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A strategic planning approach for the statewide transportation planning process in Ohio

Elhamshary, Osama Mostafa, Ph.D.

The Ohio State University, 1994
A STRATEGIC PLANNING APPROACH FOR THE STATEWIDE TRANSPORTATION PLANNING PROCESS IN OHIO

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

by
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The Ohio State University
1994

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To my mother and a person who I wish was still with us to share the fruits of his encouragement, my father.
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CHAPTER I
INTRODUCTION

1.1 MOTIVATION

The planning environment is constantly changing. New personalities assume new responsibilities. New laws amend existing ones. New issues provide new challenges to communities which must be able to respond effectively to these changes.

Perhaps the most important change is the new transportation environment. Statewide transportation planning is a complex process. The transportation system is constantly evolving; there are recurring multiple conflicting objectives, uncertainties about future events, and long range planning horizons (Current, et al., 1993). Its users are both public and private organizations with both passenger and freight transportation involved. Analytical techniques relevant to transportation needs in one geographic area of the state or one sector of the public may not be relevant to another.

The current techniques and processes of statewide transportation planning and programming are carried out with little substantive input from the most innovative planning concepts. As a result, current planning processes either have created static documents (master plans) that have little or no impact on the decision making process, or have been used to support and justify programming decisions after the fact. The existing planning procedures produce statements of desired levels of service (land use configuration, and the like), but do not respond to questions of policy and the problems of system planning.

Current statewide fiscal planning proceeds, based on assumptions, lead to static models. Priorities are determined on an ad-hoc basis. Little consideration is given to time-staging possibilities and project interdependencies. Conflicts with other articulated social policies, or the inability to compare competing
alternatives or uncertainties in funding levels, exist. There is a need for public involvement and community acceptance. At the state and local levels, some of the current questions are as follows: Are we meeting the public's need in the best possible way? Can we do better? What are the strengths and weaknesses of the current state-of-the-practice and how do we overcome such problems?

For these reasons, there is a need for research in the area of developing procedures (and formats) for transportation planning as to provide substantive and meaningful inputs for the techniques and process of statewide planning and programming.

1.2 BACKGROUND

1.2.1 Legislative Context

Transportation planning in the United States witnessed a great change in the state-of-the-practice through several stages of development and new changes in institutional arrangements, input, and especially in the mechanisms which organize the interaction among all actors who have legitimate roles in the planning and decision process. There are several remarkable changes in perspective; the Federal Aid Act (FAA) of 1962 first mandated the continuing, cooperative, and comprehensive planning process (the 3c process) in all urbanized areas that have a population of 50,000 or more. The planning process that emerged in the early 1960's was unified, directed primarily to analyzing, evaluating, and developing major capital-term investment solutions.

In the 1970's, urban transportation planning consisted of diverse activities (compared to the unified direction) and reflected growing diversity of interests in the planning process, including social, economic, environmental goals, and objectives. Recent situations reflect a shift of interest where local and state officials are faced with insufficient capital resources and are focusing on efficient management of existing facilities, including less costly alternatives that make the most efficient use of the existing system rather than considering long-term transportation options which involve high capital investment.

In the 1990's, three major pieces of legislation enacted significantly impacted the transportation planning process, they are the Clean Air Act
Amendment (CAA) of 1990, the Americans with Disabilities Act (ADA) of 1990, and the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The latter legislation not only marked the end of the interstate highway program, but relaxed the institutional, financial, and political framework within which decisions on transport investments had been made over the past 35 years (Meyer, 1993).

The ISTEA marked the end of “business as usual” in regard to transportation planning. The days of continued expansion of roadways to accommodate more traffic are over. The new act is designed to be sensitive to both national environmental and energy goals and is consequently more multi-modal in nature. It also assigns a great deal more decision making power to the metropolitan planning organizations (MPOs) than previously allowed. The new change in the transportation environment raises social considerations and proposes different sets of changes to the state of practice. These changes include consideration of land use, need identification through the management system, fund flexibility, and requires a prioritization of different projects competing for the same dollars within the transportation improvement plan.

1.2.2 Institutional and Organizational Context

From an institutional context, the transportation planning procedures mean structuring a systematic interaction among all “actors” who have a legitimate role in the programming process and the mechanisms for communication among actors; in other words, the transportation plan must be, on one hand, developed in close cooperation with multiple communities and the developers of those communities, and on the other hand, it must be responsive to overall state needs, objectives, and limitations.

When investigating transportation planning from an institutional context of general purpose governments, the actors include legally constituted decision makers: FHWA; the State Planning Agency (DOT) and other state agencies, the metropolitan planning agencies (MPOs), the regional planning organizations, and the regional citizen’s transportation advisory groups.

The FHWA historically emphasized transportation investment as an end in itself. The planning and programming of highway and transit improvement in
the State (DOTs) historically has ranged from collaborative State/local effort to processes having minimal involvement of local government. DOTs are responsible for insuring and providing public infrastructure in terms of buildings, maintaining major highways, and providing a legal framework which is influenced by the Federal government (Federal funds).

The traditional emphasis for many state DOT’s is on interstate, inter-city, and rural transportation systems. Such emphasis may leave an organization inadequately prepared to address urban issues. Consequently, the State levels are rarely oriented to use these responsibilities to assure (or force) an objective or healthy pattern of development of a particular community.

The third level, local governments (MPOs, planning commissions, and local agencies), are designed for making provisions of service and considerations for the identified need by their communities and groups, but are less influential in implementing comprehensive plans that assume maintenance or development of a community-desired character. In general, public participation refers to involvement in the planning process by persons other than the staff and decision makers. In the case of transportation planning, this includes elected officials, technical personnel, special-interest groups, users of transportation services, and members of the general public.

The new transportation planning environment includes the development of a long-range statewide transportation plan and the Transportation Improvement Plan (TIP). The necessary condition to achieve a sound plan in transportation planning activities is the coordination between DOTs and MPOs (with their new influential power in the planning process).

1.3 THE STATEMENT OF THE PROBLEM

A recurrent theme of most discussions in planning, programming, and implementation of transportation activities is that the linkage among these three vital processes are often weak or non-existing. They are performed in a way that reinforces their separation rather than as a continuum process. In other words, there is insufficient cooperation between the aspects of planning and management, despite their common ultimate goal. It might also be true that institutional,
organizational, and technical constraints explain the deficiencies of the current performance.

Consequently, the weak linkage and poor performance do not give adequate priority to the identified needs, lines of communication, proper participation, and consistent funding for the transportation improvement process.

The Federal acts and guidelines of the 1990's might offer encouraging signs that the components mentioned above can be combined in a more unified process. However, these acts do not provide a specific unified methodology or procedure to solve the problems.

Although the Federal acts and guidelines intended to help formulate a Statewide Transportation Improvement Program (STIP), the main programming and planning activities will still be done at the MPO level (with variation down to the district), while final decisions on programming and implementation will remain the responsibility of the DOT Central Office.

In this context, there is a reoccurring debate over the conflict between state goals and programs and local goals, which are based on the immediate needs and priorities of the local communities.

In essence, unless cooperative planning activities and a unified planning process with a clear line of communication and responsibilities are established, the state policies and programs that they try to force issues or target on the local community are not likely to get very far. Moreover, unless local communities have a share in the decision making and see an incentive (economic, etc.) to match their local programs and objectives, they will not do so.

In summary, although the need to strengthen cooperative and unified transportation planning processes more and more is recognized at the policy level, this recognition still has to be translated into a consistent and operating process. This, in turn, will require structural, institutional, organizational, and planning rearrangements which will take time and consume resources. Achieving this objective will be facilitated if all parties concerned are well prepared and oriented towards the new approach and know exactly what the methods and work procedures are.
The identified problem of this research is how to restructure a systematic transportation improvement program and to adopt and promote a transportation planning approach that will facilitate a more cooperative, interactive, open planning process among the legitimate transportation agencies (DOT's and MPO's) and public interest groups. The final output of the transportation planning process will be judged based on its relevance to public needs and how successfully it can be implemented. In general, the emphasis is how to establish a more accountable and efficient transportation planning process that will sustain support from both the potential decision maker and the public.

1.4 RESEARCH OBJECTIVES

Based on the above outlined discussion and problem identification, this research is intended to investigate and define future innovative concepts and methods for efficient management of the Statewide Transportation Improvement Program in Ohio. The emphasis is on identifying the current procedure, analyzing weaknesses and strengths and proposing guidelines for future improvements. The objectives of this research can be specified as follows:

1. Assessment of the state-of-the-practice of the statewide transportation planning process. This includes

   - Review and analyze the evolutionary development of the transportation planning process in the United States;

   - Investigate and classify the theoretical framework of the current state-of-the-practice;

   - Investigate and define required modifications of the transportation planning process as seen from different planning perspectives.

2. Propose and formulate the desirable future of the statewide transportation planning process. This includes

   - Identification and analysis of the descriptive model of the Ohio Transportation Planning Improvement Program;

   - Formulation of alternative transportation planning processes (ideal planning process) that will improve capabilities and respond to current issues and need priorities.
3. Formulate and recommend adaptive guidelines to improve the existing transportation planning practice and ensure a viable process.

The objective of this research is not to replace the dominant paradigm, but to investigate the possibility of how to get from one state-of-the-practice to another (performance change) by establishing a broader perspective in dealing with the transportation planning process. More specifically, establish an interactive open and effective participation planning process that articulates the public interest and the objective of the different legitimate transportation planning agencies (DOT's and MPO's). The proposed process is aimed to establish strong feedback and cooperative mechanisms to guide the decentralization of the transportation planning process in Ohio. The major emphasis is to formulate more realistic strategies for getting diverse traditions and legitimate interest groups to work together in an integral transportation planning, programming, and implementation process. The key issue is to integrate transportation planning activities and decision making into a responsive strategic management approach that seeks more opportunities and responds to the concerns of individual and public interest groups while matching political reality.

1.4.1 Assumptions

In order to establish reasonable guidelines for the systematic statewide transportation improvement program, the following assumptions are made:

1. The current practice of statewide transportation planning might allow independent actions by local and state governments and the result of these actions might be at odds with one another.

2. The proposed methodologies (procedures) have been designed to take into consideration the planning situation, which is regional in nature, (long-) or short-term in focus, and technically complex.

3. The planning process, decision making, and the involvement of citizens and public officials should be balanced with the level of technical effort.

4. The decision about the plan, including its final adoption, is to be shared between the DOTs and MPOs.
5. The plan is expected to meet the needs of elected officials as well as the regional system-level needs identified by MPOs and comply with overall objectives.

1.4.2 Hypothesis

The traditional view is that planning focuses on where we should go in the future with what and whom, while programming deals with the assessment of available resources and the appropriate scheduling for implementation. The remaining question is where planning ends and programming begins. The answer might be that planning and programming are different aspects of the same process. This research argues that the essential measure of success of transportation planning agencies is the degree to which the planning outcome is valued, but not only the ability to meet Federal mandates. Consequently, the research hypothesis are stated as follows:

1. A successful and efficient transportation planning process relies on:
   a. How to facilitate the line of communication and to provide useful information for the potential decision makers;
   b. The balance between the physical needs and the financial considerations, which is a major constraint;
   c. The overall transportation planning process, which is to match the identified needs with political reality.

2. Within the transportation planning agencies, the relative influence of administration and planning, as well as the different values that guide their staff and procedures, have made an integral planning process prone to problems.

3. There is a failure of recognition of how to formulate a consistent planning approach that allows for planning, programming, and implementation to be an integral process.

In short, this research argues that the current state-of-the-practice of the statewide transportation planning process in Ohio does not successfully cope with the needs of a changing transportation environment.
1.5 RESEARCH SCOPE AND PHILOSOPHY

The scope of the intended research is to develop a systematic statewide transportation planning process in order to provide opportunity for substantive input by planning concepts into the current state-of-the-practice. The planning tools are aimed to provide a meaningful input for techniques and processes of statewide transportation planning and programming. In order to achieve research objectives, the study stresses the following issues:

1. Great flexibility in the transportation planning process which is responsive to (a) changing conditions and new environment, (b) political and local attitudes, and (c) unforeseen circumstances.

2. Improve communication among the decision makers, the general public, and the planner.

3. An overall process stressing the systematic interaction among all actors who have a legitimate role in the transportation planning process and mechanisms for communications. Research shows that transportation planners are interested in assisting the existing decision making spectrum guided by the new institutional context rather than viewing the planner as someone who simply wants to take over or create a jurisdictional conflict among decision making groups.

4. Simplification of the planning requirements as well as procedures and planning methodologies, including selections, rankings, and alternative evaluations, will stress the consistency of real preference and the attainability of goals and objectives of transportation planning. The aim is to facilitate activities that respond to local goals and concerns in order to create a greater acceptance and an easier inter-field plan.

1.6 DISSERTATION OVERVIEW

Chapter I presents a general outlook at the intended research. It starts with motivation and background of each topic and then the significance of the problem is established. The problem is defined; the objective is stated; and the
research philosophy and general approach to resolve the problem are identified. It concludes with the intended audience.

Chapter II is an in-depth review of the evolutionary development of the transportation planning process within the United States. The review is done in chronological order, covering five decades. In each decade, the emerging planning approach and its limitations are discussed. The current Federal regulations and requirements that shape future transportation planning (ISTEA, CAAA) are discussed. Special attention is directed toward the strategic planning approach as being a promising tool in resolving immediate problems and being the direction for future research in the statewide transportation planning process.

Chapter III outlines the structure of the theoretical framework of the current state-of-the-practice; this includes planning philosophy and organizational responsibility. A conceptual framework for transportation planning activities in both the metropolitan areas and the state level is specified and discussed. A possible modification of the classical statewide transportation planning process (policy, system, project planning) is discussed and its advantages are illustrated. Current available planning techniques, such as the needs standard approach, single mode simulation evaluation approach, and the programming approach, that are useful in carrying out the planning process at the statewide level are discussed.

Chapter IV discusses the systematic analysis of the statewide transportation planning process from different perspectives, including Federal and statewide views and selected views of transportation professionals. Different planning and programming mechanisms at the statewide level are discussed. Examples of financial constraints and public involvement mechanisms in the states of Minnesota, Iowa, Louisiana, Washington, Wisconsin, Maryland, New York and Michigan are presented. It is concluded with the identification of common problems of the current state-of-the-practice and concluding remarks.

Chapter V explores and analyzes the descriptive model of the Ohio Department of Transportation's (ODOT) current state-of-the-practice. This includes an overview of the historical evolution of statewide transportation planning; the identification of the (hierarchical) organizational structure of trans-
portation activities (including the relationship between MPOs and districts); the procedures used to formulate the Statewide Transportation Improvement Program (STIP); the role of the local Transportation Improvement Program (TIP) in the STIP; the planning principals and procedures of both the MPOs and the Central Office; the future of the Access Ohio plan, and how to achieve an effective statewide plan.

Chapter VI presents a step-by-step transportation planning paradigm at the statewide level. The replication of some significant features from other disciplines are used to establish a strategic approach, this includes planning and management theories and corporate practices. A theoretical framework for the proposed paradigm is investigated and discussed. Special attention is given to the applicability and how to replicate planning concepts originating in the private sector. Basic features, such as participation, strategic vision, strategic alliance, results, and procedural design for the new paradigm are identified and discussed.

Chapter VII recommends guidelines to implement the proposed paradigm and improve the existing state-of-the-practice in the State of Ohio; this includes crisis management and the recognition of inconsistencies and problems involved with implementing the strategic planning approach.

1.7 SIGNIFICANCE OF THE RESEARCH

This research is intended to serve three groups of audience: (1) graduate researchers studying statewide transportation planning; (2) senior local and state elected officials who are responsible for conducting Federally funded statewide transportation planning activities; and (3) top management, staff, and personnel (at DOT and MPO levels) responsible for formulating the improvement plan. Among these three groups, this paper may serve the following purposes.

For the first group, graduate students studying statewide transportation planning, there is a need to understand the current state-of-the-practice, including hierarchy and the overall complexity of statewide planning activities. There is a need to pursue a new problem solving approach. In the academic curriculum there are several courses which focus primarily on the urban transportation
planning process, but few courses which focus on regional or statewide planning. Emphasis reflects either planning or engineering views. There is no single text reference available which provides an integral view of planning, engineering, and management perspectives. This research aims to partially fill this gap.

The second group, senior local and state elected officials, are faced with the complexity of Federal regulations and their requirements, i.e., ISTEA, CAAA, etc. They need to understand the limitations and apply techniques mandated by legislative regulations and possible policy alternatives in handling their responsibilities. It is essential for them to be aware of the evolutionary development of the transportation planning process as well as other successful examples of statewide procedures. This research presents an up-to-date reference tool which describes the policy of statewide planning and provides broad perspectives on the evolutionary development of the transportation planning process.

Given the multi-organizational structure and the complexity involved in statewide planning, the third group, top management, staff, and personnel (at DOT and MPO levels), is in constant need for reference guidelines to position themselves within state-of-the-art. This is especially true for those DOT staff who has partial knowledge of urban planning, and for MPO staff who is in search of a new role in the statewide plan. Consequently, the significance of this research is two-fold: (1) It allows this group to be aware of their present situation and performance. Following the required statewide planning approach, or "cooperative approach," this research is a point of reference toward further modification of the current state-of-the-practice; and (2) while ODOT has incrementally changed and modified the planning process over the past years, it has been unable to pay full attention to performance problems that arise. When change is needed, this research will allow the organizational staff to see where they are and what the possible direction is in terms of the organization's mission. It is a point of departure toward a more strategic vision, strategic alliance, and a cooperative process accommodating all legitimate parties.
2.1 OBJECTIVE OF THE LITERATURE REVIEW

Over the last five decades the transportation planning environment has seen a continuous change. In the 1990's, the Federal government issued several acts and guidelines that affected transportation procedures. The new requirements mandate for state transportation agencies to search for an appropriate strategy and planning process to establish a multi-modal statewide transportation planning process. Currently, transportation agencies are faced with new challenges and opportunities.

The primary concern of the intended research is two-fold. One, how to identify the scope and nature of the new direction, and second, how to use the transportation planning process as a catalyst to address the continuous flow of issues, concerns, and attitudes in the new transportation activities.

Toward that end, the following literature review sets out to investigate a state-of-the-art of the statewide transportation planning process. The overall objective is to capture the picture of dynamic change and its effect on the transportation planning spectrum. The review will address key elements in the transportation planning process and its evolutionary development. The scope includes different planning approaches, procedures, philosophies and will identify major shortcomings in the existing practice, pointing out a new direction for future research.

To achieve this goal, the literature review is divided into three major sections:

1. Part I: An overview of the evolutionary development of the transportation planning process.
2. Part II: Classification of the theoretical framework within the current state of practice of statewide planning.

3. Part III: Investigation of the required modification of the planning process as seen from different planning approaches.

2.2 OVERVIEW OF EVOLUTIONARY DEVELOPMENT

In recent years, a number of changes have occurred in the planning procedures through which transportation planning concepts are developed. The changes have been ongoing and rapid. As Hurst (1973) suggests, knowing the reasons why certain things have happened in the past provides a better guide toward understanding the present, and anticipating what will happen in the future.

The evolutionary development of transportation planning can be attributed to several different circumstances. These circumstances include responses to changing issues, conditions, and values (Wiener, 1984); a new understanding of the transportation phenomena; and new responsibilities. No matter how we investigate state level transportation planning and its complexity, its basic premises are developed through the urban planning process. The history of urban transportation planning can be traced back to early highway and transit planning. It is true that the new transportation planning responsibilities were evoked through Federal assistance and new acts.

2.2.1 Scope of the Evolutionary Development Review

It is not an easy task to summarize more than 50 years of transportation planning history. There are numerous individual and group efforts contributing to the evolution of transportation planning and its process, beginning in the early 1930's and ending with the provisions of the Intermodal Surface Transportation Efficiency Act (ISTEA) in the 1990s. The focus of this paper will be on some of the more significant events that help illustrate the evolution of the transportation planning process and help identify the planning perspective. The review is arranged in chronological order. It is divided into five major periods, each covering approximately one decade. The first decade covers the early development of transportation planning up to the 1950s. The second decade, the *Unified
Approach, covers the 1960s; the third decade, the Diversified Approach, covers the 1970s; the fourth decade, Decentralization Approach, covers the 1980s; and, finally, the Cooperative Approach of the 1990s. Within each decade the purpose of the review is to: (1) highlight the evolving issues of concern, and (2) define and critique emerging transportation planning approaches.

2.3 EARLY DEVELOPMENT OF TRANSPORTATION PLANNING

2.3.1 Planning Activities in the 1950s.

Urban transportation planning evolved from the early practice of highway and transit planning activities in the 1930-1940s. The primary effort was to improve the design and operation of individual transportation facilities. The central feature of this early era was to upgrade and expand the newly growing highway system.

In the late 1940's and early 1950's, transportation was subjected to extensive government intervention. The emphasis was on national interstate, and defense highway systems. The planning process targeted a long-range time horizon of 20 years. The focus of transportation planning in urban areas was mainly on economic evaluation, i.e. cost and benefit analysis. The planning procedures were a straight-line projection of traffic counts using a unified growth factor on an area-wide basis and comparing expected future volume to the existing capacity (Weiner, 1984). A good example which illustrates the state-of-the-art is a book by Ritter and Paquette titled *Highway Engineering*. The book shows that the major attention was given to the geometric design, road materials, and evaluation of alternatives based on economic criteria (Dickey *et al.*, 1983).

2.3.2 Urban Transportation Studies (UTS)

The Detroit Metropolitan Area Traffic Study (DMATS) was the first to put together the procedures of urban transportation studies between 1953-55. This pioneer urban transportation study consisted of six basic steps: (1) data collection; (2) forecasts; (3) goal formulation; (4) preparation of network proposals; (5) testing of proposals, and (6) evaluation of the proposals (Dickey *et al.*, 1983; Weiner, 1984). Four years later, the results of this Detroit study were applied to the Chicago Area Transportation Study (CATS).
Weiner (1984) pointed out that Urban Transportation Studies (UTS) were conducted on an ad hoc basis by special policy committees. Transportation planning was tied to highway planning and little attention was given to public transit (Allen, 1985). The primary objective of the UTS was to produce a plan and report on it in a limited time frame. This early effort was restricted due to the limited capacity of the available staff and computer technology (Creighton, 1972). The output of the planning activity was a regionally-oriented highway network based on economic criteria.

2.4 THE UNIFIED APPROACH

2.4.1 New Perspectives of the Transportation Planning Process in the 1960's

In the 1960's, urban transportation plans continued to be develop based on the methodology of the late 1950s. The travel demand analysis of the 1960s owes its start to the large scale transportation studies pioneered in Detroit and Chicago, as described above. Transportation planning activities in the 1960s focused on predicting travel demand in urban regions in relation to the growth in population, employment, and income. The attempt was to predict the distribution of travel demand (Martin et al., 1961).

2.4.2 The Urban Transportation Planning Process (UTPP)

The Urban Transportation Planning Process (UTPP) was established to provide a long-range regional comprehensive plan (Weiner, 1984). It was associated with wide macro-planning objectives that focus on large urban area transportation studies. The travel demand model is the basic tool of transportation analysis, it provides an input to policy formulation. The model includes four steps: (1) trip generation, (2) trip distribution, (3) modal split, and (4) trip assignment. The UTPP approach was used later with a variety of formats for most of the early statewide transportation planning studies.

