URBAN AND COMMUNITY PLANNING

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Keywords: Comprehensive planning, externality, land-use, transportation, environment, infrastructure, public facilities, regulation, pricing, operation, education, investment, population, land price, urban models, decision support system, citizen involvement, finance, private sector participation

Contents

Summary

Urban and community planning is the field within civil engineering that is concerned with the production of educated guesses of the future, and proposals of alternative development options based on such guesses. An important concept in modern planning practice is comprehensiveness, the inclusion and consideration of all relevant elements within a city. There are other types of planning that deal with particular aspects of a city, but in general these are more fruitfully seen as components of a comprehensive plan. From an engineering point of view, land-use, transportation, the environment, and their multiple and multidirectional interactions, constitute the principal elements of a city. In the analysis stage of planning, different tools are used to describe the city, and to forecast development and growth trends. Useful tools include transportation and land-use models, statistical models, and decision support systems, possibly built on a GIS environment. Policy-making, the selection of specific policy measures, should be

concerned with producing initiatives that are effective, coherent and well coordinated. Institutional set-up including public involvement and financing schemes are fundamental issues that should receive careful consideration by planners.

1. Introduction

The activity of urban and community planning takes place at different geographical levels, ranging from small districts to large metropolitan regions, which naturally include both urban and rural areas. For convenience, throughout this chapter, the term *city* is used to describe the object of urban and community planning.

The goal of urban and community planning is to try to direct development in predefined directions, to produce a city with desirable or "good" characteristics. An inherent difficulty of planning, however, is that there is no clear-cut way to define what good or desirable is, as this usually depends on the characteristics of the city, as well as the viewpoint of evaluation and the underlying values. The first step of the planning process is to define a set of planning goals (the general aims to be attained) and planning objectives (specific strategies to achieve the goals) that in general can be refined after the actual situation of the city has been analyzed. Once objectives have been defined, there are two general aspects of planning: to propose the provision of public goods, and to regulate and/or guide private development.

Public goods should be provided by the public sector; according to economics theory they cannot be efficiently supplied only by private economic activities. However, it is well known that excess intervention of the public sector (usually the sector in charge of developing plans) tends to deteriorate market efficiency, and thus will typically result in social loss. Pure "laissez-faire et laissez passer", on the other hand, is notably inefficient in the case of urban and community development, because of market failure caused by the existence of public goods and externalities. Market players in a city are shortsighted, although the effects of their actions last over many generations.

A typical example of externality is the benefits obtained from infrastructure such as road networks. Landowners will generally receive benefits from development, often without having shared a corresponding burden of development costs. Another example of external economies include the conflict caused by mixed land-uses, as for instance is the case when the coexistence of residence and manufacture results in unaccounted for disbenefits for the residents. Pollution caused by road traffic deteriorates the environment and is the cause of health problems. Another characteristic of urban development that must be taken into account is the durability of urban infrastructure: once a building (road, etc.) is constructed, it can hardly be replaced in the short term even if it does not turn out to be the most efficient use for land. It usually takes a long time before infrastructure can be replaced. Market imperfections caused by external effects such as those mentioned call for public intervention to improve the welfare of the city.

In particular, given the long periods of time needed to change the outcome of development, it is of foremost importance that planning provides a long-term perspective to complement and whenever needed guide the profit making perspective of particular developers. It is also important, however, to be able to adapt to emerging

issues in a city.

2. Planning System

2.1. Definition of Planning

Planning is the activity of making conscious and educated choices about the future. As such, it is essential to the success of any long-range and/or complex human endeavor. Examples of planned development exist all throughout history, from ancient times to the present day. In ancient Egypt, for example, the purpose of planning was to reinforce the power of the ruling elite, whereas Roman pre-designed towns were mainly planned to be garrisons and administrative centers, and are now thought to have been colonizing tools. These simple examples from history show that planning is not necessarily a democratic enterprise. In modern times, however, planning techniques that involve public participation are considered to be essential tools to direct development in democratic societies.

Urban and community planning, in its modern form, arose in the late nineteenth century, in response to challenges posed by the industrial revolution, the development of revolutionary new transportation technologies, along with the urbanization process that said revolutions enabled. These challenges have all but disappeared, and in fact, most characteristic changes to the western city in the second half of the twentieth century (i.e. growth, decentralization of employment, low density residential sub-urbanization, and substitution of public for private transport) continue to relate to the availability of new transportation, construction, industrial and information technologies. Dealing with these and other related issues, in order to ensure some degree of control on the direction of future development, is the objective of modern urban and community planning.

The American Institute of Certified Planners defines the planning profession in terms of the following criteria:

- It tries to influence public decision-making in the public interest.
- It employs an appropriately comprehensive point of view.
- It applies a planning process appropriate to the situation.

These criteria are discussed more extensively below.

