs to be justified to avoid arbitrariness of scope. Therefore, arbitrariness of (a) parameters and factors, (b) tools and methods, and (c) scopes and ascendancy are three major types of arbitrariness that need to be handled.

6.6.6 Fuzziness of Rationality: Information and Pure Rationality Versus Explanatory and Empirical Rationality

It is a mere misconception to suppose that rationality has no different types and that conclusions can be drawn about every rational phenomenon using its rational premises.

Based on the history of planning, two major types of rationality in planning are recognized, pure rationality and an empirical one, which are definable, based on the fuzziness of definition. For example, when the population increases, more food is needed to feed people. This statement is most likely to be true. It is not completely true because, with a small amount of population growth, the new, increased population can be fed with the same amount of food with which the population could have survived in the first place. Some may assert that this could happen, for instance, by changing the pattern of food consumption or employing a new type of distribution. But this reasoning does not always work, as, with a big increase in the size of the original population, it would not be possible to feed everyone with the same amount of food. Without an increase in the amount of food, some would be affected by the lack of food resources. Then the question is the location of the boundary at which the population growth passes the critical limit. This implies a pure rationality of reasoning.

In comparison, when it is asserted that in the summer, the cost of properties will increase, this statement implies that the assertion is empirically almost true (based on empirical statistical observation). There is no rational foundation for this assertion, with one exception, statistics. Usually, this type of statistical fact, with some exceptions, needs to be interpreted and explained. At this stage, based on some other facts and through rationality, some explanations will be given for the causes behind this relationship between season and cost. Thus, this is a situation in which rational commentaries attempt to explain the entire outcomes of empirical observation. And for the exceptions, there is a risk calculation provided by information analysts, suppliers, and providers who supply the information for customers. This calculation, with a percentage again based on statistical outcomes, exhibits the percentages in which the empirical outcomes do not satisfy the condition. These types of information analysis and explanations show the degree of unreliableness of the rationality based on what has happened up until the present time. This is

only a model based on existing experiences (knowledge of explanation about the past). But there is no guarantee that this will happen again in the future. Therefore, in a case that focuses on the smallest number of factors (in this example, a period of time and the cost of residential properties), with the area of research taken out of its context, the question is what other kinds of aspects are involved in determining the price of properties overall and in the summer and how much they are. Where temporal, locational, and humanistic factors are the influential values of rationality, the fuzziness of rationality will appear.

This type of empirical knowledge of (or pragmatic approach to) the intervening fields in decision making and planning is imitated in what is pursued in sciences but with huge distinctions. First, the scientific empirical observation can be controlled in a restricted atmosphere. Second, this type of inquiry is carried out on specific traits, usually on a single trait and by using the allocated tools or instruments (instrumentalism on single objective problems). Third, the humanistic values usually do not play a role in reliable examination; otherwise, the observer must expect more unreliable results. Then the inductions are more limited and more involved in the presence of the fuzziness of human factors, by which the objectives and definitions will be changed and diversified. Basically, the parameter of satisfaction is a very complicated phenomenon. It becomes more complex and engaged with the matter of uncertainty, the more individuals there are involved in the definition of satisfaction within a situation in which different people and groups look to be satisfied (providing “two opposite” or “semi opposite” satisfaction factors at the same time and in one environment is the matter of uncertainty).

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7

Conclusion

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7 Conclusion

7.1 Introduction

If dealing with people was the most important aspect of planners' work, it seems that the inquiry into diversity-oriented decision making has passed. The diversity of different interest groups (public and private or sectional) has been accepted, and different accounts to achieve an integral way to compromise with the groups have been presented. Now is the time of theorizing the method that can serve diversity-oriented interest groups of planning—private citizens, institutions, agencies, and associations—regardless of their tendencies and ideologies.