Major criticism of the UTPP approach rests on two shortcomings: 1) the UTPP model neglects the effects of congestion on highway demand (increasing congestion on a certain route reduces the usage of this route—consequently forcing people to shift to another route), and 2) due to extensive data collection requirements and costs associated with base-year calibration, the model does not
encourage the evaluation of a wide range of alternatives. Fischer (1987) adds that another shortcoming is the lack of feedback among the four steps of the travel demand model.

2.4.3 The Comprehensive Approach: "3C" Process

In 1962 the Federal Highway Administration (FHWA) established a regulation called the "3C" (continuation, cooperation, and coordination) plan. It required the Metropolitan Planning Organization (MPO) to adopt a Transportation Improvement Plan (TIP) and a process to oversee the allocation of Federal aid to urban systems (Nwankwo, 1989). Within the plan there are two main features which significantly affect the organizational arrangement in performing the planning process. The first feature of the plan required adopting a planning process in urban areas rather than cities. It focused attention and responsibility on metropolitan or regional levels. The second feature established that the planning process should be a mutual responsibility, carried out on a cooperative basis between state and local communities (Weiner, 1984).

2.4.4 UTPP vs. 3C

Urban transportation planning of the 1960's led to two approaches; the UTPP, which is travel-demand oriented; and the new 3C process. The 3C process offered more flexibility and free choice to change the model parameters in response to future alternatives. A major advantage of the 3C process, in comparison to the UTPP, is that it does not take travel demand for granted. However, the 3C process does increase the cost and expand the time of the alternative analysis, consequently, the focus of the 3C is limited only to a small number of alternatives (Kermit, 1989). In both approaches, there was one common weakness in the planning process—the problem identification phase was limited to the formulation of objectives rather than defining the issues. The reason for this shortfall might have been caused by limitations in obtaining meaningful consensus among all legitimate transportation-interest groups.

In 1966, the Department of Transportation (DOT) was created to coordinate the transportation program and to facilitate development and improvement of coordinated transportation systems. The mission of DOT was to create safe,
efficient, convenient transportation at a lower cost—matching national objectives (US Department of Transportation, 1992).

2.5 THE DIVERSIFIED APPROACH

2.5.1 Shifting Attention In The 1970's

By the late 1960's there was a lot of criticism of urban transportation planning. The complaint focused on the neglected social, environmental, and energy impact, and the limited number of alternative evaluation analysis. Planning activities during the 1960s had a long-range time horizon with limited emphasis on the multi-modal concept, and less responsiveness to emerging issues.

There were several issues and concerns that helped accelerate the shift of planning emphasis of the 1970s. Some of the concerns include: (1) scarce resources in terms of constructing new facilities, (2) a growing awareness of environmental concerns, and (3) the 1973 oil crisis and its implications for energy demand. Consequently, in the 1970s, there was a major shift of interest toward an increased assessment of social, environmental, and energy impacts. During the 1970s there was a change in perception of transportation problems starting with air pollution and high energy consumption. By the end of the decade the problem increased in complexity by the addition of growing concerns about issues of financial drain and governmental funding for social services. Transportation planning activities shifted their emphasis from long-range to short-range focus.

2.5.2 The System Approach

The system approach is a technique of utilizing scientific methods and knowledge to resolve complex problems. It stresses the analysis of the system as a whole by taking into account a large range of variables. The basic characteristics of the system approach is objectivity, multi-disciplinary, inter-relatedness, reliance on quantitative models, and similar techniques (Miles, 1973). Reichman and Saloman (1987) described the system approach as a diagnostic approach to deal with the problems of system performance, i.e., level of service, time, money, and energy cost.
The 1970s witnessed a growing interest in large scale system approaches for transportation problems. Modeling techniques received wide attention. Their application was made possible by rapid computer development and newly expanded capabilities. This situation facilitated more sophisticated transportation evaluation methods. However, the major obstacle was the limitation of data availability. The planning process during the 1970s centered more explicitly around identification of problem-setting goals, recognition of a wide range of external effects, and an increased environmental and social concern at the state and national level (Dickey et al., 1983; Manheim et al., 1975; Weiner, 1984; and Semerk, 1981).

According to Reichman (et al., 1987), major criticism of the system approach stands on the fact that "in the final analysis, the transportation policy maker still evaluates the performance of the system in terms of its own effectiveness rather than in the needs of society."

2.5.3 Transportation System Management

Due to the increased complexity of the transportation environment during the 1970s, large scale data collection and sophisticated modeling techniques became questionable. There was a growing awareness of the need for more simplified travel analysis tools (Dickey et al., 1983). While the Federal government tried to take the lead and force new issues, there was great emphasis on the new Transportation System Management (TSM), where the general trend of planning activities focused on preservation rather than expansion of the existing system. Several attempts were made to incorporate new "TSM" concepts into planning activities. However, that was a period characterized by learning to perform and implement TSM. The main challenge of the planning process was on how to keep a balance between accuracy, simplicity of assumption, and quick response. Due to the increased complexity, uncertainty, and conflicting situations, in addition to the difficulty in quantifying, the judgmental-oriented approach was the best available methodology at hand (Dickey et al., 1983). The commitment to public decisions without effective citizen involvement placed an additional burden on the planning process (Weiner, 1984).
2.5.4 Statewide Transportation Planning

In 1973 the Federal government required urban areas to submit annual unified work programs for all transportation planning activities to the state DOT as a condition of receiving planning funds. The work program also required identification of the agencies responsible for each activity and a proposed funding resource. This process was meant to rationalize the planning activity and to secure joint funding under DOT assistance (US Dept. of Transportation in Housing and Urban Development, 1974). Thus, by the year 1973, about twenty states had created their own Department of Transportation (Pecknold, 1974).

The Transportation Research Board (TRB) conducted several national conferences on issues concerning statewide transportation planning between 1974 and 1979. Most of its recommendations concentrated on a planning and programming process for a multi-modal system. Statewide transportation planning is described as a continuous process of analysis, recommendations, decisions, and subsequent evaluations covering intermediate, short-range and long-range actions on a specific network of transportation facilities within the state (Statewide Planning Seminar, 1979). This direction requires that transportation interests deal with a wide range of impacts, alternatives, capital investments, options, political/institutional restraints, and public involvement. Traditionally, the MPO initiates the planning phase of the project development while programming (scheduling projects for implementation) is done by state DOTs. One major weakness of the statewide practice is the lack of connection between planning and programming. The practice should be a coordinated effort of the involved agencies with planning, programming, and implementation as a shared process (TRB Special Report #146, 1974 and Special Report #189, 1980).

The traditional framework of statewide transportation planning between 1965-1977 was called the linear concept. The dominant feature of this approach was to provide a sound technical plan for one mode or more—and then to implement it. Historically, in most state-level experiences, implementation, programming, and communication were often conducted after the technical work was completed by the planner who was the subordinate to the process (Creighton et al., 1980).
2.6 THE NEW DECENTRALIZATION ERA

2.6.1 Flexibility in the Planning Process of the 1980's

Throughout the decade of the 1970’s there was an increase in complexity in addressing urban transportation planning. A growing number of requirements, regulations, and emerging issues placed an obvious burden on the planning process. The 1980’s brought a new challenge and responsibility to urban transportation planning—it was the start of decentralization of transportation authority and responsibility. Moreover, there was a significant reduction of government involvement. Consequently, state and local governments were allowed more flexibility in formulating planning processes. As Allen (1985) summarized the situation, by the end of the 70s there were several remarkable changes. For instance, a shift from the previous classic approach to (1) less reliance on computer programs, (2) more public participation, (3) a wider range of criteria for evaluation, and (4) increased consideration of transit alternatives.

2.6.2 The New Direction

The 1980's witnessed several fundamental changes that effected the transportation environment. Publicly funded transportation planning agencies shifted emphasis from what was essentially a single program or project planning (highway) to multi-modal planning activities. Federal government policy also witnessed a major reform. Its intervention into the transportation planning process was limited to the determination of a specific output of transportation activities, while the details of the planning and programming procedures were left to state and local agencies (US Dept. of Transportation, 1983C; Weiner, 1992).

Transportation planning activities of the 1980’s enabled the implementation process to be shorter and less complicated. The major indicator of successful implementation was the link between planning and programming and the degree of achieving a prespecified mission. An advantage of the new flexibility was that it enabled planners and decision makers to create (in coordination with elected officials) and integrate new processes which utilized the stockholder in the decision process. Urban transportation planning activities were still a mutual responsibility of the MPOs and state and public transit authorities. However, several significant features of urban transportation developed with the
decentralization of authorities. These developments included (1) the assurance of more citizen involvement, (2) an increase interest in urban revitalization, and (3) the integration of corridor planning into urban transportation planning. However, the responsibilities of the MPO were to be determined by the state's governor (US DOT, 1992). The Federal government was still committed to urban planning and required that projects be based on the principle of the 3C process; it continued to provide funds for planning activities without specifying how the process should be performed (Weiner, 1984).

2.6.3 The Strategic Planning Approach

In the 1980's, planning activities and processes tend to focus on more than just the 3C process. They shifted attention to consider possible future events and how to plan (strategically) and influence the outcome (Tyndall et al., 1990). The Strategic Planning Approach (SPA) is described as a systematic process of identifying opportunities and threats in the future environment, formulating policies based on organizational resources and goals for operations in the environment over a relatively long period of time (Steiner, 1984). Figure 2.1 illustrates the history of strategic planning and strategic management.

Olsen and Eadie (1982) divided the strategic planning process into five steps: 1) formulation of the overall missions, goals, and objectives, 2) environmental scan and analysis to identify factors that affect the transportation organization, including present and future impacts, 3) fiscal resource allocation, 4) evaluation and selection of the strategic options (where the options are selected based on organizational resources and within the surrounding constraints), and 5) implementation. Figure 2.2 depicts the strategic planning and management cycle. Despite the fact of a wide recognition and adoption of the strategic planning approach, the basic problem in applying the concept to transportation planning activities was that there was little connection between the plans and the day-to-day operations and budgets of the agencies (David, 1986). The plan, developed by planners (with limited experience in operations), and implemented by engineers, was based on the decision-maker's attitude. Consequently, many strategic plans were not successfully implemented. New planning activities were
Figure 2.1. History of strategic planning and strategic management

(source: Meyer, 1966)
Figure 2.2. Strategic planning and management cycle.
directed toward project development, implementation, and considerable investment in impact analysis and enforcement of the possible outcome. However, new planning activities faced the difficulty of allowing more revenue or approving more taxes. As a result, the transportation alternatives were limited to minor construction, Transportation System Management (TSM), and maintenance (Dickey et al., 1983).

2.6.4 The Strategic Management Approach

In literature there is a variety of interpretations of the term "strategic planning." A good review covering the subject is a published article by Bloom (1986) in the Journal of Planning Literature, Spring 1986, titled "Strategic Planning in the Public Sector." The author pointed out and summarized several references, including Ferries, 1983; Olsen and Eadie, 1982, and; Ascher, 1983.

The Strategic Management Approach (SMA) is a recent concept borrowed from the private sector (Meyer, 1988). It is described as a process of preparing future vision to achieve organizational planning objectives in order to direct and control the entire organizational activities to accomplish the prespecified mission. Figure 2.3 shows the strategic management stages and elements.

According to David (1986), the objective of strategic management is the formulation and selection of actions, and implementation of these actions that will enable an organization to achieve its objectives. Within literature there is no consensus concerning the definition of strategic management. Each organization is expected to develop its own version in terms of its surrounding environment and constraints. A pioneer example of strategic management by public transportation agencies is the attempt of the Pennsylvania DOT to modify the Strategic Planning Approach. The new process aims at uniting the diverse functions on a cohesive line of action and setting participation process to develop the statewide transportation plan (Tyndall et al., 1990). The proposed approach was an interactive process to link the planning process in the Strategic Planning Approach with day-to-day operation and management. The key difference between strategic management and other planning, management, and administrative processes within transportation agencies is that it requires basic changes in the organizational structure, including changes in attitude. It is a time consuming processes.
Figure 2.3 Strategic management stages and elements

* It is possible to be involved in States II and III simultaneously with different elements

(source: Tyndall et al., 1990)
Figure 2.4 Strategic management elements of Stage II

(source: Tyndall et al., 1990)
The "strategic" concept rests heavily on three foundations: 1) participation, 2) process element, and 3) product. A major criticism of the strategic management approach is the long time needed for formulation and implementation. Figure 2.4 illustrates the elements of stage II.

2.6.5 The Future Challenge of Statewide Planning

The 1980's were an era of decentralization. There was a renewed interest in regional scale transportation planning activities, more emphasis on new directions for the 21st Century, and several different perspectives to reach these goals were illustrated. During this time, policy considerations began to force planning, prioritizing, and programming into state-level transportation agencies. The new direction would enable a coordinated effort between the different planning levels and would integrate transportation planners' efforts into public policy considerations. By the end of the decade, the focus of statewide planning was on financial policy analysis, communication, and project scheduling for implementation (Creighton, 1980; Reed, 1992).

2.6.6 Critique of the Current Transportation Planning Process

Literature indicates that in the area of statewide transportation planning and programming, there were numerous conferences held and efforts made to predict the future of transportation planning and its processes in order to meet the challenges of the 21st Century (TRB Special Report #89, 1980; TRB #1243, 1989; and TRB, #1209, 1989).

Several individuals presented their critique and expectations for the future of the transportation planning process in the following:

Manheim (1980), in his article "The Future of Statewide Transportation Planning," points out that the traditional transportation planning process has been centered around the development and analysis of alternatives in the form of comprehensive schemes for long-time horizons (20-30 years). Within that format, urban-level transportation planning activities were dominated by the 3C process and at the state level, planning activities were dominated by the management of large scale data collection and related technical methods, i.e. cost-benefit
analysis—focus was on assessing the impact of the different courses of action—using sophisticated technical methods (centered around data collection needs). Criticism of this framework rested on three major elements: the implication that the planning approach viewed transportation planning to be somewhat removed from the political process, neglecting the value issues of conflicting goals and objectives, and forced the planning activity to be away from the emotionally expressed needs and desires of various interested groups.

Manheim (1980) argued for a change in statewide transportation planning techniques. He stressed the need to challenge traditional transportation planning rules and methods and called for new techniques and approaches for the analysis of statewide planning, programming and options. He also emphasized the opportunity to perform a quick, simple, and flexible technique that covers a wide range of impact areas, such as priority and programming.

Hoel (1989) specified that in the future, the main question will be how to position ourselves within the processes that have been used to develop plans and the proposed future of US transportation. He points out that the current process is comprised of three distinct steps:

1. The process deals with the determination of society’s needs. These needs influence the travel characteristics and form the requirements of the society.

2. The process is to seek understanding and definition of the transportation problems. This includes the perspectives of providers, users, and operators of the system.

3. The process is to formulate programs and transportation improvement that respond to social changes and needs.

In 1982, the American Association of State Highway Transportation Organization (AASHTO), in cooperation with the Federal Highway Administration (FHWA), sponsored a survey on statewide planning. The result indicates that the substantive (technical) activity of statewide planning (including programming/scheduling of project) has been isolated from management. As a result of the survey, AASHTO recommended the transportation planning agencies 1) consider management concepts (policy, communication) as an integral part of the planning process rather than a separate one, and 2) the sub-
stantive content of statewide planning should not only deal with financial constraints, but also provide the needed information for the decision maker (Synthesis of Highway Practice, N95, 1982).

As Meyer and Miller (1984) argued, many public sector organizations thought of planning only at the program or project level. The major products of the traditional planning process are a comprehensive and complete plan. Meyer emphasized that planning should be viewed as a process that is inextricably linked to organizational decision making. His philosophy is that the planning process 1) should be rooted to the premise of the organization and 2) should be viewed as providing useful information to decision makers (at all levels) in an organized fashion and timely manner. The overall objective of the process is to enable the organization to understand where it is and where it is going. He further argued that planning must be 1) an integral part of the decision-making process, and 2) the planning process should focus on communication, with the basic aim of the decision makers to provide useful information to identify and select alternative courses of action.

Lockwood (1989), in his article about transportation planning for the year 2020, described the dramatic transitions facing transportation in the 21st Century. His argument is that the state of the practice of the transportation system, between the late 1980's and early 1990's, focused on how to preserve the infrastructure and maintain the existing level of service just to satisfy the existing demand. He summarized his concerns about the future of transportation planning as follows:

1. The partial completion of inter-regional highways forced agencies to adjust their strategies to two situations:
   a.) for the completed portion, attention should be on effective operation and maintenance (preservation), and
   b.) for uncompleted portions (or due to limited funding from Federal aid), the efficiency strategy will be the precondition for eligibility of funds.

2. Although MPOs hold responsibility for urban area transportation project developments, they have limited power in the implementation process at the state level.
2.7 THE CURRENT STATUS OF THE TRANSPORTATION PLANNING PROCESS IN THE 1990'S

2.7.1 The New Cooperative Approach

In the early 1990's there was major criticism concerning the urban transportation planning process of the 1980's. Planning was criticized for fragmenting institutional responsibility in the vertical hierarchy as well as the horizontal hierarchy. There were loose ties between land use, air quality, and other modes. The early application of the Transportation System Management (TSM) in the 1980's did not prove effective in the 1990's. Although there is a wide recognition of the traffic management system and an increased awareness of the system operations, there is still a great need for a methodology that emphasizes interplay among demand and supply and among different planning levels (MPOs, DOTs).

As Elizabeth Deakin (1990) argued, the TSM analysis is used by most of the MPOs in analyzing subdivision requests. However, the analysis approach has several shortcomings due to the shortage of local data (the analysts depended on "default values" or data borrowed from another area, assumptions made about future travel behavior, origin destinations, and so on). Consequently, the results were highly approximated. Deakin stressed that ignoring land use analysis weakened the link and caused conflicting issues which affected transportation planning. Planners are responsible for land use while engineers are responsible for transportation. Moreover, most transportation facilities and services are provided by state and regional agencies, rather than local agencies, while land development is overwhelmingly a private sector initiative.

2.7.2 The Features of the 1990's Transportation Environment

In 1990, a National Cooperative Highway Research Program (NCHRP) report described the changes in the transportation environment. Some of the factors contributing to these changes are: 1) economic, 2) demographic, 3) transportation services and user demand, 4) wide range of transportation providers, 5) shift in the Federal attitude toward financial support, 6) essential completion
of the interstate system, and 7) the trend toward consolidating public transportation modes into umbrella agencies (NCHRP Report #331, 1990). The 1990s have seen two major changes in the transportation environment:

1. After a decade of decentralization of authority and responsibility, urban transportation planning was faced with the dilemma of low density development patterns, congestion, and air pollution. This situation required a more regional scale or statewide transportation planning to deal with the problems of urban areas.

2. The Federal government has had a major change-of-attitude concerning financial aid, providing more flexibility for fund allocation and encouraging cooperative planning efforts among Federal, state, and local planning organizations. The flexibility of the financial policy requires a new set of techniques and procedures to deal with multi-modal alternative analysis and planning (US Dept. of Transportation, 1992)

2.7.3 The New Federal Guides to the Transportation Planning Process

Changes in goals and objectives can influence planning philosophy. The new planning activities focus attention on more comprehensive and integrative strategies. In the 1990s there is a growing concern toward moving to a more long-range, multi-year and multi-modal process. Although there were several proposed strategies and management planning processes in the late 1980s, there was little, if any, successful implementation. In fact, there was limited flexibility and a conflict of interest between planners/operators (or decision makers)/designers within the transportation system. The 1990s are witnessing a trial to overcome institutional fragmentation and strengthen the relationship between planner/engineer/manager within the existing transportation hierarchy (MPOs and DOTs). There is a Federal government intervention to guide and strengthen transportation planning activities. The three acts of legislation that furnished the new directions are:

1. The Clean Air Act Amendment of 1990 (CAAA),
2. The American Disability Acts of 1990 (ADA), and the
3. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA)
2.7.3.1 The Intermodal Surface Transportation Efficiency Act (ISTEA)

Generally speaking, the newest legislation, ISTEA (the most significant and controversial act), was meant to fix some of the limitations of the previous Federal acts and direct transportation planning into a new era (Larry Flynn, 1992; Kassoff, 1992). The statement of this policy, set forth for the purpose of the acts, states:

"It is the policy of the United States to develop a national inter-modal transportation system that is economically efficient, and environmentally sound, provide the formulation for the nation to compete in the global economy, and move people and goods in an energy efficient manner."

U.S. Department of Transportation 1992

Netzer (1992), in his article "Do we really need a national infrastructure policy?" states that "The only evidence of widespread and systematic under investment is for highway," and stressed that the situation is a result of the structure of state highway finance systems and the lack of a coherent replacement strategy. He points out that the consequences of infrastructure deficiencies are almost entirely local, rather than national. The main cause of these deficiencies is that state and local governments rely on external events rather than internal policy for their replacement strategy.

2.7.3.2 The current effort to make ISTEA more applicable

In making ISTEA practical, it is true that the actual creation of entirely new institutional relationships with processes and criteria to handle the diverse project proposals will need a transitional period, and a vast investment of money (Mallery, Lund, et al., 1992).

As Wayne Muri, president of the American Association of Highway Transportation Organization (AASHTO), pointed out in his 1992 statement to the Senate Subcommittee on Environmental Public Work about the implementation of the ISTEA: The AASHTO Standing Committee on Planning formed a task force committee on Metropolitan Planning Organizations (MPO) in cooperation with the National Association of Regional Councils and the American Public
Transit Association. It performed a survey asking both MPOs and state DOTs to identify major challenges they are facing as a result of the ISTEA legislation. The result of the survey indicated that 60% of the MPOs and 80% of state DOTs are in the process of updating the State Implementation Plan.

Today, there is a great debate over the suitable way to utilize the new provision of the ISTEA and its requirements for the (statewide) planning process. ISTEA addresses some of the neglected issues of previous laws. The transportation community still struggles with these issues. The focus is on processes to cope with changes in the transportation environment. Knowing that future requirements are not easy to predict the Transportation Research Board, in conjunction with the Federal Highway Administration, and the Washington DOT held several conferences in an effort to anticipate the future of transportation planning in the 1990s.

The first conference, *Moving Urban America*, was held in Charlotte, North Carolina on May 6-8, 1992. The conference focused on the general characteristics of the planning approach that will accommodate the new requirements of the Clean Air Act and ISTEA.

The second conference, *Transportation Data Need*, was held on May 27-29, 1992 and stressed different types of data and data collection techniques which are considered necessary to support transportation planning activities.

The third conference (Transportation Planning, Programming, and Finance), held in Seattle, Washington, July 19-22, 1992, investigated the major characteristics of multi-modal planning and programming with emphasis on the transportation planning process and institutional characteristics of transportation decision making in the 1990s. The major objectives of the conference were: 1) review of the emerging issues affecting planning and programming decisions, 2) assessment of current approaches to programming and planning (including institutional and technical aspects), and 3) to determine steps required to address the emerging issues (Transportation Research Circular 406, 1992).

More important is the structural change in the transportation spectrum (environment) and its impact on local communities. Attention is now being paid
on how to provide a flexible planning concept and on tools to assist the decision maker to be able to interact with local objectives and goals.