2.2. Systems Approach to Planning

An important concept in planning is that of comprehensiveness, which requires all relevant aspects to be taken into account. The concept naturally leads to the idea of systems thinking: the idea that everything is a system, that every system is a part of one or more larger systems, and that most systems are open and interact with other systems. Thinking of the city as a system facilitates many forms of analysis: problems that appear to have no clear solution are more easily approached when seen at different levels of a system. The main systems considered in most forms of comprehensive urban analysis (not the same as comprehensive planning) are land-uses, transportation and the environment. Seen in isolation, there are certain outcomes to development that seem

contradictory. A well-known effect of new transportation infrastructure (e.g. a road) is to alleviate traffic congestion in the short term. Soon, however, congestion becomes an issue again. The land-use effects on transportation, and the transportation effects on land-use become clear when each of these are seen as components of a larger urban system. In general, it can be said that systems analysis provides a rigorous framework for making some (but not all) planning decisions.

It is important to note that despite the persuasiveness of the systems approach, it faced some disillusionment within the planning profession in the late 1960s, mainly expressed by the argument that planning is essentially a political, presumably non-scientific process. In spite of this criticism, developments continued to be made, especially by many model- and mathematically-oriented engineers and economists. At the end of the twentieth century, based on technological (e.g. geographical information systems) and theoretical breakthroughs (e.g. discrete choice analysis), the systems approach to planning is alive and vigorous, as testified by the number of applications of integrated models, especially in Europe, the USA, and Japan. This does not detract from the political nature of some aspects of planning, in particular policy-making. On the other hand, the systems approach contributes, through the activity of model building, to put the assumptions, definitions, data, limitations and mechanisms of operation of the system out in the open for examination. In this sense, the informative and discursive value of the systems approach becomes undeniable: well-informed politics are preferable to uninformed politics.

2.3. Types of Planning

2.3.1. Land Use Planning

Land-use planning with the objective of designating lands for future uses is one of the most visible aspects of urban and community planning. During much of history, indeed, land-use planning was perceived as synonymous with urban and community planning. The insufficiency of this perception was made evident by the transportation problem in the 1960s, and a great deal of research in the meantime has demonstrated that land-use planning alone cannot be equated to urban and community planning. Land-use and transportation, in particular, are now seen as closely related elements within a larger urban system. In modern practice, planning for future land-uses is an essential component of comprehensive urban and community planning but seldom an independent activity.

A land-use plan is elaborated by paying attention to the existing uses and their compatibility. Land demand is determined based on future population projections, and the patterns of development and uses are forecasted using industrial forecasts, and techniques that range from simply applying a factor to population, to the use of rent-bid analysis, micro-simulation, discrete choice models and input-output analysis. The most sophisticated models fully integrate land-use and transport demand analysis to provide consistent forecast of all relevant variables (e.g. land-use by type, intensity, etc.). In this way future land-use plans are sensible because they fit within the broad context provided by a comprehensive plan that addresses the related topics of roads and other infrastructure.

2.3.2. Transportation Planning

Many problems facing urban societies, such as traffic congestion, pollution, health problems and so forth relate to the transportation situation in a city. It is the objective of transportation planning to suggest the best possible solutions to many of these problems given resource availability constraints. Transportation planning is often seen as an independent variety of planning, but in fact it is more fruitfully seen as an element of a larger urban system, given the complex interaction that exist with other systems, in particular land-use: transportation infrastructure and services influence land-use pattern, which in turn influence the demand put on the transportation system.

Transportation planning is perhaps the type of planning that has most intensively and extensively used the concept of systems. From a technical viewpoint it is seen as the most demanding field in terms of mathematical and formal systems thinking transportation models used to forecast transportation demand or modal split include the gravity model, and also more sophisticated models of discrete choice analysis based on economic behavioral principles of utility maximization. Recent models try to capture the effect of space in the decision making process, in particular the interdependent nature of spatial decision making, heterogeneity and the influence of decision making at various geographical levels.

2.3.3. Environmental Planning

Environmental deterioration and the rise of an environmental awareness in many societies have prompted the search for ways to measure and evaluate the costs and impacts of development. In the particular case of urban development, this requires a plan to explicitly address sustainability concerns. The difficulty of environmental planning at the urban and community level is that in reality environmental processes take place at many different levels: it has even been argued that the key unit for environmental planning is not the locality or even the nation, but the globe. In any case, the environment is more fruitfully seen as an integral part of a system that also includes as elements other systems such as land-use and transportation. The level of sophistication of urban analysis models currently in operation is such that emissions, energy consumption, dispersal of pollutants and other environmentally sensitive indicators and by-products of urban activity can be forecasted. Methods used to estimate the environmental impacts of development used in environmental planning include cost-benefit analysis, planning balance sheets, goals achievement matrices, and environmental impact assessments.