The only prudent way to carry out planning as a sensible activity integrating diversity is to foster diversity-oriented planning investigations that welcome different forms of knowledge, either empirical or rational. This means that theorizing the method considering diversity of the people's minds and public interests no longer necessarily defines diversity for planning, which is said to be dedicated to differences. But the diversity of ideas, thoughts, and attitudes—not in a unitary and cohesive atmosphere—is needed to characterize the diversity of notions in coalition as per Campbell and Marshall (2002, p. 182) suggestion where they stress that planning cannot evade what Harvey (2000) refers to as 'the dialectic of the either/or'. This reconciliation will be adjustable, dynamic, and nonlinear.

But today and in light of fuzzy sets, we know the above comment can be relatively true. In some structures, it is true; in some others, it is partially; and in the rest, it is not. Even in those cases in which it is relatively true, it does not defy the dialect of both/and.

Whether or not the dominant decision-making styles and their theoreticians and proponents accept that planning is involved with fuzzy phenomena or is a fuzzy phenomenon as a whole, they still employ classical logic to tackle the problems, and they unanimously admit that encompassing all the required knowledge and processes required for carrying out such a task is almost impossible. As Goldsmith (1980) states, "Indeed, a complete understanding of the social, economic and political processes of city life is beyond the capacity of any man" (p. 27).

With all the difficulties working against the achievement of exclusiveness and comprehensiveness and also the pessimistic opinions about this, the important notion of linking the different models is still being pursued. Whatever the model, the idea that there is a need for a general theory (model) of linked models is still very much favored, even though there are still many existing doubts. Among many others perhaps Goldsmith (1980, p. 27) is the one who more overtly asserts that it is more likely that linking the models together would provide a better, complementary explanation, reflecting some of the wider issues.

But it seems that a justified model of planning is the one in which different atom models can be located and situated. What this situating would be like and what the possible qualities of this general model are would be subject to further inquiry. This idea is against what postmodern planning (in its broadest sense, rooted in postmodernism as a school of thought) brings to the knowledge pool that is very vague and hence unjustified. Therefore, the unifying model again is at the center of attention of many to avoid any unjustified planning and decision-making theory that would result in inequality. The inequality was claimed by postmodernism in the loss of justified modernist tools (even for small-scale intervention) that caused many serious critiques not of the whole idea of this school but of its processes through which many expect an at least better (and more accountable) set of outcomes. There is no need to look back at the harsh critique of early modernist planning or even late modernist rationality in planning the built environment. Yet much criticism about this realm exhibits the general unhappiness of the thinkers. However, it is obvious that the planning institutions' requirements would be fed with either one of these methods or most likely with an unknown ratio of amalgamation of both. But

from another point of view, the new wave of commitments to rational planning (within its new envelope) have been running in postmodern accounts, and postmodern proponents who emphasized the lack of consensus in planning were rigorously criticizing the rationality of 1960s planning, which renders a clash—the clash in which none of the sides would have their own “all-in-one” justified reasoning. Those sides do not think of reconciliation; however, they both know that the opponent has something to present. This is because of the lack of an inner appropriate logic (within each school of thought) that is coherent with planning. It is also because of the lack of logic to weld these two schools or distribute their duties in an acceptable way. The concept of making a justified balance between planning aspects, with respect to people’s wants, requirements, and futures, planning decision-making (at both theoretical and applied level) should be handled through the many-valued model (or infinite-valued model of fuzzy logic) of planning and relativeness in decision making and planning.

But first and foremost, regardless of the perspective from which the subject matter is being looked at and regardless of other priorities, the traditional definitions of planning and its processes and constituents (i.e., decision, plan, implementation, evaluation, decision) should change.

It should be borne in mind that due to the nature of the current research, and as highlighted before on several occasions, precise borderlines cannot be drawn between different sections of this research, as they are in established or ordinary types of research. The conclusion of the current research has already begun in the “Analysis” chapter, and what is discussed in this final chapter is in addition to what has been stated there.

7.2 The Aims and Objectives of the Current Research

The aim of the current research was *to introduce fuzzy logic to the decision-making theory in planning and planning in general*. This was pursued and addressed through four different objectives, as follows.