2.8 THE FUTURE OF STATEWIDE TRANSPORTATION PLANNING

The relatively new statewide transportation planning process continues to change in response to new issues and challenges facing the community. In recent years DOTs experienced several internal and external changes. One major challenge is that most DOTs are highway-oriented with limited experience in multi-modal planning concepts.

The AASHTO Board of Directors and its task force provide several new policy resolutions. In the one entitled Statewide Planning Regulation (PR-17-92), AASHTO states that "if planning continues to be done in the same way, with the same tools, using the same processes and procedures, it will end up with unusable and unrealistic plans. The resolution argues for the need of a new approach--strategic planning--that will encourage all regional partners to come together in defining a regional vision, conducting an environmental scan, performing a stockholder analysis, and identifying critical issues and strategies. In this regard, the planning process should follow both a top-down and bottoms-up planning approach." The lower level of any planning agency (mainly the MPOs) should prepare a local plan to include both programs and priorities. However, these plans must fit within the overall statewide plan. The expectation of the strategic planning concept is to allow for a flexibility in the planning process, and this will most likely differ from one state to another (AASHTO 1992).

2.8.1 Statewide Transportation Requirements

According to the Interim Guidance on Statewide Planning and Programming, 23-USC-135, statewide transportation plans must include:

1. Element for all modes, including coordination of the plan element;
2. Policies for implementation of projects based on plans, and;
3. Development of a cooperative process with MPOs for metropolitan areas of the state in accordance with 23-USC-134.
2.8.1.1 The product of the Statewide Planning Process

As a summary of the new regulation, 23-USC-135, the requirements for the statewide process include two major products:

1. Development of a long-range (statewide) transportation plan. The plan must be coordinated with the development of the State Transportation Improvement Program (STIP) and metropolitan transportation planning activities.

2. STIP must include projects which are consistent with
   - a long-range statewide transportation plan and implementation plan (SIP)
   - metropolitan area plans (TIP),
   - ozone and carbon monoxide non-attainment areas, and
   - projects which conform with statewide objectives.

In ISTEA, several important Federal requirements highlight new directions for the transportation planning process. There are key aspects giving special significance to the statewide transportation planning process and urban transportation planning. The US DOT published several Federal registers to explain the change within the transportation environment and different planning levels. Some of these registers include: Part I: Metropolitan Planning Proposed Role, Part II: Statewide Transportation Planning Proposed Role, and Part III: Management and Monitoring Systems Proposed Role, (published in March 1992.) The terms multi-modal and inter-modal describe the new types of planning and programming in the 1990s.

As Meyer (1992) pointed out, ISTEA not only marked the end of the interstate highway program of 1956, it also allowed more flexibility to the institutional, financial, and political framework within which decisions on transport investment have been made over the past 35 years. Meyer classified five areas in which ISTEA presents substantial opportunities: 1) institutionalizing flexibility, 2) multi-modal transportation planning, 3) system management, 4) advanced technology, and 5) transportation finance.
2.8.2 New Opportunities of ISTEA

ISTEA directs a great amount of attention to the planning methodology at both state and local levels. First, at the local government level (MPOs), ISTEA emphasizes that the planning process must include consideration of several issues such as land use, method to enhance transit service, and need identification (which is the basic focus of this research). These key transportation planning components are to be considered in a more comprehensive, decision-making fashion. Second, at the state level, ISTEA allows for new opportunities and requirements as follows:

1. Greater Flexibility in the Use of Funds for a Variety of Transportation Modes and/or Project Types

ISTEA created a new block grant program, the Surface Transportation Improvement Program (STIP), which provides funds available for a wide range of highway, mass transit, safety, and environmental purposes. The current state of highway and mass transit planning practice does not enable state and local agencies to perform trade-off analysis. This limited capability affects the performance of cross-modal fund analysis. The traditional planning activities at the state level focused on a planning process that was associated with fiscal planning at the state level and performed a modal-oriented approach (i.e., highway only).

ISTEA allows state and local agencies greater flexibility in the selection of highway and mass transit projects. The change and increased flexibility brings attention to the model trade-off issue. However, at present, it is difficult to perform such a task. Traditional criteria for highway project evaluation focus upon the movement of vehicles, while mass transit evaluation criteria focus on the movement of people. However, there is a new opportunity to use the cross-model fund and trade-off analysis in statewide transportation planning. The emerging issue is the quantitative and qualitative evaluation criteria. In order to be able to use the opportunity, the focus should target the idea of establishing comparison criteria based on a common ground. The promising criteria include 1) mobility, 2) safety, 3) environmental impact, 4) cost effectiveness, and 5) social economic benefit to all transportation partners. (GAO report on Transportation Infrastructure (1992)).
2. Requirement for Development and Operations of Inter-modal Transportation Management in Each State

ISTEA strengthens the MPO's processes and expands their role in project selection and transportation decision making. In addition to the fifteen interrelated factors in the development of long-range MPO's transportation plan, there are additional requirements related to congestion management, project selection, and certificates (see Appendix B).

Berenston (Washington DOT), commenting on his multi-modal transportation concept, argues that the transportation process should be viewed as an issue base not as a transportation-mode base. He defends his argument that the issues, like economic development or urban mobility, involve many modes of transportation.

3. Requirements for Developing Statewide Transportation Processes, Planning, and Programming in Each State

Statewide transportation planning is the activity (or series of activities) that tends to lead to a recommendation for making coordinated change in construction, investment, technological improvement, pricing, subsidizing, and regulations with respect to transportation facilities and services of all types, including facilities for the movement of people and goods (NCHRP Report #95, 1980).

In accordance with 23 USC, Section 135 as amended by the ISTEA, all highway and transit projects in the states funded under title 23 of the Federal Transit Act must now be included in a Federally approved, multi-year STIP.

- The STIP must reflect expected funding and priorities for programming and provide opportunities for public comments.

- States are required to develop a long-range plan (STIP) covering all modes of transportation in coordination with MPOs and utilize public comments. (For more details of new considerations of state level processes, see Appendix C.)
- MPO's will adopt a four-year Transportation Improvement Plan (TIP), for informational purposes only. The analysis of air quality conformity and fiscal constraints will include only projects for the first four years.

With the implementation of the new ISTEA, a valid question is, what type of planning and process should be used to achieve the new requirements?

TRB has been asked by the AASHTO's Standing Committee to investigate and review the result of various efforts currently underway in the 2020 Transportation Consensus Program. The recommendations of the TRB conference held in Boston, Massachusetts in May, 1985, suggests that the current planning process (3C) might need a modification to enable it to face the challenge in transportation policy planning for the 21st Century. The proposed process requires that the planner be creative, credible, and communicative.

The basic premise of this review is first, how to arrive at a better understanding of the future of the statewide transportation planning process. Second, how to focus on, and be guided by, a sound body of theoretical knowledge to formulate a systematic statewide transportation planning process. A critical point is how to integrate substantive planning concepts and tools, in addition to management systems, into a statewide planning process.

In the following chapters, this research attempts to discuss what the states are doing in order to deal with the new issues and requirements of the Statewide Transportation Plan, i.e. fiscal planning, cooperative efforts between MPOs and DOTs, public participation, etc. There are varying problems, needs, and practices among the different states. It is assumed that acts and guidelines established at the Federal level allow these contrasts. The challenge of this research is how to develop and adopt a transportation planning process for all modes that covers all regions and metropolitan transportation planning organizations in the form of a statewide plan. The process should utilize the interaction among agencies, groups, and individuals resting on an acceptable and understandable bases.
CHAPTER III
THEORETICAL FRAMEWORK OF THE CURRENT STATE-OF-THE PRACTICE

3.1 OVERVIEW

In statewide transportation there are several factors that affect planning activities, such as Federal and state programs, legislative mandates, political constraints, and fund allocations (NTPSC Report #4, 1979). Today change takes place both in the organizational framework and the emerging issues that confront the state transportation department. These changes include (1) a wider range of functions and details in planning and programming at the state level; (2) different time frames for planning activities; (3) and a wider spectrum of consideration.

Most of these factors are viewed as obstacles. The traditional viewpoint of statewide planning is that most of the decision making is political or programmatic. In order to accommodate the diverse activities, there is an increased need to create a more flexible planning methodology. There is a need for practical conceptual framework techniques that provide a quick response.

The basic premise of the needed methodology is to match the policy-sensitivity and facilitate testing and evaluating the proposed course of action. The overall objective is to provide timely and sufficient information to the decision maker rather than a very detailed and costly one. In order to achieve this, it is necessary to understand and explore the current state of the practice. At the statewide transportation planning level a number of critical issues have to be considered regarding the current methodology. The aim here is to highlight some of these critical issues. To name a few:

1. What is the generic sequence to form a definite and orderly planning process?
2. What is the current responsibility and institutional organization of the state of the practice?

3. Is there a unified planning process to perform the statewide plan? If so, how?

4. Do techniques exist by which alternative solutions can be identified and analyzed (modal, multi-modal, inter-modal)?

The objective of the following review is to discuss these questions and point the direction toward appropriate future research.

3.1.1 Planning Philosophy at the Statewide Transportation Level

In the literature about planning philosophy, various different planning concepts are expressed (Rittel et al., 1973; Wildavsky, 1973; Hudson, 1979; Shallal, et al., 1982; Saaty, et al., 1985; Wheelwright, 1984; Khan, 1989). They have three generic steps in common: (1) starting point, (2) goal (or end-point), and (3) a means of connecting the two. The aim of the planning process is to combine the three steps with the least cost to achieve the greatest output. Planning philosophy has been classified into three major distinct approaches: (1) formal planning, (2) incremental planning, and (3) system planning (Saaty, et al., 1985). Despite the differences between the three philosophical approaches, five steps formulate the generic conceptual framework of any planning process: (1) problem structure, (2) identification, (3) evaluations, (4) implementation and monitoring, and (5) re-evaluation.

In reviewing transportation planning methodologies and their relation to different definitions of planning, it is essential to understand the strengths and weaknesses of each planning approach. Figure 3.1 depicts the comparison of different planning philosophies. The simplest definition is that transportation planning is a rational process for formulating and meeting objectives of transportation agencies. Transportation planning is an important ingredient of the decision making process. Boulding (1974) argued that "the world moves into the future as a result of decisions, not as a result of plans. Plans are significant only insofar as they effect decisions." As Haack et al. (1980) point out, transportation planning must focus on decisions and both the planner product and the planning process must be designed to facilitate decision making. The
<table>
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<th>PROMINENT PLANNING</th>
<th>Identification &amp; Evaluation of Alternative Responses</th>
<th>Implementation of Chosen Response</th>
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<tr>
<td>Systemic Planning</td>
<td>Assumes that problems can be accurately characterized by quantitative models and that there is consensus on the definition of a problem. Alternatives limited to those whose costs and benefits may be objectively measured, preferably in terms of criteria common to all options. Select optimal plan in terms of precise criteria. Relaxes constraints on range of alternatives identified and uses fix of quantitative and qualitative methods to identify criteria, and select that plan which is perceived to fulfill important criteria.</td>
<td>Assumes that implementation is affected by subjective assessments of adequacy and relevance in the minds of the users of the plans. Stresses modification of a plan to meet the needs of users.</td>
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<td>Incremental Planning</td>
<td>Assumes lack of consensus on problem definition but offers no mention for characterizing diversity. Alternatives limited to those which represent marginal or small modifications of existing plans. Relies on bargaining and compromising to select plan that is &quot;acceptable&quot; vs. &quot;optimal.&quot; Criteria not explicit</td>
<td>Relies on built-in flexibility that allows the users of a plan to adapt and modify it according to needs and interpretations of its intent.</td>
</tr>
<tr>
<td>Formal Planning</td>
<td>Assumes lack of consensus and proposes explicit methods of problem structuring that capture the range of possible perceptions.</td>
<td>Assumes that the implementation of a plan follows naturally from the logic of its formulation.</td>
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author emphasizes that "if planning is to be effective, it must be adopted to deal with change and uncertainty of the future."

A critical issue of statewide transportation planning is the rational allocation of resources (Lathrup, et al., 1980). The allocation takes place between construction, maintenance, among modes, and across geography. The focus of planning is how to determine the allocation of an available budget to satisfy current and future demand, both in long and short terms. A sound planning process should be able to provide the decision maker with the needed information in order to adjust a specific course of action. In most recorded practice, modifications of system "strategic" planning are the most frequently used methodology (Fig. 3.1).

Traditionally, transportation planning and programming is a tool for state transportation organizations to address current and future transportation needs within the available resources. One major identified problems in transportation planning and programming is that the traditional planning process is directed toward satisfying Federal regulations and requirements and the focus is on categorical projects (funds). This does not leave room for planning flexibility. One way to address this weakness is to include it as a given constraint into the planning process, not as the major focus of this process. Another problem is how to coordinate programming among a large number of separate studies. The overall challenge now is how to provide simple, yet accurate, information to the decision maker and how to strengthen the link between planning and programming.

Most state transportation agencies are seeking to formulate their strategic plans and policies to guide their program implementation. The development of strategic plans and policies requires long periods of study and public participation. The definition of strategic planning varies according to the circumstances and the local environment of state agencies. Different states have their own perspective about strategic transportation planning, however, a sound process and valid product should explicitly recognize three major elements (Creighton et al., 1984):
Figure 3.1 Framework of Strategic Planning

*users of transportation system. Direct and indirect recipients of transportation services
1. **Futurism**: the relative length of the future concern is the main difference between "strategy" and "tactics."

2. **Goals or Objectives**: each "strategy" has to specify objectives to be achieved. Transportation objectives concern
   (a) physical characteristics,
   (b) level of service or performance.

3. **Means**: each strategy has means by which objectives are planned to be reached. The means could include:
   (a) a specific course of action, and
   (b) a general guideline or policy that provides a framework on how actions and guidelines will be conducted.

Strategic transportation planning deals with the futurity of present actions. Its process involves setting goals and objectives, assessing the political, social, economical, and environmental consequences (i.e. setting priorities for resource allocation), and analyzing available resources (AASHTO, 1985). The focus of the strategic transportation planning process is to formulate a framework for achieving the organization's mission.

During the 1980s strategic management was the approach emerging from strategic planning. Several transportation agencies adopted a strategic style of organizational management (Port Authority of New York, New Jersey, and Pennsylvania DOT). The organizations' goal was to integrate planning with all management functions. This approach emphasized flexibility, creativity, and continuity within the planning process.

In transportation planning, the processes of both strategic planning and strategic management are closely related. Strategic planning is the foundation of strategic management. Strategic planning provides a perceptive analysis. It is a generic function of management. In both approaches, the main purpose is to provide the needed information for the decision maker (TRB #1028, 1985; Steinger, 1979).

McKeever (TRC#294, 1985) points out that "the job of strategic management is to develop plans to make the most of future opportunities and counteract the adverse effect of future change." It is a result-oriented process to anticipate change and to guide an organization's adaptation to such change. The
simplest definition of strategic management is that it is a systematic application of common sense.

AASHTO's Standing Committee on Planning (1985) points out that the challenge is to organize planning as an integral part of the management system. To combine planning and management activities into a single unified effort. The new role of planning as an aspect of management is necessary because of the rate of social change that requires more flexible management and instant response.

The underlying assumption for the strategic management approach is that planning not only provides the information desired by decision makers, but it provides the necessary information to enable a more complete understanding of the transportation problem and directs future courses of action.

3.2 TRANSPORTATION PLANNING RESPONSIBILITIES (STATE/LOCAL)

3.2.1 Organizational Structure

Currently, there are several transportation planning levels: (1) statewide transportation planning by the Department of Transportation, (2) local or regional transportation needs of the Metropolitan Planning Organization (MPO), and (3) regional and county planning commissions which are created by small local areas. Each of these organizational levels operates within various Federal, state, or local regulations. State and local transportation planning organizations were traditionally established in response to Federal act requirements that organize transportation activities. The Federal government is the major provider for regulations of fund and grant programs. Statewide planning organizations are the legal instrumental umbrella for all required publicly funded transportation plans. State DOTs, in cooperation with local organizations (mainly MPOs), are the major implementors of transportation projects.

Most transportation departments establish procedures to advise and provide information to (1) the chief executive office for policy formation and to (2) operating divisions which implement department policies and programs. According to the responsibility of the operating department, the current organization can be classified into two major categories: modal-functional and multi-modal functional. Modal functional organizations are a modal-oriented
divisions of transportation (i.e., highway, aviation, urban transit, rail lines, etc.). In multi-modal functional organizations, the operating division is responsible for specific functions for all modes, such as planning, design, construction, and safety.

3.2.2 Hierarchy of Transportation Practice

Typical planning and implementation of transportation policies is a process shared by different transportation organizations within the state and local levels. The planning process has been shaped significantly by an evolving pattern of complex political, fiscal, and administrative relationships and influenced by legitimate organizations and interest groups. In most of the cases, shifts in relative power and influence result in jurisdictional conflicts.

The structure of state transportation agencies has developed in diverse formats. There is no real consistency, either in their modal development or in terms of approaches undertaken for statewide activities (NTPSC, 1979). At the state level, policies and responsibilities are formulated by elected officials through state transportation agencies (DOTs) and by state legislators, who also appropriate funds to carry out policies. Other non-transportation agencies, such as state Environmental Protection Agencies (EPA), Public Utilities, or Public Service Commissions (PUS/PSC), share some regulations of transportation activities. At the urban level, MPOs are responsible for preparing plans and programs within their geographical jurisdiction and are assuming prime responsibility for certain activities (i.e., land use, public involvement, environmental analysis) at the project level.

3.2.3 Responsibility of State DOTs

State Departments of Transportation are expected to be responsible for (1) formulating transportation policies; (2) conducting long- and short-range planning; (3) providing funds and constructing transportation projects; and (4) regulating transportation for environmental, safety, and economic reasons. In addition, some states own or operate their own mass transit system or railroads (Port Authority of New York, New Jersey, etc.).
The current state of the practice of the statewide transportation planning is a project-oriented approach based on categorical Federal financial assistance; DOT planning activities focus on detailed design, implementation (construction, maintenance) and operation of transportation facilities. Highway transportation planning is the dominant mode. Other modes receive less attention at the state level.

Although by the early 1970's DOTs were required to consider the multi-modal planning approach (NCHRP #179, 1979), actual allocation of Federal funds for specific programs or categories were the major obstacles that prevented successful implementation of this concept as part of the comprehensive statewide transportation plans.

State transportation policies are expressed through legislation, plans, policy statements, and interest groups. However, the establishment of Federal categorical grants and programs was a major downfall that affected both state and local priorities, in favor of Federal priorities. The new Intermodal Surface Transportation Efficiency Act, ISTEA, overcomes this problem and provides more flexibility in fiscal planning, i.e., the surface transportation program fund. The funding of transportation and the implementation of programs is the major planning tool that shapes state roles. States either fund entire projects (i.e., highway interstates, etc.) or provide financial (Federal) assistance on a match-basis to local governments. Figure 3.2 shows the fund allocation of the new surface transportation program.

3.3 CONCEPTUAL FRAMEWORK OF METROPOLITAN PLANNING ACTIVITIES

3.3.1 Planning Boundaries

The Federal regulation mandated a responsibility of the Metropolitan Planning Organization (MPO) to develop long-range transportation plans and transportation improvement programs. The Federal Highway Administration Act of 1962 required that each urbanized area with a population of 5,000 or over, establish an MPO. The new ISTEA mandated that the planning boundaries of the metropolitan area cover not only the existing urbanized area (UZA), but also
Figure 3.2 Allocation of Surface Transportation Program Funds

the surrounding areas forecast to become urbanized on a 20-year planning horizon. Moreover, in areas that are non-attainment areas\(^1\) or maintenance areas\(^2\) for ozone or carbon monoxide, the MPO's planning boundaries must include the entire non-attainment or maintenance area (except where reduced by joint action between the governor and the MPOs).

### 3.3.2 The Planning Product

The 1962 Act required each metropolitan area to use a continuing, cooperative and comprehensive transportation process as a condition for receipt of Federal capital. The recent ISTEA mandates that the statewide transportation plan elements concerning metropolitan areas have to be developed cooperatively with the MPOs, state, and mass transportation organizations.

The major purpose of the MPO is to identify needs through the planning process and provide plans to satisfy the transportation demand. The planning product emphasizes on urban responsibilities and includes policies for considering all modes, transportation plans and programs. Figure 3.3 describes the joint FHWA urban mass transit authority urban transportation planning process. During the planning phase, the process considers a wide range of alternatives, multi-modal strategies aiming to meet the needed mobility. The objective of the plans and programs is to achieve efficient, effective, integrated inter-modal transportation for each MPO in coordination with the state transportation department, and to be guided by the new ISTEA element (see Appendix A). The planning product of MPO activities includes several functional classifications (Federal Register, 1993).

#### 3.3.2.1 Long-range plan

Long-range plans focus on assessing major capital investments and other required measures to preserve and maximize the capability of the current (and future) transportation system. The plan includes proposing transportation

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\(^1\) Air quality standards are not met for transportation-related pollutants

\(^2\) Air-quality standards are met, but conformity procedures are found necessary to maintain standards (Federal Register, Vol. 58, 1993.)
Figure 3.3 Joint FHWA/UMTA urban transportation planning process
enhancement activities. It is an annually up-dated process—as part of an integral metropolitan transportation planning system—and includes financial specifications to implement the plans within the availability of funds.

3.3.2.2 Transportation Improvement Plan (TIP)

The Transportation Improvement Plan (TIP) is the central program of the MPOs. The plan covers a short period of time and includes criteria for identifying priorities and financial information. The program is updated every two years. ISTEA empowers the MPOs, in cooperation with the state, to prepare the TIP which includes a list of all identified projects eligible for funding (including minimum projects for each year).

3.3.2.3 Traffic management areas (TMA)

A Federal regulation requires all urbanized areas (within the boundaries of the MPOs) with a population over 200,000, and as a part of the transportation planning process of the MPOs, to include a Congestion Management System (CMS) program.

3.3.2.4 Project selection

The new cooperative effort between the MPOs and the state requires the approval of the TIP for the TMA to be a responsibility of the MPOs in consultation with the State and Transit Operations, except for projects of the National Highway System (NHS) and projects funded under the Bridge and Interstate Maintenance program. These project types are a state level responsibility in cooperation with the MPOs.

3.4 CONCEPTUAL FRAMEWORK OF STATEWIDE TRANSPORTATION PLANNING

3.4.1 Classification of Statewide Transportation Planning

Several authors and organizations have described the structure of statewide transportation planning in various ways (US DOT, 1990). For example, the 1974 Williamsburg, Virginia conference on "Issues in Statewide
Transportation Planning" identified and classified the planning activities at the state level into three major functions: (1) policy planning, (2) line or system planning, and (3) project planning (Ashford, 1973; Creighton, 1976; Brown et al., 1974). The overall planning activities are a continuum, process, starting from the general to the specific. Accordingly, "the policy planning process provides the general framework within which system planning should be performed and more specific system-level information is developed. This is followed by project planning, which provides long-range and short-term plans for specific facilities" (US DOT, 1990).

3.4.1.1 Policy planning

Policy planning is "a continuous process leading to a set of coordinated policy decisions, that, in turn, lead to the achievement of a defined set of goals and objectives," (Ashford, 1973). Policy planning is a determination of the allocation of resources throughout the state, both in terms of allocation by geographical areas and by transportation modes. It describes, generally, what is to be done, who is to do it, how it is to be done, and within what time limit. The resources allocation planning process, does not involve recommendations of specific facilities or corridors in this sense (Creighton, 1972). It is a "top down" approach, starting from basic state goals and working through the general state plan to evolve transportation policy consistent with these goals (Brown, et al., 1974).