2.3.4. Other Types of Planning

Many other types of planning can be regarded as elements of land-use planning. Examples include planning for parks and open space. Many other, not necessarily land-use related services, require consideration too, including utilities and infrastructure, such as electricity, telephone service, cable television, and gas, and public infrastructure such as schools, libraries, recreation facilities and fire stations. In the US, a representative from the agency in charge of providing each of these services will

typically serve as a planning liaison with the planning committee. In many places, depending on local conditions, it will be important to plan for heritage preservation, and for hazard prevention, perhaps using tools such as hazard maps.

2.3.5. Comprehensive Planning

A comprehensive urban and community plan is defined in terms of its geographic scope, target systems, and time horizon. In particular it should be extensive, covering all the land area under the jurisdiction of the agency preparing the plan. It should include not only all relevant elements, in particular land-use, transportation and environment, but also other matters of physical development, such as water and wastewater infrastructure, schools, open spaces and parks, etc. And it must consider a time horizon of appropriate length. Urban processes take place at different temporal rates, ranging from immediate (e.g. most transportation activities) to middle and long term (e.g. residential development). Professionals in the USA generally adopt a time horizon of about twenty years on the understanding that longer periods tend to exceed the planner's ability to accurately predict and effectively control the future, while shorter periods are usually not long enough to allow some processes to take place. In its finished form, the comprehensive plan represents a tangible goals set out for a community, and may consist of a short report or a lengthy plan presented in several volumes.

2.4. Hierarchical Geographic Structure

2.4.1. Planning Area

The geographical extent covered by a plan can be very wide. Many countries, for instance, have comprehensive national development plans. In most cases, this is the highest level of planning in terms of geographical coverage. Plans are frequently made at other geographical levels including the metropolitan area, city or municipality, sectors of a city, or even a neighborhood block.

2.4.2 Relationships between Hierarchical Plans

In general, planning takes place at three different levels that cover correspondingly different geographical extents: the central government, regional planning agencies, and local governments. Central governments are in charge of broad, overarching development plans that inevitably overlap with geographical areas under the responsibility of regional and local governments and planning agencies. In principle, feedback between local and regional and national plans is supposed to exist, but in practice this is not always the case. The level of detail regarding planning items depends on the map used to elaborate the plan: small-scale (large coverage) map for large area planning and large-scale map (small coverage) for small area planning.

2.5. Planning Stages

2.5.1. Master Plan

A master plan is the main product of a comprehensive planning process. A master plan

describes at different levels of detail the desired outcomes of the planning process and the policy-measures to achieve said outcomes. A useful analogy is to think of it as a map showing the destination (the point, state, etc. that the community wants to reach), and the way to get there (given by the objectives and policy-measures). When a plan covers only part of the urban system, there will typically be a master plan for middle- and long-term horizons. An example is a road network master plan of a city, which represents exiting and planned roads. This includes large-scale projects, both in terms of fiscal budget and time. Implementation should be made step-wise according to priority selection and feasibility study.

2.5.2. Feasibility Study

Before any part of a master plan is implemented, a feasibility study should be conducted. A typical example is a subway project in a city. Feasibility is tested from three major viewpoints: technical, economic and financial evaluation. Technical evaluation is made from the engineering viewpoint, and should include an assessment of the possible environmental impacts caused by the construction and operation of the project (EIA). The level of welfare is examined from an economic viewpoint based on cost-benefit analysis. Financial analysis is required to assess the viability of the body in charge of the operation of the project. The financial analysis heavily influences the feasibility of the project.

2.5.3. Detailed Design

Detailed design follows the feasibility study to design the structure and other details of infrastructure. In the case of non-physical measures such as taxation or land-use control zoning, fine tuning of detailed taxation scheme setting and land-use designation in small block level are examples of detailed design.

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Biographical Sketches

Kazuaki Miyamoto is a Professor at Faculty of Environmental and Information Studies, Musashi Institute of Technology. He obtained a Dr. of Eng. from University of Tokyo. He has been teaching and conducting research at Musashi Institute of Technology since 2004 after having worked at the University of Tokyo, the Asian Institute of Technology, Yokohama National University and Tohoku University. His areas of specialization are urban models, decision support systems, comprehensive planning, project evaluation and accounting and financing public works. He is currently working on the development of a GIS test-bed for urban models, on the measurement of externalities in urban systems, the effects of information provision on land-use and transport planning, private sector participation in infrastructure development, application of business accounting system to public works and generational accounting of infrastructure projects. He has been appointed as chair/member of various committees of ministries, local governments, and public and private organizations. He has also served for international and domestic academic societies, more recently as chairperson of the International Scientific Committee of the Eastern Asia Society for Transportation Studies.

Antonio Páez is an Assistant Professor at McMaster University. After obtaining with honors a B.S. of Civil Engineering from I.T.E.S.M., Mexico, and having worked as a Survey Engineer, he received a scholarship from the Japanese government to pursue graduate studies in the field of Urban and Regional Planning in Japan. There, he earned a degree as Master of Science from the Graduate School of

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