- To examine classical logic as the main underlying thinking framework in planning and the loopholes attributed to it that make this logic subject to criticism, and to illuminate what the aspects of decision making in planning are and how unjustifiable the decision theory can be when committed to nonfuzzy accounts and unstructured defuzzification methods.

An epistemological review of the logic embedded in and attributed to planning (and with particular reference to the decision process) was carried out to point out the normative approaches to the theory and practice of decision making in planning.

- To analyze and map out the problems that the decision process is facing as a result of this method of thinking.

An in-depth study of planning with special focus on the decision theories was conducted to investigate the dimensions and specifications of the decision process and the deficiencies it is facing as a result of the application of the established methods.

- To investigate what is already in use as an alternative to bivalued thinking, logic, and systems in other fields of science and technology when dealing with multivalued situations.

Established and tested alternatives to bivalued thinking, logic, and systems in other disciplines were closely examined to enable this study to build upon what is already in use in those disciplines.

- To outline an alternative logic and way of thinking in decision making to handle complexity to integrate the known factors and role players in a structured way.

Building upon the previous objective, the research yet needed to point out what the most probable problems could be, should such alternative approaches be applied in planning. In achieving this next objective, the research also took into account the complexity where the number of decision factors or stakeholders grows dramatically.

The research showed that as a result of the complexity and uncertainty involved in the decision process in particular and in planning in general, the mindset of the discipline and the underlying philosophy of the theory and practice of planning should change to adapt to the dimension of the uncertainty and complexity of the planning decision process.

The research also presented a new way of thinking, fuzzy logic and thinking, and showed that, if this logic and thinking as well as fuzzy sets are applied appropriately, their use can promise a significant move forward in the history of planning theory and practice. Their application can also result in formulating an alternative way of thinking that is proportionate to what is happening in the discipline and can establish a new milestone in planning history that can offer a longer and safer response to the underlying thoughts of planning for a comparatively longer period.

7.3 Conclusion

The current research drew upon the fact that there is a big gap between what planning is actually offering and what it can achieve using its full potential as Klosterman (2003, p. 96) rightly suggests that an objective evaluation of sixty years of planning experience must recognize the tremendous gap between planning's potential and its performance.

With a special concentration on the process of decision making in and for planning, the research aimed to address the knowingly uncovered areas or negligently ignored sections within planning decision theory and, consequently, the process of planning decision making. Those realms, of course, were not merely limited to the other disciplines involved but also included all contributing entities, ranging from intervening parties to the crucial factors and influential processes. As a result, the current research came up with the following conclusions ranging from planning as the discipline in which decision making is taking place down to the detailed subprocesses involved. In this procedure, insight about the whole system has always been borne in mind.

1. Planning is a multidisciplinary, multiobjective, multivalued, and multijudgment discipline. Any approach that undermines those facts about planning will partially or completely fail to serve the purpose of planning decision making in mediating between the parties, stakeholders, and role players in the process.
2. The existing mindsets of planning theory and behind planning practice and any planning activity taking place are using duality and reductionism as a result of their underlying classical (formal) logic. Although different mainstreams have been formed in the history of planning, each belonging to either modernist or postmodernist accounts of planning, they have all used the same classical bases to build their epistemological ontology and thereby prescribe their solutions to the practice of planning.
3. Where such logic is underlying a multidisciplinary, multiobjective, multivalue, multijudgment discipline, the decision making within that discipline cannot be justified. This is, as shown during the course of the current research, because the complexity and uncertainty involved prevent the process from coming to a justifiable conclusion. This does not mean that it is not justified only on the basis of the ethical problems. Quite to the contrary, neither is it justified from the procedural point of view nor by its

consequences. This is not the problem of a lack of participation by citizens or interest groups but of how to allocate their appropriate shares in the process.