3.4.1.2 System planning

System planning is a "bottom up" process starting from forecasting of population and economic growth and continuing with estimates of persons and goods movement to a physical description of the system required to meet real or implied needs (Ashford, 1973). The process includes (1) data collection; (2) determination of modal needs and demands, (3) technical assistance to urban and local transportation studies, (4) public involvement, and (5) environmental impact analysis. Criticism is that system planning is oriented more towards regional development on a long-range scale. In this regard, statewide planning efforts are more policy-oriented.
3.4.1.3 Project or facility planning

This process deals with individual facilities. Requirements include design procedures and assessment of the impact. It involves activities carried out by planners and designers. Among the areas of detailed planning are: (1) demand consideration and coordination between planners and designers to assure a project design that satisfies identified needs, (2) assessment of the environmental impact of a project on communities, and (3) integration of planning requirements for individual facilities into urban and rural areas (TRB Special Report #166, 1974).

3.4.2 Classical Approach of Statewide Highway Planning: System Approach

Historically, most state DOTs were highway-oriented organizations. The biggest challenge for state transportation agencies was to build and maintain the highway system. An important tool was the system planning approach. The classical highway planning approach was described as linear, starting from system planning and ending with implementation within this framework. Figure 3.4 illustrates the hierarchy and components of traditional transportation planning. The objective of system planning is to determine the configuration of the highway system of the future using prevailing knowledge and forecasts. It contains the concept of short- and long-range planning. Among the different state highway agencies, the concept of system planning revealed different content. In other words, there was no general agreement on the exact components.

In the 1970's, the Federal Highway Administration conducted a series of seminars on statewide highway planning activities. The emerging publication, called Digest of Statewide Planning Activities (US DOT, 1979), defined the activities as pragmatic decisions. FHWA suggests that statewide planning include:

A. Establishment of jurisdictional responsibility for transportation systems elements. It is a technical tool for rationalizing the assignment of responsibility.

B. Development of fiscal plans including revenue forecasting and allocation of costs and funds.
TRADITIONAL TRANSPORTATION PLANNING

Figure 3.4 Traditional Transportation Planning

(source: modified from McDowell, 1984)
C. Development of long-range system plans. This includes physical improvement plans, which involve activities such as policy, needs studies, development of alternative plans, and corridor and specific route studies.

D. Development of short-range plans. This stresses setting project priorities, budgeting, and scheduling. It is the implementation document of the physical improvement plans.

E. Establishment of surveillance and evaluation programs. This includes reporting on accomplishment of missions, goals, and objectives in order to direct or adjust the planning activities. In most of the cases, financial planning was linked to functional classification and large-range system planning.

According to NCHRP Report #95 (1982) "the system planning problem consists of adapting and refining the existing highway network, deciding which highway to improve, where to add links, and whether or not to complete a link that has been planned."

The AASHTO Standing Committee on Planning (1980) defined the "ideal system planning process" as follows:

1. Establish level of service criteria to be satisfied by the system.
2. Provide a prioritization process for corridors within the system on the basis of importance.
3. Compare the level of service within the established criteria and different corridors, and provide data concerning the existing corridors.
4. Identify system deficiencies on the prioritized basis.

3.4.2.1. Critique of the Classical System Approach

The system approach deals with the substance of transportation (technical planning) for all modes and presents the ideal system for the future. The emphasis of the system approach is that the planning process is an ongoing process and should be able to provide a flexible and adaptable product. The major advantage of the system approach is the ability to provide a highway system, in advance, that allows investigation of alternative courses of action. Where certain types of projects require a longer time, however, the major obstacle is the uncertainty of future events.
Figure 3.5 Framework of Classical Transportation Planning

Major criticism is that implementation used to be done in isolation of the planning.
The early conceptual framework of statewide highway transportation planning that prevailed during the 1960s and 1970s is called the *linear* or *classical* approach. The major emphasis of this approach is to provide a good technical plan (system planning, corridor planning, and project planning). The drawback is that the implementation process is usually started after all technical planning has been done. Figure 3.5 shows the major criticism of a classical transportation planning process. In other words, the implementation process is performed in isolation of the planning phase. Consequently, some of the projects identified in the planning steps do not find their way to the implementation stage. Implementation is treated as a subordinate part of the planning process (NCHRP #95, 1982).

### 3.5 MODIFICATION OF THE CLASSICAL STATEWIDE HIGHWAY TRANSPORTATION PLANNING: THE COMBINED APPROACH

In the early 1980's, the state-of-the-art of statewide transportation planning was just bits and pieces of work that had been done in unrelated situations. A major shortfall is that there was no integrated satisfactory approach that brought regular planning operations on-line. The planning practice consumed most of the time and was less responsive to changes, consequently planning actions were dominated by crisis.

Creighton, *et al.*, (1982) investigated and proposed another framework for managing statewide transportation planning. This approach was intended to help the heads of the state transportation agencies. It was an integral framework that tried to overcome the flaws of the linear approach and was broken into two major parts: substantive content and management content. The proposed framework for statewide transportation planning is illustrated in Figure 3.6.

#### 3.5.1 Substantive Content

The *substantive content* is the technical planning activity that often, in the past, has proceeded in isolation from the management context. It is a process that deals with different modes, their physical and service properties, i.e. looking at the transportation system and seeing how it should function. The substantive (planning) level includes system planning, then corridor planning, and finally
### Substantive Content of Statewide Transportation Planning

**Modes**
- highway (auto/truck)
- rail
- aviation
- port/waterway
- pipeline
- bicycle/moped
- bus (inter-city/rural)
- urban transit*

**Levels of Planning**
- system planning
- corridor planning
- project planning
- preliminary engineering**
- engineering design**
- planning for operations of existing systems of services**
- assistance to local/county/ and regional transportation planners

**As a Process**
- data collection
- forecasts
- goal specifications (obtain)
- preparation of alternative plans
- testing
- evaluation
- decision

---

### Management Content of Statewide Transportation Planning

**Strategic Planning or Policy Analyses**
- financial
- regulation
- shared policies (e.g. with land use, energy, and the environment)

**Communications with**
- state administration
- legislature
- public
- regional transportation planning agencies
- local governments

**Programming**
- projects
- resources (including staff time)

**Performance Monitoring**
- of systems and services evaluated in terms of goods/standards

**Miscellaneous**
- operations management studies

---

*In some states, urban transit may be a function of a statewide transportation planning staff, but in most states only the funding levels are critical issues in statewide transportation planning. **Not functions of transportation agency’s planning staff but part of the total process leading to construction of project implementation.*

---

**Figure 3.6 Framework for Statewide Transportation Planning**

(source: Creighton et al., 1982)
the project development process, consisting of project planning and engineering design (Creighton, 1976; TRB Special Report #146, 1974).

3.5.2 Management Content

The management content deals with the entire spectrum of procedures for implementation. It concerns decisions on policy making and strategy, communication, detailed programming of projects, and monitoring and surveillance of the system performance. Management of statewide transportation planning involves the planning staff and administrative activities of the transportation agency.

3.5.2.1 Strategic planning or policy analysis

The term ‘strategic planning’ and ‘policy analysis’ are inter-related words for the same objective. In both, fundamental requirements focus on staff work to assist the decision maker at the state level. This includes (1) articulation of goals, (2) programming plans, and (3) estimation and evaluation of the impact of the proposed course of action. The major target is the allocation or control of resources, humans, materials, and energy. Traditionally, allocations are done by mode, program, or project. In addition, strategic planning includes the consideration of regulations, shared policies (policies related to transportation involving other sectors such as housing, land use, etc.), and environmental concerns.

3.5.2.2 Communication

The communication concept is one of the required essences of the transportation agency practice. The objective targets two levels: (1) the internal “up word” to the governor and his staff, and (2) external “out word” to the legislation and general public. In this regard, the substantive or technical work and the management are the available output to provide the needed information in order to obtain effective decision making.

The FHWA Report #6 (1982), on statewide transportation and management, states that the central issue of communication is to involve legislators and the general public in the highway and programming process.
Figure 3.7. Proposed Process of Statewide Highway Planning
3.5.2.3 Programming

The concept of programming is one of the major management activities at the state level. The programming includes (1) estimation of the financial resources (forecast revenue), (2) policy, (3) setting priorities, and (4) scheduling, by considering financial and geographic constraints.

3.6 ADVANTAGES OF THE COMBINED APPROACH

The major advantage of the combined approach is the ability to link the entire transportation planning process, from policy directions to the planning phase, ending with the implementation phase. Figure 3.7 illustrates the component of proposed statewide highway planning as seen through the combined approach. The approach provides two important changes:

1. Opportunities for top managers to control the whole process in order to satisfy the organizational mission, and

2. Integration of the planning phase into the whole transportation process and utilization of provided information in a more consistent manner.

3.7 CURRENT AVAILABLE PLANNING TECHNIQUES FOR THE STATE LEVEL

3.7.1 The Scope of Planning Activities at the State Level

Historically, every state has established highway system plans. The major objective of the highway system plans was to guide (provide information) the decision making process for resource allocation. The planning activities include highway systems, rail plans, and airport plans. Some states have already established a bi-modal plan (highway and transit). Still, there has been little success in implementing multi-modal plans.

At the state level, the primary goal of all plans is two-fold: (1) To anticipate future required funds for the state transportation system in order to meet the identified projected transportation demand, and (2) to develop policies that guide the implementation process for the specified plans.
The basic premise of the statewide planning activity is to achieve comprehensive planning and programming. These plans are the mechanisms that handle current and future transportation needs. The measure of success of the current methodology depends on how to establish a link between the long-range plan, mid-range goal, and short-term plan. The coherent link is the prerequisite to achieving a significant rational, continuous, and efficient transportation system development.

3.7.2 Multi-Year System Planning Approach

The multi-year system approach is one of the most frequently targeted approaches at the state level. The principle elements of the approach are comprised of three parts: (1) A long-range transportation plan for 25 years, it provides the top manager with descriptive information for a long-term resource availability and future anticipated demands. The advantage is that it leaves sufficient time ahead for policy analysis to match anticipated demands with expected resources; (2) a mid-range project, where priorities are followed by establishing a performance objective; and (3) short-range programming (of specific projects) to direct the selected course of action. Figure 3.8 illustrates the components of the multi-year system approach.

As Reed (1992) emphasized, the advantage of the multi-year system planning approach is (1) the ability to address the anticipated future of transportation demands, (2) to identify critical elements of the transportation system, (3) to develop goals and objectives (in terms of long-range planning), (4) the mid-range plan identifying various projects within the long-range plans, and finally (5) the short-range construction program that helps to schedule the identified project within the available (or anticipated) funds. The major advantage of this approach is the integration of the three horizons of planning.

3.7.3 Available Planning Methods

A major difficulty in statewide planning activities is the scope of the problem. This scope requires dealing with complex activities that affect the entire state with different modes. The planning process should not deal only with the technical problems. Currently, it deals more with specific projects, models, or locations through the development of the highway system at the state level; it
should deal with the whole management spectrum. The critical question is: Do technicians exist to deal with this problem? There are several problem-solving methods that can be used for large scale system uncertainties. The following is the more popular planning methods dealing with statewide transportation problems (Reed, 1992; Creighton, et al., 1982; N. Wilson, et al., 1979; and TRB Special Report #146, 1974):

1. The needs-standard approach
2. The single modal simulation evaluation approach
3. The multi-modal simulation evaluation approach
4. The programming approach

<table>
<thead>
<tr>
<th>LONG-RANGE PLAN (25 yrs)</th>
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<tbody>
<tr>
<td>• anticipate future demand</td>
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<td>• specify goals and objectives</td>
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<tr>
<th>MID-RANGE PLAN (10 yrs)</th>
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<td>• establish project identification and priorities among long-range plans</td>
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<tr>
<th>SHORT-RANGE PLAN (5 yrs)</th>
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<tr>
<td>• schedule the prioritized project for construction within the available fund level</td>
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Figure 3.8 Major components of the multi-year planning approach

3.7.3.1 Needs-Standard approach

The needs-standard approach is one basic approach used in the national transportation planning manuals of the US Department of Transportation. It is a descriptive method to guide decision making in a less costly fashion based on the physical characteristics of the transportation system. The focus of the method is to establish specific standards which include physical design, level of service, safety, etc. as a principle criteria for the decision making process.
The planning process of this method combines three major steps: (1) survey to measure the existing physical characteristics of the transportation system (i.e., highway deficiencies, establish preferred standard); (2) forecast and estimate of future demands; (3) the need specification as the difference between established standards (each element to be developed to a defined standard) and the existing (or future) conditions.

The major difficulty is that the identified needs might exceed the available financial resources. Consequently, the problem of matching with available resources leads to a fourth step, which is called project identification. This step, project prioritization, or optimum mix of project selection, is performed in order to construct or implement within the availability of funds.

The major advantage of the needs-standard approach is its simplicity and applicability. The critical issue is that the approach relies heavily on specified desired standards which vary from one perspective to another. In other words, the approach relies on judgmental perspectives and does not consider the role of the users or non-users in terms of benefits or costs (it does not consider any economical feasibility except fund availability).

3.7.3.2 Single-modal simulation evaluation approach

This approach originated in the urban transportation process. It breaks the transportation system into single-modal components. The validity of the approach relies on the availability of data for each mode and the implementation mechanism. The planning activity is a simultaneous process compromised of four major steps: (1) goal and criteria specifications, (2) action plans to improve the system performance in relation to the pre specified goals or criteria, (3) simulation of the present or future performance based on the proposed improvement action, and (4) evaluation of the resulting performance of the system.

In comparison to the need-standard approach, the latter approach has the ability to incorporate a variety of goals or criteria, other than the physical characteristics of the transportation system. This approach has the ability to incorporate the observed user and non-user reaction into the performance criteria (i.e., travel time, out-of-pocket, safety and so forth), it is more behavior-oriented
than the needs-standard. It uses a quantitative data base rather than a judgmental one. Despite its advantage, it is still a data-oriented approach, which increases the complexity. It requires costly and extensive data preparation and, therefore, consumes a lot of time.

3.7.3.3 Multi-modal simulation evaluation approach

The multi-modal simulation evaluation approach is yet another variation of the single mode. The planning process can be specified into three steps: (1) the estimation of the transportation demand for both people and goods for all parts of the state, (2) allocation of the estimated demand among the available modes, and (3) running of a simulation scenario (as in single mode) which allows feedback or reallocation of the demand among the different modes based on the possible improvement of service levels.

This approach depends on the coordination between different modes in order to achieve a better level of services. Currently, there is no significant application of this concept at the state level. Several basic requirements have to be met to be able to apply this approach, this includes developing a modal data base and experience with modal trade-off and allocation.

3.7.3.4 Programming approach

Transportation planning activities at the state level are a coordinated effort of a large number of separate studies and plans. They come from different levels, including MPOs and local or regional agencies since the objective at the state level is to adjust transportation systems to achieve a more efficient service. The planning process and the decision makers at the state level have to deal with a large number of issues, competing projects, and conflicting objectives. The problem is how to reduce this diversity. The program approach is a more popular approach, focusing on implementation. Programming is the mechanism to accomplish the long range plan. In other words, it is a prioritization process to accomplish the objective of the statewide plan. By definition, the program approach emphasizes "scheduling of project starts and completion according to an evaluation of their relative importance within the available financial resource and according to department policies." In the literature, there are several names for the programming approach, also called project program or priority program.
In essence, it is the top level function of the DOT management process and the intermediate activity level in statewide transportation activities.

The planning process of the programming approach starts by (1) receiving a list of identified projects from different levels (MPOs, regional, etc.), (2) continues with arranging the projects in priority using evaluation procedures, and ends with (3) scheduling the prioritizing projects into construction or implementation process within the available financial constraints.

The advantage of the programming approach is its applicability of intergovernmental balancing—the ability to utilize the planning output where political decision making can be managed. A major disadvantage is that the program itself is not creative—it does not consider the dynamic environment—it is a mechanical process. In most cases, it is not a separate step.

In the literature, the term "program" refers to the process of project development steps to be performed within a certain future time period (Krecji, 1973). Current programming methodologies to assign project priority procedures are conducted using six evaluation methods (Krecji, 1973; Pecknold, 1974; Reed, 1992): (1) Sufficiency rating, (2) quasi-economic analysis, (3) benefit cost analysis, (4) macro- and micro-economic theory, (5) pure judgment with little quantitative input except funding constraints, and (6) optimization techniques.
CHAPTER IV
DIFFERENT PERSPECTIVE AND METHODS OF THE
STATEWIDE TRANSPORTATION PLANS

4.1 OVERVIEW

The current state of the practice of statewide transportation planning has diverse approaches and styles. The major challenge is the response to the new technologies and the changing environment. DOTs are seeking unified and consistent statewide planning methodologies. The cornerstone of any successful methodology is the establishment of a productive relationship between state organizations and their professional transportation planners. It is a fact that management and planning have mutual short-term and long-term interests.

At the state transportation level, there are two predominate features of transportation planning and programming. There is an increased awareness of the need for the decision maker to have quick and timely information to intercede transportation problems. On the other hand, professionals are searching for a more effective and responsive planning and programming methodology to provide the required information. Accordingly, the role and performance of the state transportation agencies should change to meet new directions. A sound methodology is expected to be interactive, cooperative, and resolve the conflicts among different functional transportation organizations and among different legitimate interest groups. Looking toward that goal, several points of view are expressed about statewide transportation planning methodology. Following are viewpoints of the major partner's (Federal/state/and selected professionals) in transportation planning.

4.2 FEDERAL VIEW

The bottom line of Federal concern with statewide planning is expressed in several formats, including the new regulations and acts as well as personal comments from several administrators. The major emphasis is that state
planning should be responsive to management decisions. Responsive planning should include (1) a cooperative effort to be representative of all legitimate interest groups in transportation, and (2) those activities needed to develop each state's program of capital projects and operating assistance. According to Hassel (1980, Associate Administrator for Planning, FHWA), FHWA does not specify a detailed process to be followed. The general emphasis is that good planning should be able to produce five major products and that effective public participation in all stages of statewide planning is essential for successful preparation. The five products are:

4.2.1 Policy plan States should be able to define goals, objectives, assignment of jurisdictional responsibilities, and perform a cooperative process among different transportation organizational levels (state, local, regional).

4.2.2 Financial plan States should establish a vision of their implementation program in coordination with short- and long-range funding resources and their availability.

4.2.3 Long-range physical development plan The plan should be able to guide the anticipated physical transportation system improvements and required services. This includes anticipation of future transportation problems, provision of alternative courses of action, and organization of programs to support the proposed activities and include trade-offs between modes.

4.2.4 Short-range transportation improvement plan The plan should enable allocation of anticipated (available) resources among identified projects and specification of priorities for implementation. Main emphasis should be given to operation and maintenance, as well as capital projects.

4.2.5 Evaluation process This is a feedback process and a control tool to insure that state missions (goals, objectives, plans) are accomplished. It is a reevaluation of the established plan and implemented programs.

The overall recommendation assumes that the public has input in the analysis of issues and development of goals and objectives.
With the increasing controversial interpretation of the ISTEA Act of 1991, and its multi-modal planning emphasis, another FHWA administrator (Larson, 1992) argued that the transportation professional should be prepared for a "paradigm shift" of what is needed for the required transportation planning approach. Larson stated:

"The "old paradigm" driven definition of one transportation goal, to complete the interstate influenced our perception in many ways. The focus on the engineering challenge of putting such an immense set of facilities in place contributed to the dominance of civil engineers in investment decisions. By defining the product interim of construction, the opportunities for feedback on the social, economic, and environmental contribution of facilities was limited. Assessments of alternative investments was limited to traditional engineering criteria. The focus on issues related to facilities themselves distanced the designers and planners from the multiplicity of what we now consider relevant interests."

Transportation Research Circular No. 406
(opening remarks by Tom Larson, page 42)

Lockwood and Williams (1993) argued that "the nineties is a time of expanding options versus constrained resources and tough trade-offs in surface transportation. In response, the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and the Clean Air Act Amendments (CAAA) of 1990 are introducing major changes in planning and programming at both the MPO and state levels. Taken together, they are evolving toward a new planning and programming process, life-cycle oriented, management-intensive, which produces a prioritized scheduled improvement program developed in an interactive fashion on a multi-jurisdictional basis."

4.3 STATE VIEWS

At the state level there is an increased need for shaping the role of the planner and stress planning activities that will generate needed information. Within literature, several authors expressed their views. Kinstlinger (Colorado DOT, 1980), representing the state view in his article about the role of planning in state transportation, the author summarized outlines four major objectives of the planning and programming activities at the statewide level.

4.3.1 Early warning system The objective is to identify a problem before it occurs and to alert state executives and legislature branches. The warning system should identify issues and trends that might be out of control by the
government (external issues), but might be viewed and accommodated by shifts in state programs, i.e. the construction cost inflation, reduced highway revenue.

4.3.2 Policy analysis The objective is to estimate the impact of an alternative transportation policy on such areas as economics, fiscal resources, energy, and environmental policy. The analysis should include issues, alternatives, and evaluations.

4.3.3 Programming and budgeting system The objective is to develop mechanisms enabling the state to negotiate and cooperate with local governments, private interests, and state legislatures.

4.3.4 Continuing program of surveillance It is a process to monitor the transportation system and the implemented programs in order to identify the shortcomings, the future directions, and the requirements.

4.4 SELECTED VIEWS OF TRANSPORTATION PROFESSIONALS

The overall objective of transportation planning and programming is to provide courses of actions (solutions) that incrementally add to the transportation system and strengthen its relation with other sectors. The process of transportation planning is aimed at establishing three steps: (1) a strategy, (2) a program to respond to the social change and identified needs, and (3) an implementation mechanism to perform the identified plans. Traditionally, the final decision is left to public officials and political leaders. The critical issue from the professional point-of-view is how much is suitable information we are able to provide and how much of it is credible to match the interest of political leaders and public citizens (the users of the system). Several authors have written perceptively on this topic (Salvucci, Berentson, Hellman, and Jackson, 1989; Manheim, et al., 1980; Humphrey, 1993; Meyer, 1993) and, in summary, all of the views stress the need for a statewide transportation plan that is policy-oriented (sensitive), as opposed to project-oriented planning process and should be a participatory process. A good planning process should involve a broad range of people and emphasize identifying and reaching collaborative recommendations for action. The overall objective of the process is to lead rather than to follow, but not just as a simple reaction.
Neumann, et al. (1993) argued that at the state level, decision makers require a wide array of information and organized analysis that guide the implementation. This includes: 1) a wide array of options and courses of action; 2) the impact assessment of specific alternatives on society, economics, environmental interests; 3) public support for the plan, i.e. more open planning processes, and; 4) explicit recognition of the uncertainties.

Larson (1987), in his article in “Inventing Our Transportation Future” (AASHTO Quarterly), pointed out two major features of the new transportation planning process: vision and credibility.

1. Vision. Transportation solutions rely on expertise and a sophisticated planning process. The author suggests that the output of the process (plan) should integrate the perception of the decision makers and the user. This will require new visualization of the process of transportation investments and public needs.