4. An alternative way of thinking that includes all three of the previous planning mainstreams, planning for cities, planning for people, and planning by people, needs to be utilized. These different approaches do not need to be subsequent to each other, with one ending and the next starting. On the contrary, they should all coexist and intervene in the process of decision making according to their respective agendas, each to a degree. This alternative way accumulates all that has been advocated by other major movements to reach the best possible combination as per the given decision case.
5. For decision making (or planning) theory justified, it should, before everything else, including concerns about its comprehensiveness, have a proportionate logic in planning theory, theory of planning, and logic for decision-making theory that match the dimensions of the real world.
6. Not only does recognition that fuzzy logic should be the prevailing applied logic of the profession help provide an integrated, structured, and justified approach to planning decision making, but fuzzy logic itself can orchestrate the various approaches to and aspects of planning as well as unify and integrate them to work together yet to have their own shares in the theory and process of planning.

The problem is to find a method of participation proportionate to stakeholders' roles, righteousness or falseness of vantage points and decisions, the mistakes the stakeholders have made or are likely to make, and also to the degree of their membership in the process as well as the final consequences of the decisions. A result will be the distribution of fallibility to all of the parties involved. This research shows that a certain truth does not exist to represent a specific legitimized aspect of decision making. How the parties can contribute to the final decision as per their level of membership in the decision process, regardless of the success or failure of the final decision, is what this research set out to address.

All theories that are seeking for an ultimate truth to confer legitimization upon a particular group or to a certain and exclusive method will fail to offer a justifiable approach to decision making because such theories cannot get involved in a multiobjective operation that guarantees each intervening party a share proportionate to its contribution in the process.

Therefore, it can be concluded that even though planning and decision making in planning once experienced the end-state planning, the postmodern planning as well as the technicalist view of decision making, this time, they should enter a different type of process. Instead of supposing a certain reality, the process should succumb to the fuzziness of truth to be able to provide a more realistic model of the planning sphere and thereby practice a more realistic form of decision-making. This by no means suggests that either of the already established approaches should be completely abandoned.

A dynamic multilayer approach with the simultaneously multivalued variables and relations is what planning needs to overcome problems. This dynamic rule-based approach would be able to analyze the problems coming from different levels and then nominate the approach that is compatible to the scale of the problem. After studying the level of intervention for the plan, this approach can compare it with the predetermined (and dynamic) matrix, achieved through consensus (rather than the current person-based view), and defuzzify the information for the model that can be proposed for the situation. Through this model, the possible actors, their share and expectations, and the method of their coalition with the others (considering parameters such as the cost efficiency of participation in the level of the plan) will be recognized and introduced to the planner and the related planning institution.

7. The research showed that this new particular (rule-based) tool needs a peculiar underlying thinking method, which, in turn, requires an alternative supporting logic. Fuzzy was introduced as an alternative logical system that can offer the proportionate dimensions of a multivalued, multiobjective, and multijudgment thinking method, and it was demonstrated to be the appropriate substitute for the existing school of thought in the planning discipline.

The rule-based approach can also control, define, and restrain two types of relationships: first, the relationship between the planner and the developer (private sector), which makes them closer to each other in finding their common interest involved in each other's success, and second, the relationship between the planner (that planner who meets the people and the developer) and the politician. In the former relationship,

in sociological terms, developers and planners will come to develop a shared subculture. They will be likely to develop shared attitudes and values, shared perceptions of what is economically possible and socially desirable, and most significantly, shared beliefs as to what kind of development is in the "public interest" (Reade, 1987, p. 92, as cited in Taylor, 1998, p. 128).

A set of rule-based principles that leads planning decisions to deal with the problems prevents the planner's interest from coming too close to that of the developer's and also prevents the planner from accepting the temporal interest of the politician, which can be achieved through negotiation and communication.

Then, in this process, whenever a modification or alternation is needed, it should pass through a specific yet transparent and reversible procedure to become legitimized. Therefore, the person-based (taste- and background-based) decision making will be changed to a rule-based process. Through this method, however, planners, in Forester's sense, must be prepared to "get their hands dirty" by negotiating deals with capitalist developers in order to secure some "planning gains." This dirtiness will be pursued through some determined presupposition from a higher level of approach rather than instantaneous decision making and decision taking about what is needed to legitimize the whole process. This method, will not only facilitate the prevention of hidden discriminations that occur when one interest group ignores another interest group, but it will also protect the planner from being defeated by the developer and politician. This can provide a balance in the planner's (in the person-centered part of the process) and planning institution's (in the system-based view) behavior in protecting the public's, politician's, technician's, and private sector's interests against each other.

This can also protect the whole system from the extravagance of applying fundamental ideas and ideology in planning (in its political economic sense). The rule-based approach can also prevent the system-based approach from instantaneous decision making on the large or small scale that may be pursued to answer upcoming concerns. It will also help determine the parameters to meet the regional requirements which possibly are against the dominating state of the global (or national) market. This dynamicity enables the local planning to deal with local problems in a framework of global policies commensurate with the actual needs, defects, and deficiencies.

This can be seen as the first fuzzy modeling of planning based on fuzzy logic. This means that planning as an infinite-value activity can be explained through a fuzzy model. Obviously, the current model is one among many possibilities that can be used. Yet it is worth mentioning that this suggested model, generated for the case of decision-making theory, and hence the decision-making process, can be extended to the supplementary processes of planning including but not limited to data gathering, problem definition, analysis, and policy and plan making. The different aspects and processes and, apparently, the whole system will be more coherent, and the outcomes will therefore be achieved in a more accountable way. This method also responds to the accessibility of a plan proportionate to its type and scale.

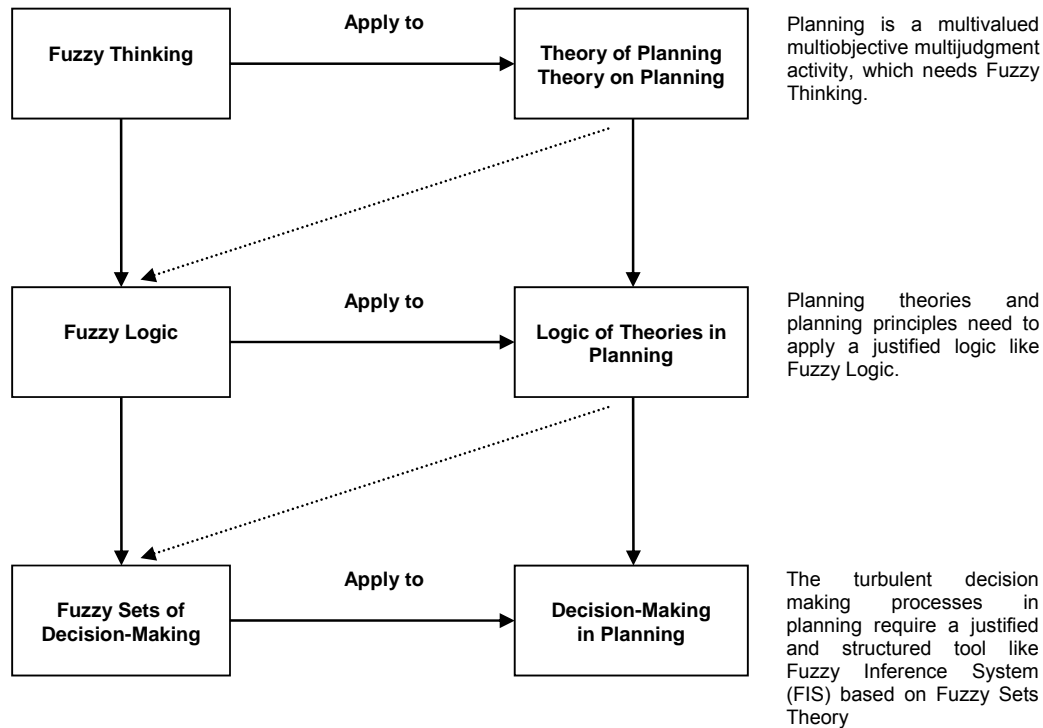


Figure 7.1. How to apply nonbinary logic to planning: fuzzy thinking, fuzzy logic and fuzzy sets in (urban) planning and decision making.