2. Credibility. The primary purpose of transportation planning is to advise and provide information to the decision maker. The central issue in the planning process is overestimating or underestimating the required needs, both directions have their political and economical circumstances. Consequently, the credibility of the planning process is based on how careful consideration is given to both directions and the utilization of the different points of view among the legitimate participants.

4.5 DIFFERENT PLANNING AND PROGRAMMING MECHANISM OF STATEWIDE TRANSPORTATION PLAN: EXAMPLES OF THE STATE-OF-THE-PRACTICE

4.5.1 Background

According to Meyer (1993), "the ISTEA not only marked the end of the interstate highway program which began in 1956, but it greatly loosened the institutional, financial, and thus political framework within which decisions on transportation investment had been made over the past 35 years." Humphrey (1993) adds that "ISTEA now encourages state and localities to seek solutions to transportation problems appropriate to their needs and desires."
Today, transportation is viewed as a means of achieving some greater aim. This new perspective requires a search for integrated planning, programming, and budgeting. There is a need for new conceptual frameworks and supportive analytical tools and models.

The objective of the following section is to investigate the current state of the practice of statewide transportation planning and its mechanisms. The investigation focuses on two concerns: The first deals with the development of a financially constraint transportation plan. Early statewide planning before ISTEA focused on financial constraints of the highway system. Today, the guidelines for statewide financial planning (ISTEA) are stressing the emphasis that state and MPOs together ensure that TIP reflects available Federal and state funds (Lockwood, 1993). The availability and equitable allocation of funds for capital improvements is the major concern of statewide planning.

The second concern involves public participation in the planning and programming development; to a large extent, the available literature and documented experience in citizen participation are related to the urban or project level. ISTEA emphasizes citizen participation in all stages of the development of statewide plans. The following investigation is limited to the availability of literature. The extent and depth of the review is affected by the limited documentation of the current state of the practice.

4.5.2 State of the Practice of Financially Constrained Statewide Transportation Plans

4.5.2.1 New York State Approach (NYSDOT)

The state of New York, Department of Transportation, developed a multi-modal statewide plan (2020 plan). The major feature of this plan is the development of a Goal Oriented Management (GOM) process (Fig. 4.1). Commissioner Franklin E. White (1987) explained the purpose of GOM as follows, "The idea behind goal-oriented management is to clearly articulate the department mission and goals with accountability and quantifiable performance measure at every management level." The tools and procedures that are developed through GOM (like strategy planning) are aimed to enable the department to pursue its mission."
The Advantage of GOM

- Application of state-of-the-art management tools
  - Enhanced accountability and control
  - Efficient use of taxpayer's dollars

Figure 4.1 New York State Department of Transportation
Components of goal-oriented management (GOM)
According to Peyrebrune's (1989) presentation at the TRB conference on the Future of Statewide Planning, "the process is an instrumental tool to coordinate efforts and to help the department to communicate with elected officials and the general public."

4.5.2.1.1 The Goal Driven Analysis

The procedures of the goal-driven analysis compromises two major key elements:

1. A continuous inventory of the transportation system condition. This inventory identifies conditions that could be translated into goals, i.e. no more than 15% of pavement surfaces rate poor.

2. A suitable model technique that takes into consideration transportation system conditions. New York used a model analog to the pavement management system. The suggested considerations are:
   - continued deterioration
   - impact specific program on deterioration
   - impact of different program mixes
   - impact of inflation

The analysis of the process of the goal-driven scenario contains three steps:

1. Develop a series of goal-based scenarios;

2. Estimate amount of money to achieve each goal; and

3. Analyze trade-off among different scenarios. If we decide to achieve a specific goal (say scenario A), it will cost (x) dollars. A higher goal (scenario B) will increase the cost another (x) dollars. On the other hand, if we decide to do nothing and do not invest in the system, we expect the condition and level of service to deteriorate to this level. The goal-driven scenario is used in statewide resource planning to establish revenue estimates for scaling future funding needs and in a five-year plan for capital program. In both plans, the approach is a major tool to communicate and convince the governor and the general public.
4.5.2.2 The Wisconsin State Approach (WIDOT)

According to Jackson (in his 1989 TRB presentation on the Future of Statewide Transportation Planning), the Wisconsin Department of Transportation was formed in 1957. Wisconsin's approach to statewide transportation planning is a modal-oriented (project) approach which contains four major steps (Fig. 4.2). The following is a selected paragraph from the state highway plan 2000 (WIDOT, 1985):

4.5.2.2.1 The Four-Step Process

Policy planning "involves the analysis of a wide variety of issues that affect Wisconsin's transportation system. This includes economic conditions and development trends, energy price, and availability, environmental sensitivity, technological innovations, and regulations. The purpose is to guide the agency's activities concerning transportation modes aiming to achieve unified and consistent objectives.

System planning "is a more detailed analysis of the modal components of the state's transportation network, air, rail, water, and highways. System planning studies include assessments of current and future system deficiencies and potential improvements." It is a long range (10-20 years) program that focuses on the interface between modes and develops alternatives regarding highway systems.

Programming "is a short term project scheduling of multi-year transportation facilities investment program." It is a 6-year highway improvement program consisting of three successive 2-year periods.

Project development is the dominant planning procedure for the Wisconsin DOT. "It involves all the necessary steps to refine a facility improvement concept, including preliminary project specific studies and actual project design and construction."

The most critical issue in Wisconsin is how to perform a close connection between the budgeting process and the planning process. This requires the
WISCONSIN'S FOUR STEP INVESTMENT PROCESS

POLICY PLANNING
- Broad policy guidelines and priorities

SYSTEM PLANNING
- Systemwide studies of deficiencies and needs
- Forecasts of long-term trends in demand, revenue, etc
- Identification of priority areas for program emphasis

PROGRAMMING
- Detailed assessment of specific policies and program choice
- Multi-year schedule of proposed projects
- Biennial budget request and budget review

ACCOUNTING

BUDGETING

PROJECT DEVELOPMENT
- Detailed construction plans, cost estimates, and environmental analysis

Figure 4.2 Wisconsin's four steps - investment process

(source: U.S. DOT, 1990)
coordination of DOT, legislators, the governor, and the general public as a major input to the planning process.

4.5.2.3 The Maryland State Approach (MDDOT)

Maryland has a unique combination of transportation activities. According to Hellmann in his 1989 presentation at the conference of Future Statewide Transportation Planning, the department has a broad set of activities, including (1) a highway administration which is responsible for the state highway system, (2) a mass transit (including bus and rail) administration that owns, operates, and builds transit facilities in Baltimore, and (3) the responsibility for several ports.

4.5.2.3.1 The planning concept: a consolidated transportation program

Statewide transportation in the state of Maryland has two major components:

1. A Consolidated Transportation Program (CTP) (6-year horizon)
2. Two dedicated trust funds.

The CTP is the major product of statewide transportation planning and programming. It is updated each year. The plan includes a list of all projects that are going to be (1) planned, (2) designed, (3) constructed over a 6-year period. There are three major stages to formulate the CTP: (1) Stage I: Policy planning and programming, (2) Stage II: Public participation, and (3) Stage III: Financial approval.

Stage I: Policy planning and programming. In this stage, two volumes are prepared as a documentation of statewide transportation planning and programming.

Volume I: State report on transportation. It is a policy document focusing on where the departments are and where they are going. It considers issues related to each mode (the department is modal administrative, where each administration writes its own policy). The overall output is a collective volume of reports of effort of all the administrative units.

Volume II: List of all projects and their priorities.
Stage II: Distribution of Volume II to all local/state elected officials. Then the department staff performs a tour across counties. The purpose is to ideas and solutions with the public.

Financial approval After the draft and the program tour are completed, the department submits its plan to the Governor for final approval, followed by the General Assembly. To balance the power between the legislative and executive branches, the General Assembly's role is only to cut, not to add, projects to the statewide plan.

4.5.2.4 The Michigan State Approach (MIDOT)

A common problem facing all states is funding. Michigan is no exception. The Michigan State Department of Transportation, according to Mortel (1989) developed its own investment planning process. The methodology rests on two basic requirements: needs studies and revenue forecasting.

The overall focus of the transportation policy is to identify how the system will look at some point in the future and how much change in the system can be expected for a given investment level. Figure 4.3 illustrates the Michigan planning process.

4.5.2.4.1 Statewide transportation planning and its procedures: resource allocation process

The methodology is a long-range planning process called Statewide Investment Planning and Programming (resource allocation process). It is the allocation of available revenues to an investment plan with broad categories. Then the State Department produces a development program and proposes an investment plan consistent with the resource allocation plan. The main idea of the investment plan is to keep the program in line with the expected revenues. In other words, it uses the investment plan as vehicle to carry out the transportation policy. The procedures contain four major steps. Figure 4.4 illustrates the Michigan Statewide Transportation Planning procedures.

Needs study. The process starts with the need study based on the local level. It is an inventory of all the needed capital projects of the transportation system.
Figure 4.3 Michigan planning process - direct line

(source: Mortel, 1989)
MICHIGAN STATEWIDE TRANSPORTATION PLANNING

NEEDS STUDY

STATE TRANSPORTATION PLAN "STIP"

FISCAL ANALYSIS

INVESTMENT PLAN "Long-Range Program"

PROGRAMMING "Annual Program"

Figure 4.4 Michigan statewide transportation planning procedures "Resource Allocation Process"

(source: Mortel, 1989)
The Statewide Transportation Improvement Plan (STIP) is a list of identified projects based on the needs study and is revised annually. The STIP is a department policy document. It determines which project is more important, sets priorities among categories, and is a control measure to check progress toward the achievement of goals.

Fiscal analysis. This is a forecast estimation of future capital funds which will be available for all modes.

The investment plan. This is the start of the implementation process. The anticipated revenues are divided into program categories over a 10-year period. The aim is to implement the identified priorities for the state transportation plans. The investment plan is structured into three major categories: (1) preserve, (2) improve, and (3) expand (Fig. 4.5).

Preservation is the major emphasis of the department. This means the maintenance of the existing services and facilities for all modes. The investment plan uses a data collection base and a computer modeling process to determine the impact (measured in dollars) on economic sectors (agriculture, forestry, manufacturing, and tourism). The model assigns values to determine the priority and the importance of networks that serve each economic sector.

Programming of long-range plans. This is a process to assign needed projects to identified revenue categories. It is a breakdown of the long-range plan into an annual program with an assigned budget.

4.5.3 Concluding Remarks

Analyzing the current state of the practice and the previous examples, the review is able to highlight several issues within the scope of the statewide transportation process.

1. The first step of the transportation planning process is careful identification of the state's mission, goals, and objectives. The mission should furnish future direction.
MICHIGAN INVESTMENT CATEGORIES

1. • PRESERVE
   - to maintain the existing systems

2. • IMPROVE
   - to add capacity to the existing state trunkline

3. • EXPAND
   - to add to state highway services

Figure 4.5 Structure of Michigan's Investment Plan: "Investment Categories"

(source: Mortel, 1989)
2. Current statewide planning and programming is a complex process. It is more time consuming and has conflicting objectives. There is a lack of ability to link the emerging issues on a day-to-day basis to the overall process.

3. At the statewide level, the current techniques for planning and programming have diverse formats. There is a large variation in the degree of intensity and sophistication of the process. However, the general categories of the state practice can be classified into four major categories: (1) policy planning, (2) single modal planning, (3) intermodal or multimodal coordination, and (4) programming projects. The last category is the dominating approach for the highway system. The programming of projects can also be divided into two categories: establishing priorities and allocation of funding.

4. One of the major problems of the state of the practice is that statewide planning not always clearly identifies the link between state needs and its prespecified missions. In other words, in most cases, the statewide transportation is a kind of 'wish list.' There is no clear connection among mission/planning/programming/available funds.

5. Today, there is an increasing need to perform cooperative and integrative planning and programming efforts among the different responsible transportation planning organizations or levels, i.e. state/local/regional. The objective is to develop a more unified transportation planning process.

6. The obvious observation is that it is hard to distinguish clearly between planning and programming. Both parts are not supposed to be considered just sequentially, but there is a need for ongoing feedback between them. The processes require adjustments in order to be able to consider all the possible alternatives and courses of action.

7. The proper approach to reach the implementation stage of any statewide transportation plan is to form realistic plans and programs. The focus is on what is possible (feasible), rather than what is desirable.
8. Another feature of the required statewide plan is the mixed approach. This approach incorporates both qualitative and quantitative judgment (how to use the expert opinion). In other words, there is a need for a comprehensive visualization of the required integrated methods and techniques.

9. The state departments are required to conduct a multimodal system planning as part of a single plan effort. Most of the states deal only with an individual modal problem, except in a specific corridor or at modal interface points. Perhaps there are other reasons that might explain the lack of focus on the multimodal planning, these include limited flexibility of fund allocation (the previous constraint of the categorical fund) and the fact that different modes require varying time horizons for implementation of highway transit.

10. The center of future transportation planning efforts should focus on three major issues: (1) the credibility of the planning product, i.e. the legislative and policy decision maker should be provided with a timely and concise planning and programming information, (2) the management side of the transportation process should be a major part of the planning process, and (3) the development of a more responsive planning process for investment and capital improvement.

4.6 THE PUBLIC INVOLVEMENT MECHANISM OF THE STATEWIDE TRANSPORTATION PLANNING PROCESS

Historically, public participation in decision making was developed in the 1960's and 1970's as a partial response to citizen opposition. Participation started with highway and urban transportation planning. The requirement of citizen involvement targets (the affected) communities and the potentially opposing groups, i.e. environmentalists and other non-established interest groups. The early problems of statewide public participation was affected by 1) the lack of experience of the staff to conduct formal public hearings, and 2) the selection of an adequate process for communications among the legitimate concerns and across jurisdictions (local, county, regional, special districts) (Runke, 1980).

Today, legislation and Federal acts mandate public participation in all planning stages. The requirements focus on a wide range of interests groups
with various concerns. There is a need for careful design of the participatory mechanisms that promote response to statewide transportation planning development. It requires accommodation of the public sector, enterprises, institutions, and the general public. As Manheim, et al. (1980) stresses, participation should be viewed in a positive way as an asset and support to various planning activities rather than as potential opposition.

4.6.1 Different Models to Develop Public Participation

There is a large body of existing literature documenting citizen involvement, mainly on urban and project level participation. At the state level there is a limited number of papers and documented literature describing the states approach in dealing with citizen participation (Wilson and Cannon, 1979; Fleet, Kashuba, Jilek, Osborne and Swisher, 1979). Presentations on statewide transportation and public participation include Runke, et al., 1980; and Manheim, 1980, and presentation by executive directors at the 1989 conference on the future of statewide transportation planning (Salvucci, Berenston, Hellman, and Jackson). As a summary of the available papers and literature, the review will highlight the issues and mechanism used to implement public involvement in statewide transportation planning development, particularly in the states of Arizona, Iowa, Louisiana, Minnesota, and Washington.

Recently, ISTEA puts a great deal of emphasis on public involvement with different groups now likely to be involved in transportation planning (Meyer, 1993).

4.6.1.1 Minnesota Department of Transportation (MNDOT)

One of the earliest examples of public participation was established in Minnesota. The Department of Transportation created a multiphase approach to public participation throughout the early stage of the development of the statewide transportation plan. The approach contains three phases:

Phase 1 The focus is on development and identification of transportation issues and problem as perceived by the public. The idea is to simulate public input through three ways of communication:
1. Letters to legislators, elected officials, interest groups, citizens
2. Public meetings at the level of regional planning districts and metropolitan areas.
3. Brochures to answer concerns of the general public about specific transportation issues.

Public input, whether positive or negative, is grouped into two categories: policy issues and specific transportation project recommendations.

**Phase II**. The phase consists of the activities of two groups: issue teams and an advisory task force. The issue teams focus on developing a background data analysis, issues, and policy alternatives, a so-called evaluation alternative.

The advisory task force was established for each planning region. It is responsible for evaluating the output developed by the issue team (i.e., project identification and ranking of project selection and criteria.)

**Phase III**. In this phase, a draft of the statewide transportation plan is written and published for public review, regional task force responses, and public meetings.

### 4.6.1.2 Iowa Department of Transportation (IADOT)

**Organization Process**. In order to develop the state transportation plan (TRANS plan 76), the department established a regional citizen advisory council as a means to incorporate public input in the plan. The Citizen Advisory Council (CAC) represents different geographic regions and consists of (1) private, (2) government, and (3) a specific interest sector. It is a voluntary participation group with bi-monthly meetings.

**Output**. The output of the CAC centers around four major areas:

1. Identify and prioritize critical transportation issues
2. Review of various specific modal planning studies.
3. Final review of the 5-year transportation improvement program.
4. Help to develop a report on major issues to encourage the public to communicate with the department.

The CAC does not substitute for the public meetings but is a tool to facilitate communication
4.6.1.3 Louisiana Department of Transportation (LADOT)

Although documented experience of the Louisiana DOT focused only on highway planning and programming, the department has a unique process of involving the public. It has two steps:

**Step 1** LADOT prepares the usual highway needs study, evaluation of alternatives, project priorities, and preliminary construction programs.

**Step 2** A joint committee consisting of the state legislature and transportation highway, and public works examines Louisiana's DOT information and plans. During the process, the Louisiana DOT staff answers technical inquiries. The procedure has two major features:

1. It allows any individual to comment, advise, and assess highway projects in areas where proposed construction takes place.

2. It allows positive and negative feedback from different public groups, particularly those impacted by the project.

4.6.1.4 Washington State Department of Transportation (WADOT)

The declared philosophy of the Washington DOT is that the planning process is issue-based, not transportation mode-based. Consequently, in 1980 the Washington DOT integrated public involvement into the process of developing recommendations for statewide planning by establishing ten issue subcommittees. Each committee covered specific issues, i.e. preservation, freight, good movement, intercity and urban mobility.

The overall objective of the process is to get information out to the public and to receive impact from the public. Public involvement contains four steps:

1. A broad representation in the form of a Steering Committee.
2. For each issue, a subcommittee was established to investigate the specified issue.
3. As an output, a monthly status report is sent to Washington residents.
4. In addition to monthly letters, a series of regional forums are performed.
4.6.2 Concluding Remarks

The statewide transportation planning environment experiences two major shortfalls: (1) Reduction in expected revenue and an increase in the future cost of capital improvement, and (2) an enormous need for institutional arrangements and political balancing in the decision making process. It is expected that active and effective citizen participation and improved communication among different legislative interest groups, i.e. planner, legislator, governor, and the general public will help to produce a higher quality, more acceptable, and more credible planning product. The overall objective of the process of public involvement is to achieve the required attributes for an open planning process.

The combination of open planning, citizen involvement, and alternative analysis strategy is expected to provide more responsive and timely information for the decision makers. The output is a more conscious plan that requires less time consuming revision and staff efforts.
CHAPTER V

DESCRIPTIVE MODEL OF THE OHIO TRANSPORTATION IMPROVEMENT PROGRAM

5.1 OVERVIEW OF THE HISTORICAL EVOLUTION OF STATEWIDE TRANSPORTATION PLANNING IN OHIO

Traditionally, in the United States, the Departments of Transportation (DOTs) have been established according to a mandate or request from state legislatures and responsibilities were outlined under the direction of that state's top managers. The Ohio Department of Transportation (ODOT) was created by the Ohio General Assembly, September 29, 1972 as a successor to the Ohio Department of Highways. Historically, and unlike most state DOTs, ODOT has no legislative requirements to prepare statewide transportation plans on a regular basis. This does not mean that ODOT does not have a transportation planning process for transportation activities, but what it does mean is that there is no comprehensive overview to coordinate and conduct its policy throughout the state. The transportation planning process is a decentralized system affected by the fragmentation of responsibility among different planning levels.

In the past, ODOT has tried to set policies aimed toward organizing its transportation activities (e.g., resurfacing a specific percent of the state transportation system or replacing a specific number of bridges). However, this direction has had little, if any, impact in performing overall transportation planning. The following section is intended to investigate and review the historic development of statewide planning. To achieve this goal, this researcher has conducted several informal interviews and had personal conversations with various members of the ODOT staff and reviewed several ODOT publications.
According to Coburn (1991), ODOT activities in the early 1950's (up to the 1970's) concentrated mainly on highway construction and improvement. The traditional view was that the only planning solution for transportation problems was a better highway. At this early stage, there was little concern about fund availability and transportation activities concentrated on the short-term demand of project scheduling, programming, and development.

The first successful attempt to formulate a comprehensive long-range schedule of transportation projects plan was made in 1977, with the formation of the Transportation Development Process (TDP). TDP was requested by FHWA (ODOT, 1993).

By 1983, the TDP lost sight of the importance of early planning and initial planning programs became a collective effort of the Metropolitan Planning Organizations (MPO). Each MPO initiated its own Transportation Improvement Program (TIP). Consequently, ODOT headquarters set more emphasis on preparing schedules of implementation and design processes rather than the initial planning process itself.

Transportation planning activities are highly affected by politics. Any proposed plan or modification of the state of the practice, depends on several factors, including the degree of acceptance by top management and the assigned relative priority for such improvement in the organization's agenda.

In the 1980's several attempts were made to conduct statewide sketch plans. These attempts, however, were just proposals without any actual applications that might help create the establishment of a statewide transportation planning process. One attempt was to coordinate different management perspectives and investigate ODOT's organizational structure with the possibility of formulating internal reform (Peat Marwick Consultants, 1988). The final report is a major achievement to investigate the organizational structure of ODOT. The report pointed out fragmentation of the planning and programming responsibilities within the ODOT Central Office organization. Despite the importance of the study, little application of the recommendations was performed at that time.
During 1989, top management and elected officials were exhibiting a significant amount of awareness of the statewide transportation planning problem. One emerging issue at the time was the establishment of the statewide planning section within the planning bureau (Coburn, 1993). This new section, within the Bureau of Planning had the following responsibilities:

1) Identify future transportation needs and opportunities;  
2) Guide future project selection and programming decisions; and  
3) Improve coordination of program funding needs and resources.

However, the relative position of the Bureau of Planning within ODOT's functional organization, and the lack of internal cooperation, prevented an effective practice towards a more formal statewide transportation plan.

By 1991 there was an increase in the awareness of the importance of having a general framework for long-range transportation activities. Supported by the legislature and top management, a new program *Moving Ohio Toward the 21st Century* was established. This program helped formulate a policy document that would guide the process for future transportation planning (ODOT, 1990).

The Federal Intermodal Statewide Transportation Efficiency Act (ISTEA) of 1991 accelerated statewide transportation planning. The Act mandated requirements to establish multi-modal long-range planning activities in all state DOT's. ODOT responded to ISTEA by establishing an "Access Ohio" program consisting of two phases. Phase I (macro level) established new department missions, including goals and objectives, and identified major statewide corridors plans. Phase II (micro level) is expected to identify the connections that link the major corridors identified from Phase I and to form a proper mechanism to implement statewide transportation planning activities (ODOT, 1992, 1993a).

5.2 ORGANIZATIONAL STRUCTURE OF STATEWIDE TRANSPORTATION PLANNING IN OHIO

5.2.1 Federal and State Agencies

Each state has a transportation department that is responsible for establishing and maintaining a safe, effective, multi-modal transportation system. ODOT is responsible for planning and implementing the Federal-aid highway
Figure 5.1 Planning and research activities of ODOT's common goals to achieve planning for coordinated transportation system.
program at the state level. Figure 5.1 depicts the expected overall framework of planning and research activities by ODOT in the statewide transportation planning activities. There are several organizations involved in preparing the transportation planning activities. The Central Office of ODOT coordinates the rural portion through several district offices. The urban portion of the transportation system is a coordinated effort between metropolitan planning organizations and local communities. The following briefly analyzes and investigates these Federal, state, and local agencies.