7.4 Contributions and Implications

The current research makes a distinct contribution to the knowledge pool and, subsequently, if applied, holds significant implications for both the theory and practice levels of planning decision making.

7.4.1 Implications at the Theory Level

Although the current research does not intend to declare a new theory of or in planning, it can easily proclaim an alternative logic, in its authentic meaning, in the planning discipline. Apart from what this study can stimulate in the theory of planning in general, it has more straight-to-the-point implications for the decision process in planning.

The most important implication for the decision-making process is that the current research can strike a balance between the state of theory and what is being carried out in the practice of decision making in the real world. An outstanding outcome of this will be to make a sensible and workable correlation between the theory and practice of decision making that can potentially lead to a wider conformation between the two across the entire discipline of planning.

The second most important implication will be that what underlies the theory of decision making (i.e., negotiation, communication, and debate) can find their places as intrinsic characteristics of planning (decision theory and process). In other words, altering and fluctuating measures that may vary from time to time, from place to place, and from person to person can be replaced by an evidence-based (but not necessarily a qualitative or quantitative) method in which the influential factors, involving conditions, and influential parties can be taken into account based on the degree of their level of intervention in each decision case and process.

The last outcome at the theory level will be that the accepted traditions of reductionism and dualism will be recognized as no longer necessary. This means that with no need to pick and mix selectively what is at hand, what is manageable, or what is favored by the decision-making bodies (or those who rule them), all of the real contributors in a decision-making process can be given their shares in the process, respective to their role, influence, and level of contribution. Furthermore, the decisions and their justification process will be defensible, repeatable, and acceptable for both those who have made them, and those for whom they have been made, and assessable by the internal or external auditory bodies. In other words the validity and reliability of those questions can be guaranteed.

7.4.2 Implications for Practice

At the practice level, the current research can promise a quantum leap forward. If what has been addressed here is to be applied in practice even gradually, its first and foremost implication is that there would be no need to worry about the disproportionateness of the tool with the problem. In other words, the control and decision-making tools will not be overwhelmed by the intervening parties, stakeholders, and beneficiaries or by the involving factors and their interconnections. As the tool is capable of dynamically adapting to the level of complexity involved and responding respectively to whatever the level of uncertainty, regardless of its dynamicity, alteration, and consistent metamorphosis, there would be no need for the traditional selectiveness that was practiced through the principles of reductionism of formal logic.

The second implication of the application of what is proposed by the current research is that the practice of decision making in planning can with no anxiety comply with what is sought after by a generic theory in general and by a planning theory in particular. In other words, this research will facilitate the ways in which practice can be coded by theory.

The last but by no means least implication is that the practice of planning decision making will find a firmer ground and more defensible basis upon which it can be redone, assessed, evaluated, modified, and improved on a real-time basis as time passes and the contextual conditions differentiate or transform.

7.5 Limitations of the Current Research

The first but perhaps not the most significant problem with the method of the current research was its scope. Which aspects of planning this research should target, open up, analyze, and draw conclusions about, and how, where, and to which extent, in order to offer its findings to the broadest area and most colorful range of components in the planning discipline were all questions that needed to be settled. Determining the scope was a very time consuming yet interestingly attractive process formed though a wide range of activities during the journey of the current research. It included an enormous amount of reading in philosophy, logic, planning, and decision theory; a huge range of field study in more than 50 cities around the globe; and a tremendous degree of academic consultation in the form of interviews, conferences, individual informal talks, and semi-structured telephone interviews with a wide range of academics in Europe and the United States. This informed the focus of the research and ultimately helped ensure that the initial concerns regarding the design and application of this research along with what was highlighted or pointed out throughout the aforementioned processes are all taken on board.

The current research might look like a mere introduction to an alternative logic in the logic of planning, as an activity with a lot of literature, in combination with a very well-developed logic: fuzzy. This is true—but only to some degree. It is truer if an unrealistic revolution is expected or aimed at in the whole discipline. But it is less true when an evolutionary change is ideally in mind in one of the most important areas of planning, decision making. Not only is the change most likely and most sought after in this area of planning, but if effected in this area, the change

promises to permeate to other areas and initiate a fundamental reinterpretation of the whole discipline, slowly but surely and sustainably. From this, it is imaginable how delicate yet broad a route this research has taken. Moreover, it is obvious that the current research's literature is based on existing literature of planning theory, which is solely based on classical logic's thinking framework. Hence, the conclusion is abstract and to some degree general. On the one hand, this could have posed some difficulties for the entirety of the research. Yet on the other hand, it makes the research unique in decision making and planning as a whole. The research also attempted to address the links between the theory and practice of decision making in planning not only for the sake of the importance of the two but also to break the traditional mold of this abstraction and generality embedded in almost each and every theory in planning. How influential this new approach will be is a matter that will be revealed as time passes, but it must not be forgotten that this will deeply depend on both acceptance of the current mode of planning and further research on this issue.

The other restriction facing the current research was the fact that it was attempting to be epistemologically analytical yet to a high degree retain its autonomy and be all-inclusive while going into a detailed critique of the status quo. As a result, it does not use examples in the form of physical case studies. This might not look like a real problem, as many research projects also do not use such examples. But it becomes much more important yet exclusive to the current research with respect to its methodology, its aim and objectives, and where it addresses the problem of decision making. In other words, it has permeated the topic, but in a way, the topic itself is the complexity of decision making, and affected the journey of the current research. Further research can cast light on this complexity and make clearer where this research can lead and how it can affect the whole discipline through creating change in the decision process.

The last but not the least limitation facing this research is the issue of generalization. This is a limitation because this research should not be looked at as an established bivalued research resting on the foundations of classical logic. By contrast, from the very first stages, this research has had the subject of generalization on its agenda. Every single step has been taken with the idea of going into the most delicate detail while examining how, where, and to what degree these analytical studies can inform the subject of the research both generally for planning and particularly for decision making.

7.6 Future Research

To further the current research, a broad range of activities can be carried out. One of the first steps that can be taken next is to demonstrate the application of fuzzy logic, based on what was addressed through this research. Fuzzy sets theory can be used to show the practical implications of the logic and thinking on planning both at the theory and practice level. Because this action would involve a high degree of participation at the practice level, the coordination entailed is predicted to be enormous. Therefore, it is envisioned that demonstrating, testing out, and monitoring the implications of the current research will best be divided by its implications for theory and expected outcomes for practice, as addressed earlier in this chapter. The researcher already has plans of action for both and will be pursuing them in the near future. However, it is very important, as emphasized before during the research, that the full segregation of theory and practice should be carefully avoided. This can easily be done as per the specifications and dimensions of the current research and how it sees the problem, how its methodology has been defined, and above all, what it advocates. A back-and-forth intermediation between what is/can be achieved in the practicality of decision making and how this will reflect on the theory of decision making should always be pursued. This may well lead to reform in decision theory in general, promising an alternative way of thinking in decision theory, this time initiated from inside the planning discipline.

In addition, what proves desirable for the near future is to investigate how this logic and thinking, which has been initiated from inside the planning decision process, can succeed in informing

other components and sections within the planning discipline. This can and should be done by a comparative analytical study of the decision process in other planning areas and subdisciplines. Through this, all the similarities and differences, potentials and restrictions can be pointed out and highlighted to best facilitate the initiation of a fuzzy rule-based approach in other parts of the discipline. This project, despite these suggestions for further research, is not imagined to have an instant outcome or to come immediately into effect. First, a number of similar long-term research projects that investigate how this alternate logic can be established and practiced in those other areas is necessary.

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