5.2.1.1 ODOT Central Office

ODOT is one of the largest governmental agencies in Ohio. The Director of Transportation and his immediate staff are responsible for implementing all transportation activities within the state. The organization hierarchy of ODOT is composed of a Central Office (headquarters) located in Columbus and twelve district offices located throughout the state. The principal coordinator for the Central Office (divisions and bureaus) and the districts is the Assistant Director of Transportation. The functional organization of ODOT, in relation to various transportation activities, can be classified under three major functions: 1) a general support function; 2) a transportation programs support function, and 3) operational function. Figure 5.2 illustrates the functional organization of ODOT. Each functional group consists of several divisions (or bureaus) who's assigned responsibility is to perform specific organizational missions that accomplish the department's overall mission. A typical statewide transportation activity is in the State Transportation Improvement Program (STIP). The process involves all transportation project development through five major stages: 1) planning, 2) programming, 3) project development, 4) construction, and 5) operation.

5.2.1.2 District offices

The twelve district offices in Ohio are structured to perform activities similar to that of the Central Office. Transportation activities at district levels are on a smaller scale and focus on specific geographical (rural) areas. The location of the twelve districts is presented in Figure 5.3. In the overall transportation activities, the Central Office is the decision maker and the major implementor. Districts work closely with the Central Office assisting in the implementation
Figure 5.2 Ohio Department of Transportation (ODOT) Organizational Structure & Staff
Figure 5.3 Geographical locations of ODOT districts

(source: ODOT, 1993)
process and are responsible for monitoring the system. In other words, the Central Office is responsible for providing policies, administrative control, fiscal control, and technical guidance. The districts are the operating branches for the established policies and procedures within their jurisdictional area.

5.2.1.3 Other related Federal and state agencies

There are several other Federal and state organizations within the State of Ohio that affect (or have been affected) by transportation activities. These organizations include the Environmental Protection Agency (EPA); the Department of Economic & Community Development, the Department of Natural Resources, etc. Generally, most of these organizations have an overall different mission than ODOT. Consequently, their comments or contributions to the transportation planning effort, or project development, are in the form of public input. However, this level of participation depends on the complexity and nature of the problem. Table 5.1 illustrates different cooperative activities that are classified into five major categories. These categories include coordination, interim coordination, environmental documents, public hearings, special agreements, and permits.

5.2.2 Local Planning Agencies

In addition to ODOT's Central Office and its twelve districts, there are several planning organizations that contribute to the overall transportation improvement programs. Figure 5.4 depicts the different transportation organizations and their responsibility and level of input in the statewide transportation planning process. These organizations vary in their degree of sophistication and responsibility (ODOT, 1983).

5.2.2.1 Metropolitan Planning Organizations (MPO's)

MPO's are formal regional system planning agencies. Although urbanized areas represent about one-third of the total land area in Ohio, three-fourths of the state's population reside in these areas. These urbanized areas are comprised of sixteen MPOs (Fig. 5.5).
Table 5.1 Cooperative Activities Between ODOT and Other State and Federal Agencies

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<thead>
<tr>
<th>Agencies</th>
<th>Public, Environmental, Federal, State, and Local&lt;br&gt;Coordination</th>
<th>Interim Coordination</th>
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<td>Corps of Engineers</td>
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Activities:
- x: Cooperative activities
Responsibility
- Implement statewide planning system
- Organize statewide planning process to identify need (planning & programming)

LEVEL OF INPUT
- Statewide Planning System
- Urbanized Area
- County Level
- Local Level

ORGANIZATIONAL INVOLVEMENT
- Department of Transportation (DOT)
- Metropolitan Planning Organization (MPO)
- Regional or County Planning Commission
- City or Other Local Planning Agencies

Figure 5.4 Different transportation organizations and their responsibilities and level of input
Figure 5.5 MPO locations in Ohio

(source: CDOT, 1993)
MPO’s were established based on the 3C’s planning principles: continuous, cooperative, and comprehensive planning. Their major function is to conduct regional planning activities for urbanized areas. Their overall work program consists of three primary steps:

1. Long-range transportation planning;
2. Transportation system management; and
3. Four-year Transportation Improvement Programs (TIP) which are updated annually.

In Ohio, MPO’s are often requested by ODOT to assist in, and assume prime responsibilities for, urban activities that contribute to overall statewide plans. This includes an early public involvement process and preparation of environmental documents. Currently, ISTEA mandates the MPO’s role and delegates more power to them. However, planning activities by MPO’s are executed on a project-by-project basis. (Detailed discussions about planning boundaries and planning products are outlined in the Literature Review.)

5.2.2.2 County planning commissions

County Planning Commissions were established under various sections of the Ohio Revised Code. These organizations are not required to support or maintain the 3C process. Traditionally, their role in comprehensive planning activities is considered as public participation. Consequently, their participation contributes to the long-range need study and identification of project improvement. Although participation is on an irregular basis, ISTEA’s emphasis on early public involvement in all transportation planning stages strengthens their role.

5.2.2.3 Local planning

Local Planning agencies are another form of public input in the planning process. Each urban area within the individual municipal authorities (under 50,000) establishes a local planning agency. The new transportation environment emphasizes prime concern for local impact. Consequently, these agencies will play a more significant role in the planning process.
5.3 PROCEDURES TO DEVELOP THE STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM

ODOT is responsible for multi-modal transportation programs, including aviation, bicycling, public transportation, rail, water, and highways; the major concern being the highway program. These responsibilities also include capital improvement projects on all interstate highways and Federal and state highways located outside of municipalities. It also operates and maintains bridges on these highways. The remaining streets, highways, and bridges are the responsibility of the counties and townships (municipalities) where they are located (ODOT, 1991).

The current state-of-the-practice of ODOT relies on a short-range Statewide Transportation Improvement Program (STIP). Figure 5.6 depicts the traditional procedures for the development of STIP. The procedure is composed of five major steps. The initial plan is started at the MPO level. Each MPO develops its own Transportation Improvement Program (TIP). The final output of TIP is a list of all identified needs by each MPO. Each MPO submits its TIP to the Central Office. In addition, each district is to submit a list of needed projects. The Central Office then combines all the projects and then formulates the Statewide Transportation Improvement Program (STIP).

The Central Office is responsible for the programming process and preparing the state implementation program (SIP). The process provides the Central Office with a tool to control environmental quality. In addition, it allows the Central Office to control the allocation of Federal funds for STIP. The Central Office performs the implementation process that includes the approval of selected TIP designs and contracting the projects for construction. The final decision is subjected to approval from the Director of Central Office, the Federal Highway Administration (FHWA), US Environmental Protection Agency (USEPA), and the Federal Transit Agency (FTA). The Central Office and district office are the major implementor for STIP. Their responsibilities include monitoring the system performance and feedback. A notable observation is that on one hand MPO's are responsible for initiating the planning process but their major focus is on urbanized areas; while on the other hand, ODOT's Central Office and its twelve districts formulate the overall program details and design
Figure 5.6 Procedures for the development of the Statewide Transportation Improvement Program
plans with the major focus on rural areas. Although TIP is a multi-modal document, MPO's rely on the comprehensive system planning approach but perform a modal-oriented process.

5.3.1 The Role of TIP in the STIP

The decentralized transportation approach in Ohio resulted in a significant influence of MPO's on the planning output. Each MPO has the primary responsibility of initiating a transportation planning process in both long- and short-term planning horizons. The TIP is a major contributor in the overall STIP. Consequently, the primary concern of STIP is to schedule programs for implementation based on each MPO's short-range TIP (i.e. TIP is the foundation for statewide planning.) In developing a multi-modal transportation improvement plan, a critical issue is how to coordinate all the TIPs that have been created by each metropolitan planning agency. This requires a cooperative effort between ODOT's Central Office, MPO's, and the Transit Authority. The following section will investigate and analyze the current state-of-the-practice to formulate TIP as a collective effort for STIP.

5.3.1.1 Objective of TIP

The major objective of TIP is to establish a cooperative relationship between the urban transportation planning process at the metropolitan planning level with the program of projects advanced for implementation using Federal funds at the statewide level. TIP includes all Federally funded transportation improvement projects as well as locally funded transportation system management (TSM) for air quality. TIP formulation relies on several major elements:

1. Establish a need for the project,
2. Identify source of funds (cost of the project versus available funds),
3. Satisfy all TIP planning principals and criteria, and
4. Get the approval of MPO's (i.e., policy committee)

5.3.1.2 The planning principals of the TIP

There are several factors that contribute to the successful formulation of a TIP: 1) the ISTEA requirement guidelines, 2) early public involvement, 3) air
quality standards and compliance with the Clean Air Act Amendment (CAAA), and 4) the principles of the congestion management system. TIP is a four-year project. It is a short-range improvement program. From the state's point of view, the conditions of eligibility for receiving Federal funds depends on whether the project is included on the TIP or not.¹

53.1.2.1 ISTEA

The development of updated annual TIPs is now a Federal mandate within the MPO's jurisdiction. The Intermodal Statewide Transportation Efficiency Act (ISTEA) requires that TIPs be consistent with an area's need and include priority lists within the identified projects. In addition, the identified list of projects must be within the availability of funds. A literature review of this research illustrates the impact that ISTEA has on MPOs.

53.1.2.2 Early public involvement

Early public involvement gained more importance after ISTEA. Public involvement in transportation improvement projects is expected to be a two-step process. The first step covers all individual projects on a TIP at the MPO level, and the second step covers STIP at the state level. The objective of public involvement is to identify the social and economic effects, and to consider the environmental impact of the project in the early stages of the planning process. Public involvement is one of the major factors to achieve credibility of the TIP planning process. It depends on the ability of the planning process to include the participation of private citizens, public officials, and interest groups in a more effective fashion. To achieve this, it is necessary to consider the early identification of the affected segments of the community, and to have a coherent formulation of issues and problem concerns. Participation will serve as a guide for project improvement identification. The overall process requires continuous refinement and feedback. Table 5.2 illustrates different formats and levels of

¹There are several planning and management steps that formulate the basic structure for TIP, these include: 1) public participation, 2) TIP development process, 3) project selection, 4) financial analysis, 5) the compliance with air quality standards, and 6) the Americans with Disabilities Act (ADA).
<table>
<thead>
<tr>
<th>Professionals</th>
<th>Public Officials</th>
<th>Public Information Programs of Agencies</th>
<th>Public Officials</th>
<th>Citizens</th>
<th>Professionals</th>
</tr>
</thead>
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<tr>
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</tbody>
</table>

**Table 5** Application of Citizen Involvement Techniques
public participation. Traditional TIP processes to establish public involvement rely on public meetings to discuss and initiate or propose and discuss projects to be considered.

5.3.1.2.3 Air quality standards

The Clean Air Act Amendment (CAAA) of 1990 mandates that air quality and transportation system management be considered within the TIP process. The Act provides for the attainment and maintenance of national ambient air quality standards. In accordance with the CAAA; the EPA and ODOT Central Office require conformity analysis for all transportation plans in the TIP. The conformity analysis focuses on urban areas that are classified as moderate non-attainment areas for ozone or noise. A quantitative analysis for the entire TIP is required to be made jointly by MPO's and ODOT and the analysis document to be submitted to FHWA. Figure 5.7 shows the location of non-attainment areas in Ohio.

The following procedures discuss major activities within "the planning process." The procedures consist of five generic steps: 1) policy direction, 2) need identification (or deficiency), 3) proposed alternative solutions, 4) evaluation of the proposed alternative solutions to select the best, and 5) project prioritization (MORPC, 1987). After the last process is completed, MPO's submit their TIP to ODOT's Central Office. ODOT will advance these lists of projects in the TIPs for programming, design, and finally implementation.

5.3.1.2.4 Congestion management system (CMS)

The Federal government mandated the establishment of the Congestion Management System (CMS) by 1995 for all urbanized areas with a population over 200,000 (TMS area). During the period prior to full implementation of the CMS in all TMS areas, regulations required that MPO's--in cooperation with state DOT's, public transit, and other operational agencies of major transportation modes--identify locations of the most serious congestion problems and prepare a comprehensive congestion management strategy. This cooperative effort is a prerequisite to advance project implementation. Table 5.3 shows several planning strategies for transportation system management for congestion relief.
Figure 5.7 Moderate and marginal non-attainment areas in Ohio
Table 5.3 Examples of TMS Planning Strategy

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Purpose</th>
<th>Strategy or Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spot Improvement</strong></td>
<td>• improve road efficiency and safety at specific locations</td>
<td>• additional left lane at intersection</td>
</tr>
<tr>
<td></td>
<td>• reduce overall vehicle delay and decrease congestion</td>
<td>• improve traffic signals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• provide pedestrian facilities and transit passenger service</td>
</tr>
<tr>
<td><strong>Corridor or Area Access Control</strong></td>
<td>• manage the impact of rapid development</td>
<td>• comprehensive analysis of transportation problems along roadway corridors</td>
</tr>
<tr>
<td>Planning Activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activities with Regional impact</strong></td>
<td>• improve and upgrade the whole transportation system efficiency</td>
<td>• increase ridership, transit service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• regulate land use development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• encourage flexible work schedules</td>
</tr>
</tbody>
</table>
5.3.3 TIP planning procedures: MPO level

In the Ohio transportation planning process, participation of the MPO plays a vital role. In this section the researcher has collected information and analyzed the state-of-the-practice of several metropolitan planning organizations. The results indicate a similarity among the MPO's in their transportation planning process. However, each MPO presents their final documentation of the TIP in different formats. This research focuses on three major MPOs in Ohio: Columbus, Cincinnati, and Cleveland. The Columbus MORPC is selected for this section's detailed analysis. The research classifies current state-of-the-practice of MORPC into three major activities: 1) the technical analysis to establish the means, 2) the planning process, and 3) the management and supportive activities. The latter activity could be divided into a) programming, i.e. schedule transportation projects, b) implementation, and c) communication and feedback, which includes monitoring system performance and re-evaluating future systems. Figure 5.8 simulates the graphical relationship among all these processes to formulate the TIP.

The following procedure discusses major activities of the planning process. The procedure consists of six major steps: 1) Policy direction (determine goals), 2) need identification (identify problems and deficiencies), 3) proposed alternative solution (determine an alternative to overcome deficiency), 4) evaluation of the proposed alternative, 5) select the appropriate course of action, and 6) project prioritization (MORPC, 1987). After the last process is completed, MPOs submit their TIP to the ODOT Central Office. ODOT will advance these lists of projects in the TIP for programming, design, and final implementation.

5.3.3.1 Policy direction

The basic task of this step is to adopt regional goals and objectives for both long- and short-range transportation planning. The policy directions are expected to guide future planning activities in terms of strategy, process, and project selection and formulate alternative courses of action. At the MPO level, a major constraint on the policy direction is the need to conform to Federal, state, and local laws and regulations, and to investigate funding availability. The
### Figure 5.8 Visualization of planning process to prepare the TIP

Transportation Planning Process
policy document serves as a political commitment to the public interests and local concerns. The primary assumption in policy direction is that by solving transportation problems, a maximum benefit to the region itself will be attained.

The difference in policy direction of the state level and the MPO’s is the scope of the target group and the degree of generality. At the MPO level the focus is regional while at the state level, focus is on the entire state. There is a need for cooperation and integration in policy formulation between the MPO’s and the state facilitate to formulate an attainable goal that fits within the political reality. Furthermore, a correct policy specification enables transportation to serve as a means to achieve societal goals in both urban and rural areas.

An important aspect of policy direction is the development of measures of attainability or achievement of specific goals. Table 5.4 illustrates examples of MORPC's measures of effectiveness in relation to the transportation goals and objectives.

5.3.3.2 Need identification

Need identification is one of the major technical planning aspects of the transportation planning process. Within this step, a set of technical and modeling analyses was established, including: 1) inventorying the existing transportation system, 2) forecasting future systems, and 3) satisfaction of a specific levels of service (or measure of performance). An output technical analysis is combined with public input and political commitment to identify the required projects for improvement. Figure 5.9 illustrates a sketch planning process for the identification of projects for improvement.

5.3.3.3 Proposed alternative solutions

Commonly, each jurisdiction is responsible for developing alternative solutions for all identified deficiencies. However, in an open planning process, public comment and suggestions should be taken into consideration. This means that the staff of each planning level is responsible for checking the degree of suitability of the suggested solution. If the proposed solution is applicable, it
Table 5.4 Example form MORPC: Measure of Effectiveness and Scope of Evaluation in Relation to Transportation Goals and Objectives

<table>
<thead>
<tr>
<th>Selected Goals &quot;Perspectives&quot;</th>
<th>Attribute &amp; Measure of Effective Goals</th>
<th>Scope of Evaluation</th>
</tr>
</thead>
</table>
| • Improve the efficiency and service of the regional transportation system | • Reduce travel time and delay in the transportation system  
  • Increase the comfort and convenience of the transportation system | Focus on suggested performance, i.e. internal effect |
| • Enhance the safety of regional transportation | • Improve deteriorated highways, transit, pedestrian, and bicycle facilities | Extend the scope to the external effect of the system, i.e. safety |
| • Protect the transportation related local, environmental, and economic well-being of the citizen | • Reduce public and private costs of the regional transportation system  
  • Reduce energy consumption of the regional transportation system  
  • Assurance of the National Ambient Air Quality Standards (NAAQS)  
  • Ensure cooperation between transportation and land use, i.e. neighborhoods and economic development | |
| • Protect the investment in the regional system | • Maintain and/or rehabilitate the element of the transportation system | Use transportation as a means to achieve a greater goal, i.e. economic development |
GOALS & OBJECTIVES from policy directors

Long Term

Data Collection & Forecasting (existing & future systems)

Short Term

Translate the goals and objectives to a measure of effectiveness (level of service or measure of performance)

Non-Technical Analysis
  - Public Input
  - Interest Group
  - Political Commitment

Technical Analysis
  - Short Term: gather information in terms of capacity, safety, ridership, etc.
  - Long Term: compare data collection and forecast with level of service or measure of performance

IDENTIFY LIST OF PROJECTS FOR IMPROVEMENT

Figure 5.9 Sketch plan process for identifying deficiencies
should be included in an MPO alternative plan. The goal of this program is to convey information about the problem and explain the possible course of action and its implication upon the community. The second step is to establish a mechanism for feedback from the public.

5.3.3.4 Evaluation of alternative solutions

An evaluation of proposed alternative solutions requires establishing a set of measures of attainability in relation to specified goals and objectives, and evaluating these alternatives according to the degree of achievement of those goals. Usually, the selection process is performed based on a combination of both non-technical (judgment) and technical analysis. However, one major obstacle of technical analysis is data availability. The limitation of data availability means that a large portion of technical criteria are not applied in a proper way. The current state-of-the-practice of alternative selections becomes more dependent on judgmental analysis or political commitment than on technical analysis.

5.3.3.5 Project prioritization

Project prioritization is a process used to rank the selected alternative projects for implementation. The process considers the funds available as a budget constraints and lists all projects in hierarchical order. The order of importance begins with the most urgent and ends with the least urgent. There are three major assumptions that control overall project prioritization (MORPC, 1987):

1. A selected alternative is expected to solve a specific problem. That is, all alternative projects that have advanced to prioritization step have passed the technical analysis in terms of level of service or measure of performance.

2. A selected project is the best alternative and is expected to contribute to the establishment of the identified goals and objectives.

---

2The essential requirement to achieve this productive format of public participation is to establish an educational program.
3. The final list of prioritized projects is financially feasible for implementation and the funding sources for each project have been identified.

By satisfying these assumptions, the list of projects is expected to improve some of the transportation system deficiencies, respond to community needs, and conform with political reality.

Several limitations exist within the current prioritization process. Most urban areas focus on highway improvement rather than alternative modes. The operating assumption is that changes in transit do not require large capitol costs and it commonly focuses on short-term implementation or specific site analysis. The widespread method for prioritization is the sufficiency rating technique, which focuses more on judgmental analysis than quantitative analysis. Table 5.5 depicts the current evaluation and prioritization criteria for the year 2010 highway plan for MORPC. Major observation is that the listed criteria use subjective rating rather than quantitative measures and do not facilitate a trade-off analysis among different transportation modes (highway vs. transit).

5.3.4 Ohio STIP Planning Procedures: ODOT Central Office

The basic expectation of a sound statewide multi-modal plan is to relate courses of action for specific problems, goals, and objectives. The characteristics of the procedure and its steps must reflect the political reality and financial capability. During the 1990’s several new Federal acts specified many elements which should be considered in developing a statewide planning process. Details are presented in earlier literature reviews. Table 5.6 illustrates the different Federal acts and their implications on the planning process. Unlike other acts, ISTEA has a significant impact on the current state-of-the-practice. The Act stated:

"The state shall develop transportation plans and programs for all areas of the state. Such plans and programs shall provide for development of transportation facilities which will function as inter-modal state transportation systems."


The Literature Review investigates several successful examples of state-of-the-practice. The results indicate that the statewide plan should consider a wide
Table 5.5 Evaluation & Prioritization Criteria  
Year 2010 Highway Plan

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Measure</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severity of Problem</strong></td>
<td>v/c 1.25 or less</td>
<td>0</td>
</tr>
<tr>
<td>(projected volume to existing capacity)</td>
<td>v/c greater than 1.25</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>v/c greater than 1.35</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>v/c greater than 1.50</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>v/c greater than 1.75</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>v/c greater than 2.00</td>
<td>25</td>
</tr>
<tr>
<td><strong>Average Daily Traffic</strong></td>
<td>Projected ADT 8,000 or less</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Projected ADT over 8,000</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Projected ADT over 15,000</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Projected ADT over 20,000</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Projected ADT over 30,000</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Projected ADT over 40,000</td>
<td>25</td>
</tr>
<tr>
<td><strong>Regional Significance</strong></td>
<td>0 to 10 subjective</td>
<td>0-10</td>
</tr>
<tr>
<td><strong>Safety Considerations</strong></td>
<td>0 to 5 subjective</td>
<td>0-5</td>
</tr>
<tr>
<td><strong>Cost of Improvement</strong></td>
<td>Total cost $15 million and over</td>
<td>0</td>
</tr>
<tr>
<td>(est. in 1989 dollars)</td>
<td>Total cost under $15 million</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total cost under $12 million</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Total cost under $9 million</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Total cost under $6 million</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Total cost under $3 million</td>
<td>15</td>
</tr>
<tr>
<td><strong>Social, Economic, and Environmental Impacts</strong></td>
<td>-10 to +10 subjective (point range)</td>
<td>0-10</td>
</tr>
<tr>
<td><strong>Energy Impacts</strong></td>
<td>-5 to +5 subjective (point range)</td>
<td>max 0-5</td>
</tr>
<tr>
<td><strong>Air Quality Impacts</strong></td>
<td>-5 to +5 subjective (point range)</td>
<td>max 0-5</td>
</tr>
</tbody>
</table>

Total Score:

(source: MORPC 1997: Evaluation and Prioritization Criteria)
<table>
<thead>
<tr>
<th>Acts</th>
<th>Goals</th>
<th>Impact on the Transportation System</th>
<th>Tools to Achieve the Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAAA Clean Air Act Amendment 1990</td>
<td>Requires transportation program activities to achieve air quality standards</td>
<td>• Immediate effect requires transportation control measure: auto emission test</td>
<td>Control and restrict the rate of growth in vehicle miles traveled in major urban areas restricted so the effect of new, cleaner, vehicles is not overwhelmed by the increase in miles traveled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Long-range effective transportation program to improve air quality</td>
<td></td>
</tr>
<tr>
<td>ISTEA Intermodal Surface Transportation Efficiency Act 1991</td>
<td>Develop a national intermodal transportation system that is: economic efficiency environmentally sound a foundation for the nation to compete in the global economy</td>
<td>• Emphasizes a multi-modal statewide plan</td>
<td>Increase the flexibility of transferring funds among highway and other modes. Establish a transportation management system Provide a guidance list for each MPO and state level to follow.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Delegates more power to MPOs in the statewide transportation process (i.e. more cooperative effort among DOTs, MPOs, and locals)</td>
<td></td>
</tr>
<tr>
<td>Energy Policy Act 1992</td>
<td>Reduce the transportation dependency on oil by 30% by the year 2010. However, it will not affect the physical transportation system compared to others. It focuses on the kind of fuel used rather than the shape of the transportation system itself.</td>
<td>• Decide what percentages of state fleet purchases in urban areas should use alternative fuels. • Puts restrictions on new and current state fleet purchases in urban areas.</td>
<td>Domestically published alternative transportation fuels, i.e. natural gas, ethanol, methanol, electricity, propane, hydrogen, etc.</td>
</tr>
</tbody>
</table>
range of issues and require a dynamic mechanism to formulate the state planning process. The process includes a management system data base, energy and environmental consideration, various transportation modes (i.e. highway, bicycle/pedestrian, transit, aviation, and water). Today, the major characteristic of statewide planning is the financial analysis and implementation mechanism. The critical issues are problem definition, technical analysis and evaluation, public participation, and relationships among different state planning organizations.

As discussed in the previous section, statewide transportation practices in Ohio assume that MPO's initiate the planning phase. The most significant duties of the Central Office are administering Federal funds and preparing program designs and operation processes. STIP procedures rely mainly on the project development process. The process is applied to all highway projects on the state and local level, regardless of partial or complete Federal funding.

The current state-of-the-practice deals with four major activities: 1) administration of funds, 2) consideration of environmental impact, 3) public input, and 4) contract planning. The procedure for project planning, conducted by STIP, includes five major stages. These stages and the overall transportation development process is depicted in Figure 5.10.

5.3.4.1 Planning Phase This stage involves the administration and coordination of system planning, data collection, and distribution. The main activities are:

a. develop and maintain statewide multi-modal transportation system plans,

b. integrate and assist transportation planning of local and regional government and MPOs into statewide transportation planning (STIP). The process is designed to meet the identified needs at all levels in the state (regardless of the level).

The planning stage involves: a) determination of goals and objectives, b) identification of STIP needs and deficiencies, c) development of alternatives, and d) selection of preferred plan. Currently, it is a collective effort between ODOT
Figure 5.10 Transportation development process and its stages
(continued)
Figure 5.10 continued

**STAGE III**  PROJECT DEVELOPMENT

- Evaluation
- Preliminary Development
  All project with environment impact
- Final Development

**STAGE IV**  CONSTRUCTION

- Completion of Project Development
  subject to
- Availability of Funds

**STAGE V**  OPERATIONS

- Maintain the Transportation Facility at Acceptable Level of Operations
- Maintenance Schedule
- Implementation of Maintenance Based on Priorities of Funding
and MPO's, especially regarding urban issues, while ODOT is mainly responsible for rural areas.

5.3.4.2 Programming In programming, the goal is to schedule and monitor the categorical projects identified by STIP. The primary concern is to assure that programs are consistent with up-to-date statewide planning and budgeting. The programming stage considers public reaction, financial resources, and design status at right-of-ways. In this phase, priorities are assigned and statewide programs are prepared.

Currently, ODOT prioritization is performed at the MPO level, not at the state level. However, the state level controls the SIP. It allows the state to require elimination of specific projects from the TIP (using environmental control and fund availability as the major criteria); it recommends ODOT establish a statewide prioritization process.

5.3.4.3 Project development Project development is a major activity and a contribution of ODOT in the formation of Statewide Transportation Improvement Program; it advances the programmed project to the construction (implementation) stage. This process, called the Transportation Development Program (TDP), integrates four basic principles\(^3\) (ODOT, 1984):

1. Integration of several disciplinary approaches;
2. Participation and early involvement of citizens, public officials, and other planning agencies;
3. Consideration of alternatives;
4. Consideration of social, economic, and environmental effects.

The project development stage is comprised of three phases: evaluation, preliminary development, and final development. In the evaluation phase, all projects of the STIP are reviewed to determine the scope of the required analysis. This includes the compliance with public needs and environmental conformity. The STIP list of projects is split into two categories in terms of environmental conformity. The first category contains all projects without significant

\(^3\)The Federal Aid Highway Act of 1970 (Sect. 136(b)) is designed to make sure that each state fully consider the impact of any and all Federally aided highway proposals within that state.
environmental impact; they advanced directly to the final phase of development. The second category, those with possible environmental impact, advance to the second phase, preliminary development. In this second phase, all identified projects are to be investigated and analyzed to select alternatives and decide upon environmental conformity. Table 5.7 depicts air quality conformity input and project eligibility for funding.

In the final development stage, all projects that have advanced from the evaluation stage (or satisfy the constraints in the preliminary development phase) are eligible for detailed designing and purchases of right-of-way. The final development includes all activities necessary to finalize the STIP to be advanced to the construction stage and prepared for final approval.4

5.3.4.4 Construction After the completion of the project development stage, all projects in the STIP are scheduled for construction subject to the availability of funds and final approval. Table 5.8 depicts current statewide funding categories, the Federal share, and the level of responsibility.

Final approval plays a vital role in the implementation of the STIP. The final decision usually comes from top management and, in some instances, by an elected official based on political commitment. When original decisions need to be modified, it is necessary to seek reviews from higher levels of management or for special projects, such as in non-attainment areas. Consequently, different levels of approval are required based on the type of project, funding, and conformity. Table 5.9 illustrates the procedure developed by FHWA, FTA, and EPA to reduce the approval time.

5.3.4.5 Operations In the operation phase, the contracted project is implemented. The major focus is to maintain transportation facilities at an acceptable level of operation. This includes maintenance, scheduling, and implementation of maintenance based on funding priority.

4 However, the final list of STIP's is still within the constraint of public satisfaction and environmental quality and requires final approval before advanced to the construction stage.
Table 5.7 Procedures and Requirements for Air Quality Conformity (projects outside the annual approval cycle)

Air Quality Conformity Input and Project Eligibility for Funds

<table>
<thead>
<tr>
<th>Required Steps for Mutual Agreement</th>
<th>Project Responsibility</th>
<th>Action Procedures</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• public Involvement</td>
<td>regardless of sponsorship</td>
<td>MPO undertakes public involvement process at minimum by: • passing resolution approving the project to be included in the TIP • receiving approval of MPO's publicly elected representative • advertising project in a period of time for public comment (newspapers)</td>
<td></td>
</tr>
<tr>
<td>• Fiscal Constraints</td>
<td>not sponsored by ODOT</td>
<td>The MPO conducts a priority analysis to assure that state funds are available</td>
<td>Central Office confirms state funds availability</td>
</tr>
<tr>
<td></td>
<td>sponsored by ODOT</td>
<td>ODOT assures funds availability prior to MPO's request to add the project into the TIP</td>
<td></td>
</tr>
<tr>
<td>• Conformity Analysis</td>
<td>for MPO's in non-attainable areas with self-conformity analysis</td>
<td>MPO's in non-attainable areas which perform their own conformity analysis should submit this analysis to the Central Office</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For MPO's in non-attainable areas who rely on ODOT for the analysis</td>
<td>The needed information for the conformity analysis should be submitted by the MPO's to ODOT's Bureau of Technical Services prior to adding the project to the TIP</td>
<td></td>
</tr>
</tbody>
</table>

*In non-attainment areas, the decision to add projects outside the annual approval cycle requires cooperation and mutual agreement between MPO's and ODOT on the project priority.*

(source: ODOT, 1989 Adopted from Interoffice Communication TIP/STIP Development Requirement)
Table 5.8 Current Statewide Funding Categories
Responsibilities & Rates of Federal Share

<table>
<thead>
<tr>
<th>Funding Category</th>
<th>Abbreviation</th>
<th>Responsibility</th>
<th>Federal Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interstate Construction</td>
<td>I</td>
<td>ODOT</td>
<td>90%</td>
</tr>
<tr>
<td>Interstate Maintenance</td>
<td>IM</td>
<td>ODOT</td>
<td>90%</td>
</tr>
<tr>
<td>National Highway System</td>
<td>NH</td>
<td>ODOT</td>
<td>80%</td>
</tr>
<tr>
<td>Bridge Replacement &amp; Rehabilitation</td>
<td>BR</td>
<td>ODOT &amp; local government</td>
<td>80%</td>
</tr>
<tr>
<td>Congestion Mitigation &amp; Air Quality</td>
<td>CM/AQ</td>
<td>ODOT &amp; local government</td>
<td>80%</td>
</tr>
<tr>
<td>90% minimum allocation</td>
<td>MA</td>
<td>ODOT &amp; local government</td>
<td>80%</td>
</tr>
<tr>
<td>Demonstration Projects</td>
<td>DP</td>
<td>ODOT &amp; local government</td>
<td>80% -</td>
</tr>
<tr>
<td>Safety Projects</td>
<td>HES</td>
<td>ODOT &amp; local government</td>
<td>90%</td>
</tr>
</tbody>
</table>

(source: ODOT, 1993)
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Project Status</th>
<th>Level of Approval</th>
<th>Observation</th>
</tr>
</thead>
</table>
| 1        | • project is highway related  
• it is a neutral emission impact, or  
• there is no sufficient scope to conduct a technical quantitative conformity analysis | Local FHWA division | FHWA & FTA coordinate if any questions arise |
| 2        | • project is transit related  
• neutral emission project | FTA office in Chicago, IL in coordination with the FHWA division office | |
| 3        | • project requires revised air quality conformity  
• funding source results from a transfer from highway to transit or vice-versa | Joint FHWA/FTA approval is required | MPO or DOT will coordinate with US EPA when revised air quality conformity funding is required |

(source: ODOT, 1993 Adapted from Interoffice Communication TIP/STIP Development Requirement)
5.4 THE FUTURE OF TRANSPORTATION PLANNING ACTIVITIES IN OHIO

Today, ODOT's major transportation objective is to produce a multi-modal statewide transportation plan. The planning process will be used to identify key resources by mode, addressing existing capabilities and future needs. The mission is to provide, for Ohio, an efficient and convenient access for movement of people and goods. The multi-modal transportation planning process is expected to serve as a policy document. It determines the department's mission and provides strategy for solving transportation problems (ODOT, 1991).

5.4.1 Access Ohio

In November, 1991, ODOT created Access Ohio. Access Ohio was envisioned by ISTEIA. "It is a systematic process aimed at providing a state inter-modal transportation plan." The purpose of Access Ohio is to incorporate policies, program development, evaluation and implementation components into a statewide transportation planning process. "The procedure aims to integrate land use and intermodal management into future planning activities at state and local levels" (Access Ohio Proposal Development of Model State, July 10, 1992, p. 1).

The proposed approach for Access Ohio is divided into two major phases:

5.4.1.1 Phase I: The Macro Level

The purpose of the macro phase is to examine the overall mobility of people and goods in Ohio. Emphasis of the plan is on the selection of major corridors of statewide highways, rails airports, public transportation, and water ports. Economic significance is the major criterion for the adoption and selection of the major corridors plan. The process was developed via an extensive outreach program. Figure 5.11 illustrates the process of the outreach program.
OHIO DEPARTMENT OF TRANSPORTATION
ACCESS OHIO: SPECIFIC GOALS

System Presentation & Management

Cooperative Planning Process & Transportation Efficiency

Economic Development & Quality of Life

ACCESS OHIO Identified Framework

Funding

Transportation Safety & Convenience

Figure 5.11  ODOT Access Ohio: Goals

(source: ODOT, 1990)
5.4.1.2 Phase II: The Micro Level

The micro phase is currently in development and is expected to be in its final stage by the end of 1994. In this phase, the department intends to first examine and define local and regional transportation access links to connect to identified major corridors in the macro level; and second, to establish a mechanism for the coordinated implementation process. The procedure is expected to include detailed methods and procedures for evaluation, prioritization, and programming of the identified corridors and arrange the proposed linkage in terms of importance. ODOT emphasized three major criteria to identify the connectivity: 1) economic development, 2) compliance with the state goals and the Clean Air Act Amendments, and 3) accessibility to disabled and environmental quality (ODOT, 1992, 1993a).

5.4.1.3 Access Ohio procedures

The planning process for Access Ohio (established by ODOT) was described as a participatory, data-gathering effort to identify the perceived needs and policy issues. The process focuses on public sessions and meetings with legislative partners and interest groups. The aim was to identify and select goals and criteria to formulate the micro level corridor.

A statewide planning advisory group (SPAG) was established. It is the responsibility of this group to develop a set of criteria for determining the efficiency and effectiveness of the corridor plans as a base for multi-modal statewide planning under ISTEA (Singleton, 1992). In order to establish these criteria, an investigation of various parameters and performance of efficiency is considered. The criteria include: total travel time, cost of travel, speed, cost of the intermodal transfer of people and goods, and the consumption of energy by types of fuel.
5.5 OBSTACLES TO ACHIEVE EFFECTIVE STATEWIDE TRANSPORTATION PLANNING: SUMMARY/DISCUSSION/CONCLUSION

5.5.1 Summary and Identified Problem Areas

Ohio's current Statewide Transportation Improvement Program (STIP) is a decentralized approach. ODOT's Central Office does not play a significant role in the initial planning stage except for rural areas. Typical planning activities in Ohio are modal-oriented, where the local level (MPO) provides the initial planning foundation for the STIP. Planning activities focus on the highway component, while transit authorities provide the transit element. ODOT's Central Office plays an essential role in deciding the implementation of STIP. Consequently, in the transportation planning process, ODOT has to combine all sixteen TIPs and districts into one STIP based on a vital decision-making process.

The objective of the decisions is to facilitate the advancement of the STIP into the implementation stage, where each project will be scheduled for construction. Currently, ODOT's Central Office has two mechanisms to create this control plan: the process of project development (TDP), and the state implementation plan (SIP). The major responsibility in applying these two mechanisms is to satisfy Federal regulations. More specifically, to conduct a conformity analysis, to satisfy fiscal constraints and fund flexibility, and to assure public involvement.

This requires ODOT to organize, coordinate, and decide upon a huge flow of information (TIP) and to enforce Federal regulations while satisfying local needs within this complex process.

Taking into consideration the process of the Ohio descriptive transportation planning model and the conducting of several discussions with the ODOT staff and MPOs, this research identified several problem areas within the current state-of-the-practice. The major causes stem from the lack of a comprehensive transportation planning process combined with the lack of a clear coordination strategy among the planning organizations.
The following is a brief identification and specification of some significant problems that act as obstacles to achieve an effective statewide planning process in Ohio. This includes:

1. There is no clear planning function for ODOT's Central Office in the overall statewide transportation planning process.

2. There is either conflict or insufficient information to coordinate the sixteen TIPs into one consolidated STIP, especially regarding:
   
   2.1 Jurisdictional responsibilities;
   2.2 A lack of a clear line of communication among the different planning organizations (ODOT/district/MPO); and
   2.3 A lack of a clear internal line of communication within the current ODOT structure (Division of Mode vs. Bureau of Planning).

3. There is both a lack of a unified guidelines to provide a common format and procedures to establish a cooperative process between TIP and STIP. As a result:
   
   3.1 There is no clear strategy as to how to face the problems of air quality, public involvement, and fiscal constraints;
   3.2 There is no consistent project development format between MPOs and ODOT, which affects deadlines and delays final approvals, and
   3.3 There is a lack of unified technical analysis to investigate the deficiencies in STIP.

5.5.2 Discussion of Identified Problem Areas

Having identified the problem areas, this researcher attended several informal meetings and had several personal conversations with members of the ODOT staff. The following is a summary of the research concerns:

5.5.2.1 Why do we need a uniformed format?

Today, each MPO tends to prepare local transportation improvement progresses (TIP) in its own style. A unified format and general agreement on statewide transportation objectives has not been established yet (state vs. local level). The current state-of-the-practice will impose further difficulties for
ODOT to efficiently assemble the sixteen MPO TIP for one statewide plan (STIP). The common conflict between local and state objectives will also affect the productivity of any future transportation investment. Furthermore, the current practice of ODOT will enforce segregation of the planning/programming/implementation process.

5.5.2.2 Deficiency of public involvement in the STIP

STIP is a lengthy document which includes sixteen TIP's by reference. There is a need for effective public input and participation. There are several significant reasons for participation:

1. There is a need to establish a general consensus, especially where the costs of the identified improvement project in TIP/STIP exceed available funds and require prioritization.

2. There is a necessity to establish a shared vision among all legitimate parties, including public citizens, to decide the future direction of statewide planning as well as to allow local MPOs to coordinate their objectives with ODOT.

3. There is difficulty complying with the complex air quality standards and the consequences need to be understood.

The current practice of ODOT does not perceive public participation as a necessary condition as long as the required projects do not exceed the available funds. Currently, public participation is done in the form of providing information to the public on the availability and status of the STIP in the form of written comments from the public or interest groups. Consequently, the effect of the public participation in the STIP is limited. In other words, there is a need to establish a general consensus and shared vision among all legitimate partners, especially the public.

5.5.2.3 Line of communication

There is a need for a clear line of communication among the different planning organizations (ODOT's Central Office, districts, local MPOs), and among individual planning organizations. For example, within ODOT there is no clear line of communication between the different mode divisions and the bureaus of planning and environmental services. This deficiency will inevitably
create inconsistencies between TIP and STIP. Even if such inconsistencies are discovered, they cause delay in the overall transportation process in terms of public involvement and will impose hardships on fiscal and conformity analysis. As a result, it will have a severe impact on deadline recognition and final approval of the STIP.

5.5.2.4 Jurisdictional responsibility and the cooperative effort

The strict application of home rule in the State of Ohio will cause ODOT to loose ground on statewide transportation responsibilities, except outside the municipalities. The current practice is for MPO's to control and be responsible for urban matters, while ODOT controls rural areas and major highways and interstates. The problem is that any significant transportation project involves both urban and rural areas. Consequently, failure to coordinate the effort or adequately consider the impact of any proposed project might create a bottleneck rather than improvement. A common data base collection and more general set of performance standards or compatible technical analyses among the different transportation partners on a statewide basis might facilitate the cooperative effort and avoid jurisdictional conflicts.

5.5.2.5 Funding flexibility and fiscal constraints

Ohio's major source of transportation revenues is the gas tax. The generated revenues are still dedicated to highway activities only. This fund is not transferable to any other modes. Professionals argue that the level of resources dedicated to specific modes represents the potential of the mode. There is a tendency to dedicate more funds toward highways rather than other modes. Consequently, programming activities at ODOT focus on highway projects. The programming process is structured on the basis of modal-oriented funding. As a result, the current practice of project development is not done as part of a comprehensive plan or an integrated multi-modal transportation system.

5.5.2.6 Technical analysis and evaluation procedures

At the technical level there is no unified evaluation methodology to compare or rank the generated alternatives among the different transportation modes (ODOT, 1993). The problem is severe because ODOT's Central Office
plays a minimum role in the initial planning process. Two major factors contribute to the problem: (1) ODOT's Central Office relies on individual MPOs to initiate the planning and programming steps, and (2) ODOT does not perceive the necessity of prioritization mechanisms as long as program costs do not exceed the available funds. The current ODOT programming process is reactive. There is a need for a proactive strategy in terms of need identification and the relationship between transportation investments and other social goals (i.e., economic development). The current strategy is still vague and does not apply a consistent process to guide the attainability of specific goals by specific projects. More specifically, there is no basis for plan prioritization according to needs or objectives. Management of transportation planning activities either respond to a crisis or advance a project for construction based on the "first come, first serve" policy. In some cases, projects are based on top management concerns or political commitments.

5.5.3 Conclusion

Responding to any of the performance problems of the current state-of-the-practice in Ohio poses difficult analytical and planning challenges. The nature of the dynamic transportation environment requires a quick response, which is difficult because of resource limitations, skills, and training constraints. Planning, programming, and implementation capabilities and structures need to be improved in order to enforce the decentralized planning approach for STIP. There is a need for a more open, interactive planning process that allows and encourages public involvement. A new strategic approach has to synthesize all collected TIP information and to form a unified planning process. This process should allow continuous consideration of a wide range of factors and a large collection of information, which has to be handled by the ODOT's Central Office. Above all, this is a process that will provide the needed information to facilitate decision formulation and obtain final approval.
CHAPTER VI

THE PROPOSED IDEAL TRANSPORTATION PLANNING PROCESS

6.1 INTRODUCTION

6.1.1 Objectives

The objective of this section is to investigate and propose a new step-by-step transportation planning paradigm at the state level. This paradigm is aimed to achieve five major goals: (1) establish a unified vision for all parties involved in the transportation planning process (DOT, MPO, districts, etc.); (2) act as a mechanism to link and integrate the planning, programming, and implementation stages; (3) assure that all legitimate stakeholders have a role in the overall planning process; (4) overcome current shortcomings in statewide transportation planning, i.e. overcome jurisdictional conflicts, improve communications, and avoid poor decisions; and (5) overall, to achieve social objectives within the limitations and constraints of the existing environment.

In this regard, the new paradigm calls for a statewide vision of the role of transportation planning activities which will enable transportation professionals (planners, engineers, and managers) to mobilize resources more effectively and equitably. More important, it will allow professionals to handle tough decision making in turbulent environments. The basic tool is to have a better understanding of our mission and establish more applicable and flexible strategies that will enable a transportation organization to provide the required services.

We argue that, in order to establish an ideal transportation planning process, it is necessary to integrate other successful methodologies from related fields. In specific, the theoretical base of the proposed transportation planning paradigm relies on the integration of planning and management theories. The basic idea is to adopt and integrate several features from different disciplines, such as the strategic planning concept (borrowed from the private sector) guided...
by organizational development theory and the rationale of the traditional planning theory. The emphasis is to provide an integral process for the coordination of diverse information and anticipates future opportunities. The aim of this integrated conceptual framework is to formulate a strategic approach that utilizes both transportation managers and customers in making effective decisions for transportation improvement. The critical issues are how to assess options, explore possibilities, and provide a flexible process that will help transportation organizations to learn and adapt to their dynamic environment (Nutt, 1989).

6.1.2 Complexity of the problem and the necessity of change

Transportation planning at the state level is complicated by several factors which must be incorporated into its process. They include: (1) hierarchical interaction, where various levels of stakeholders are involved, i.e. Federal, state, local and government agencies, and public citizens. Within this hierarchy, the Federal level imposes requirements and laws on the overall process and, at the same time, it is the major source of funds. State levels have to decide on statewide objectives, allocation of funds, and assure environmental conformity, i.e. they are the major decision maker and implementor. Local levels have the responsibility of representing local objectives and needs. Finally, public support and rejection plays a vital role in the implementation of the planning product. (2) Transportation planning is affected by the political environment, where frequent elections and changes of leadership have their significant impact on policy directions, especially when current state-of-the-practice discourages participation, and the difficulty to deal with values contributes to the transportation planning problem. (3) Transportation is a multi-objective process where transportation activities are not an end in itself, but rather, a means to meet societal goals (Current, et al., 1986). (4) Changes in the typical financial mechanism have a significant impact on socio-economic conditions (transportation investment typically involves a large amount of capital and has long range implementation periods). (5) The degree to which services are able to meet the needs of citizens and the increase in regulation complexity impose a severe uncertainty on the planning process.
As a result, today's transportation planning organizations are faced with rapid changes affecting their ability to govern transportation activities. A typical transportation planning process is preoccupied with the present and, therefore, is reactive in nature. Primary criticism is that the attempt to respond to change is often after-the-fact. Traditional transportation planning practices, based on past experience, have been characterized as being reactive, staff-oriented, dominated by response to crisis, lacking community support, and distant from political and emotional issues (Kemp, 1993; Neuman, 1993).

Taking these factors into consideration, the current transportation planning process is multi-hierarchical, multi-objective, full of uncertainty, and accompanied with ambiguity and failure to recognize crucial conditions. Within such an environment, it is difficult to arrive at acceptable transportation decisions and, consequently, there is a need to establish a new paradigm which addresses these factors and is future-oriented. In this regard, any proposed transportation planning process should be a specified in analogy to the phenomena we are investigating.

6.2 PROBLEM CLARIFICATION AND THE STARTING POINT

The demand for a new transportation planning paradigm is affected by resource limitation in terms of the time, money, and knowledge available, by political feasibility, and by public support in a rapidly changing environment. Nutt (1989) states three major reasons for poor decision making: uncertainty, ambiguity, and conflict. Focusing attention on these three attributes will increase our ability to formulate an acceptable conceptual process that is guided by regulations and utilizes emerging technologies. Consequently, a successful proposed paradigm will rely on the following factors: (1) Careful understanding and consideration of the nature of the problem and the environment that the process is expected to deal with; (2) The ability to provide flexible strategies to use resources effectively; (3) How to allow transportation organizations to adopt self-regulations that enable them to fit within their internal and external surroundings. This will allow an organization to have control over its internal capabilities, provide effective services, and fit into the surrounding environment. We argue that it is imperative for any successful public organization to have a
flexible planning process. The key issue here is the internal capability to process diverse information.

There is a variety of planning methodologies used to solve transportation problems. However, these diverse approaches often confuse rather than clarify the decision maker’s task. As a point of clarification, this research will view the transportation planning process as an integral cycle of information processing and decision making that will coordinate and enable planning, funding, and management to deal with future uncertainty.

We argue that there is no single approach within the planning or management theory that is solely capable of providing an optimal transportation planning framework. Each approach or perspective, whether in planning or management, highlights specific issues and is affected by specific assumptions. More important, it is applicable in specific environments. Consequently, emphasis should be on integrating different successful processes from several disciplines to establish a best fit which will assure an effective transportation planning process. Figure 6.1 depicts the schematic relationship of the proposed framework to adopt a strategic management perspective. In this regard, the concept of strategic control and feedback of information through the process is an attempt to predict the disturbance (bottleneck) before it affects the overall performance. The initial expectation is that the proposed framework will help transportation top management to effectively perform statewide planning in a turbulent environment.

This research is based on the understanding of the shortcomings of the current transportation planning practice. The basic idea for the proposed paradigm is to identify critical issues and develop a flexible transportation planning framework which facilitates a decentralized transportation planning process (DOT, MPO, districts). The initial visualization of an optimal process emphasizes three major aspects to be considered: (1) vision, (2) strategy, and (3) indication of success or failure. The first aspect, vision, requires clarification and identification of critical issues: A clear identification of the surrounding environment in a measurable or observable manner to establish a common level of knowledge (consensus) among the different legitimate interest groups. The second aspect, strategy, emphasizes the creation of various flexible action plans
Figure 6.1 The schematic relationship
to achieve the organization's mission. In this sense, the strategies are the vehicle to carry out the mission and fit it into the surrounding environment. The third aspect, success and failure, consists of a set of performance measures and controls that provide an early warning system of bottlenecks or service disruptions. The intention here is to evaluate, internally, the attainability of our objective, and provide a self-regulatory process. The argument is that an ideal transportation planning process will allow the organization to utilize its external opportunities and deal with its internal weaknesses and strengths. This process stresses the need for a decision making procedure to act in a more open, participatory fashion; it is a coordinated effort in the form of a strategic alliance. The judgment of the proposed framework's success or failure will depend on how the process utilizes and internalizes the accountability, productivity, and participatory concept. A critical question is if we apply such a process, do we provide environmental fit and allow self-adjustment to avoid a bottleneck and poor performance or not.

6.3 THEORETICAL FRAMEWORK FOR THE PROPOSED PROCESS

6.3.1 Set of choices

In a planning and management theory, both schools of thought are divided into different perspectives. On the planning side, this includes the comprehensive, long-range, and master plan that relies on the rational concept and system planning and its modification (incrementalism and advocacy) (Hudson et al., 1979; Friedmann et al., 1974; Saaty, 1985). Management theory is divided in organizational development theory, other anti-organizational theories, and radical organizational theories (Morgan, 1986). Each school of thought has built its arguments and the conceptual perspectives based on how they perceive and understand the phenomena and how they utilize different social, political, and biological concepts (Jackson, 1985).
The difference among these schools of thought are well defined in the literature. The debate among them—how they view and define the problem—sharpens one another and, consequently, highlights each strength and weakness (Hudson, 1979). The selection of an appropriate approach is complex and depends on the type of planning scenario as well as the philosophy of the user. This includes his or her personal preferences, social and political backgrounds, and the objective of the selection.

The intention of this research is to borrow the strategic planning concept (initiated in both military and private sectors) to establish a theoretical framework and adopt it for an appropriate transportation planning process. Thus, focus is on a successful model that is functional in character. Figure 6.2 illustrates a schematic relationship to arrive at an acceptable, theoretical foundation for the proposed strategic planning and control concept. It starts with understanding the strategic planning concept in the private sector and analyzes the possibility of adapting it successfully in the public sector. By understanding its applicability, the questions then is, what is its advantage in comparison to the traditional planning approach?

In this stage we argue that there are promising possibilities in applying the strategic planning concept to the statewide transportation planning process. Our next step is to investigate the limitations and the required modifications. The understanding of the problem and the limitation of strategic plans to be effective in public transportation organizations raises the question of discontinuity in the future, and the emerging reaction of the transportation organization (when we impose a new process). As a result, this research investigates the possibility of combining the strategic planning approach with the organizational development theory to arrive at a more compatible strategic planning and control concept. We will propose a combination of strategic planning with the cybernetic approach as a proposed applicable way of establishing a more dynamic fit between the transportation organization and its environment.

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1The historical evolution and the relationships between these different schools of thought are not the aim of this research (see Burrell and Morgan, 1979; Jackson, 1985; Ansoff, 1984; and Olsen and Eadie, 1982.
SCHEMATIC RELATIONSHIP TO ARRIVE AT AN ACCEPTABLE THEORETICAL FRAMEWORK FOR THE PROPOSED IDEAL TRANSPORTATION PLANNING PROCESS

Strategic Planning
Private Sector

Strategic Planning
Public Sector

Strategic Planning vs.
Traditional Planning

Limitation of Strategic Planning

Strategic Planning &
Organizational Development

Strategic Management
Planning Process & Control

Dissimilarity &
applicability to
public sector

Comparison &
advantage

Investigate limitations

Proposed modification
"the combined approach"

Theoretical framework
for the proposed process

Figure 6.2 Theoretical framework for the proposed ideal transportation planning process
In short, the search is for a more solid, theoretical ground to support the proposed process given the purpose to be served and the environment to be fit. On that level, the paradigm will be judged based on whether it will help the organization to fulfill its mission and whether it facilitates the proposed strategic process and ensures a match with political and environmental reality. To arrive at this end, the strategic planning concept, the contingency theory, and the cybernetic concept of control and command are integrated to formulate a strategic planning and control process.

The basic steps of the planning process rely on the strategic planning concept or, more specific, on the "SWOT2" concept and environmental scanning. It looks toward future opportunities and how to utilize internal strengths and weaknesses. The contingency theory focuses attention on types of environment and organization fit as important variables to be taken into consideration in designing an effective organizational structure and process. The cybernetic concept emphasizes the importance of information flow and communication lines; it binds organizations together (Jackson, 1985; Thompson, 1967; Weiner, 1984; Ashby, 1956).

The combination between the strategic planning concept and the cybernetic concept intends to, on one hand, facilitate the dynamic decision making process. On the other hand, it will assure self-regulation and control. The idea here is to tie planning to command and control by providing detailed understanding and flow of information to aid top management in executing and adjusting a transportation improvement plan. At the same time, we assume the environment fit. The following section is a detailed discussion of the theoretical framework. It serves as a conceptual base for the proposed ideal transportation planning process.

6.3.2 Strategic planning concepts

The purpose of strategic planning is to balance internal and external forces and plan the organization's resources to meet external opportunities (Rowe, et al., 1989). Early knowledge of strategic planning in the United States was evident with the military and private sector of economy in the 1950's. Strategic planning

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2Strength, weakness, opportunity, and threats
and thinking involves action and choice for organizational purposes. The process is oriented toward the future and deals with uncontrollable environmental forces (Mercer, 1991). Strategic planning is action- and result-oriented. Bryson and Roeing (1987) agree, strategic planning can be a useful framework through action. However, the fact that each situation is different has to be considered, as is true for other traditional planning approaches as well.

In the last few years, public planning scholars have called for the strategic planning approach to be a tool for public, state, and local organizations (Kaufman and Jacobs, 1987). Strategic planning can take a variety of paths. Kaufman and Jacobs (1987) cited two major approaches. The first, referred by Taylor (1984), is where corporate strategic planners have developed five styles: (1) central control, (2) framework for innovation, (3) strategic management, (4) political planning, and (5) future research. The second path, identified by Bryson, Freeman, and Roering (1986), is where the strategic planning approach is represented by five model types: (1) Harvard policy model (Andrews, 1980), (2) portfolio (Henderson, 1979), (3) industrial economic, (4) stakeholders, and (5) decision process.

The central issue among all these different corporate planning processes is the SWOT technique and the environmental scanning. Bryson and Roering (1993) examined the applicability of private sector planning to public sector organizations and its purpose. The research investigated six private strategic plans. It concluded that not all approaches are equally useful and that there are several conditions that govern a successful adaptation by the public sector.

The conclusion emphasizes the concept of initial agreement among decision makers as being necessary for successful strategic planning formulation and implementation. Also, it is necessary to clearly identify the purpose of the effort: Who will be involved? What steps should be taken? and What issues do we address? Finally, the need for full support and commitment of top management combined with a clear understanding of the internal organizational staff.

There are several critical points to be considered in applying the strategic planning concept: (1) issue specifications, (2) specific maps of how to formulate
and implement the strategy in different situations, (3) cautious consideration of ambiguous and conflicting objectives, and (4) link the content and process.

It is important to understand that in organizations, the strategic planning concept is viewed as a management tool. Table 6.1 illustrates the evolution of strategic planning in the private sector. Table 6.2 depicts strategic planning perspectives and highlights the dissimilarity between the utilization of the concept in public and private sectors. Based on this dissimilarity, several critical issues with regard to public transportation organizations are identified. Mercer (1991) argues that the major difficulties in applying strategic planning to the public sector are the lack of strategic management skills, the time required, the commitment to the process, and most important, the resource limitations and frequent elections.

6.3.3 Strategic planning in the public sector

In literature covering public planning, Olsen and Eadie (1982) define strategic planning as "a disciplined effort to produce fundamental decisions shaping the nature and direction of governmental activities within constitutional bounds."

The argument is that strategic planning is aimed at creating a balance between what is the desirable future and what is the possible future. Of major significance is to clarify the critical issues and to provide a way to deal with interdepartmental conflicts. Applying strategic planning to the public sector requires some critical adjustments in the organizational structure and attitude. The process calls for commitment and specific skills, and consumes resources and time.

Sorkin, Ferris, and Hudak (1984), authors of a strategic guide funded by the U.S. Department of Housing and Urban Development, point out that adopting the strategic planning concept can result in numerous achievements in the public sector. For example, educating the public, building consensus, developing a shared vision that extends the PRESENT, prepare communities to seize opportunities, identify the most effective resources, and provide a mechanism for public/private partnerships.
Table 6.1 Evolution of Strategic Planning in the Private Sector

<table>
<thead>
<tr>
<th>TIME PERIOD</th>
<th>TYPE OF ACTIVITIES</th>
<th>SCOPE OF ACTIVITIES</th>
<th>CRITICAL ISSUES &amp; CONCERNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950's</td>
<td>general Management</td>
<td>organizational studies</td>
<td>• performance standard</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• budget control</td>
</tr>
<tr>
<td>early 1960's</td>
<td>profit planning</td>
<td>• profit plan</td>
<td>• assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• objectives &amp; forecast plans</td>
<td>• budgeting control</td>
</tr>
<tr>
<td>late 1960's &amp; early 1970's</td>
<td>business planning</td>
<td>• strategy planning</td>
<td>• future performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• mission, objective</td>
<td>• stakeholder expectations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• product/market/resources</td>
<td>• operational planning &amp; control</td>
</tr>
<tr>
<td>1980's</td>
<td>strategic management</td>
<td>• corporate strategic planning</td>
<td>• environmental scan</td>
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<td></td>
<td></td>
<td>• division strategy planning</td>
<td>• organization efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• operational planning</td>
<td>• annual planning &amp; control</td>
</tr>
</tbody>
</table>

(source: Modified from Mercer, 1991, p. 19)
Table 6.2 Dissimilarities Between the Public and Private Sector

<table>
<thead>
<tr>
<th>ASPECTS</th>
<th>PRIVATE SECTOR</th>
<th>PUBLIC SECTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominating Force</td>
<td>Economic</td>
<td>Political</td>
</tr>
<tr>
<td>Decision Making</td>
<td>Centralized</td>
<td>Pluralist/special interest group</td>
</tr>
<tr>
<td>Implementation</td>
<td>Responsibility of the low level department or division</td>
<td>Responsibility of top level management</td>
</tr>
<tr>
<td>Mission, Goals &amp; Objectives</td>
<td>Well defined and mostly long ranged</td>
<td>Very broad, short term</td>
</tr>
<tr>
<td>Selection criteria for evaluation of alternatives</td>
<td>Specific economic measure; profit, market share</td>
<td>Ambiguous (public interest, political, efficiency, cost-benefit analysis)</td>
</tr>
<tr>
<td>Chain of command</td>
<td>Distinct</td>
<td>Not Clear</td>
</tr>
<tr>
<td>Time horizon for top-level management</td>
<td>Lengthy</td>
<td>Short term</td>
</tr>
</tbody>
</table>

(source: Mercer, 1991, p. 36)
According to Sorkin, *et al.*, (1984), seven basic steps must be followed to incorporate strategic planning into the public sector:

1. scan the environment;
2. select key issues;
3. set mission statements and broad goals;
4. undertake external and internal analysis;
5. develop goals, objectives, and strategy with respect to each issue;
6. develop a plan to carry out the strategic action, and
7. monitor, update, and scan.

The basic idea is to assess opportunities and utilize internal strengths and weaknesses.

Other authors argue that strategic planning for public sectors should be constrained by several factors: (1) How to tie local decisions by local governments to the state/Federal processes; (2) The issue of bureaucrats and dynamic participation.

In literature, most supporters of the strategic planning concept in the public sector stress the importance of a clear understanding of the dynamic environment and the role of the decision makers and planners. It has been argued that a good strategic planning model should satisfy the following items (Bryson and Roering, 1987; Mercer, 1991; Ansoff, 1984):

1. careful specification of issues;
2. provide specific advice on how to formulate and implement the proposed strategy in different situations;
3. deal explicitly with ambiguous, conflicting objectives;
4. link content and process; and
5. identify the situation of competition and collaboration.

Bryson and Roering (1987) support the argument of applicability of the corporate strategic planning concept to the public sector. The authors point out that it is essential to think of the decision maker as a strategic planner and to think of strategic planners as facilitators of strategic decision making.
is to search for a new approach for service delivery and the satisfaction of office holders, professionals, and client groups.

In this regard, strategic planning concepts are to be used as a framework that compromises broad policies and provides direction. The intention is to give external assessments careful consideration to key stakeholders, to identify issues, and to provide information to decision makers.

6.3.4 Strategic planning vs. traditional planning

Typical questions for any planning approach are what is the problem and how do we solve it? The argument is not how to do things right, but how to find the right things to do and to concentrate resources on them (Drucker, 1964, p.6). The real problem is that the future is full of uncertainties. Traditional planning approaches have well defined paradigms. Their focus here is on rational and technical methods. The underlying assumption is that problems will be defined and understood and that there is some sort of control available on the future environment. Consequently, a complex problem could definitely be solved using the appropriate technical method. The process, starting with setting objectives (ends), is followed by designing a means to achieve these objectives and is constrained by a set of criteria and standards. There is a sequence of feedback among the processes. The basic paradigm could be represented as illustrated in Figure 6.3.

![Figure 6.3 Traditional planning approach](image)

However, in a more dynamic environment, full of uncertainty, there is always a limitation to arrive at a correct identification of the problem and meet
the discontinuous environment. A good example of this is the change in taste of the users of the system and funds availability. There is difficulty in building a consensus. Moreover, there are weak ties among the planning steps when there is a lack of vision about the future. The process will be top/bottom or bottom/up and will be affected by the role of planning. Most often, the sequence of steps is in reverse order. It is to decide what the system must accomplish (output by top management), followed by intermediate steps to accomplish the output. In reality, traditional planning in public organizations tries to reduce complexities and their accompanying uncertainties by using feedback rather than developing anticipatory capabilities (Cyert and March, 1963). In this regard, the strategic planning concept contributes to the anticipation of future threats and opportunities. It concerns itself with establishing the major direction of an organization in terms of what its purpose is, its major client, its major program to pursue, its major geographical area, and its major delivery approach (McConky, 1986, p. 51).

There are several outstanding features that distinguish the strategic planning approach from the conventional comprehensive and master planning approach. These features include: (1) action, (2) consideration of a broad and diverse set of stakeholders, (3) attention to external opportunities and threats and internal strength and weakness (Kaufman and Jacobs, 1987).

The strategic approach is more oriented toward action results, implementation, and concerns of environmental scanning. Table 6.3 illustrates the contrast between the comprehensive and the strategic planning process.

Literature describes several successful applications of the strategic planning concept to the public sector. Lindblom (1979) argues that strategic planning approaches enable decision makers to assess limitations more effectively. The author argues that the incremental planning approach has a purely reactive behavior toward the future and there is always the possibility of "disjointed incrementalism." Etzioni (1967) disputes that incrementalism is more conservative. The strategic approach provides a supplement to incremental analysis by providing better information to help the decision maker think about future directions and, at the same time, it makes "synoptic" rationale analysis possible. In other words, the strategic concept, by using critical issue and environmental
Table 6.3 Comparison of Comprehensive Planning and Strategic Planning

<table>
<thead>
<tr>
<th>Comprehensive Planning vs. Strategic Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>• comprehensive</td>
</tr>
<tr>
<td>• physical development</td>
</tr>
<tr>
<td>• 10-25 year time frame</td>
</tr>
<tr>
<td>• process partly implemented by capital improvement programs, zoning actions, etc.</td>
</tr>
<tr>
<td>• participation limited to planner/staff/public hearings</td>
</tr>
<tr>
<td>• extrapolation</td>
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<tr>
<td></td>
</tr>
<tr>
<td>• selective</td>
</tr>
<tr>
<td>• wide range of issues</td>
</tr>
<tr>
<td>• not time dependent</td>
</tr>
<tr>
<td>• process follow through specific action</td>
</tr>
<tr>
<td>• large participation through community feedback</td>
</tr>
<tr>
<td>• anticipation</td>
</tr>
</tbody>
</table>

(source: Modified from S. Weir, 1993, p. 157)
scanning, allows for multiple levels of assessment. It takes the boundaries of rationality into consideration. In short, strategic planning by emphasizing SWOT techniques and strategic issues defines, in a more practical fashion, the future direction. It avoids the limitation of the traditional planning approach in terms of problem definition.3

Eadie (1993) argues that systematic use of strategic planning as a technique in the public sector has an advantage over traditional long-range planning. The latter approach rests its assumption on a predictable future and generates a multi-year plan. Meanwhile, "traditional long-range plans can actually make an organization strategically less capable by diverting attention from the changing environment and creating the illusion of control over events," (Eadie, 1993, p 84) while public support or rejection of the planning activities plays a role in any successful implementation. This fact highlights the "human resource" as a critical issue in the strategic concept.

6.3.5 Limitations of applying strategic planning in the public sector

The objective of using a strategic planning process is to improve an organization's performance. The process aims to articulate organizational goals in coordination with key stakeholders and to establish strategic direction for the organization, including its mission, major clients targeted for service, problems to be solved, and specifications of the delivery approach. However, there is a need for careful consideration in applying strategic planning in the public sector.

One of the silent points is that "the one time, all encompassing, plan does not recognize the reality of the political process and the public sector organizations need to continually reexamine their strategic options" (Mercer, 1991, p. 5) Understanding strategic planning as action-result oriented, the emphasis of the plan should be directed towards continuation of the process rather than a comprehensive document.

Concern should focus on policy directions and an organization's capability to learn to adapt to its environment as a major advantage of strategic planning.

3The strategic approach is more anticipatory in style than the problem solving approach. More important, most traditional planning approaches are perceived as a threat to top management.
The question of operational control plays a significant role in achieving any new strategy. It is not enough to arrive at a policy direction; it is essential to translate such a direction towards an operational objective. Most scholars in public planning argue that careful consideration of internal political influence in an organization is a critical issue. In specific, the degree of commitment by top management, the degree of acceptance from different staff levels, the degree of satisfaction by the public to the end result (Ansoff, et al., 1976; Eadie, et al., 1983).

The key issue of any strategic planning approach is to start with a careful collection, examination, and diagnosis of all relevant factors that facilitate correct identification of the problem and emphasize the suitability for the proposed strategy. This research argues that doing so is not enough to achieve a dynamic equilibrium between an organization's performance and its dynamic environment. The issue here is the organization's emerging action (reaction) and its interaction with the proposed strategy. Expected performance is severely affected by organizational reaction. Klay (1993) argues that even when strategic planning does emphasize preparing for the future, that may be significantly different than the present, still, the problem of resistance to such plans and the planning process from which they emerge remains (Klay, 1993). Accordingly, any proposed strategy should be more than just a good specification of the problem, or just a means to achieve the objective. It is essential to build an organization capable of learning, adapting, and interacting with the process.

Ansoff, Declerck, and Hays (1976, p. 78) argued that the "strategic planning approach (strategic management) should be a synthesis between organizational change and a rational planning process, and an adoptive psychosocio-political process." Criticism is that most literature about strategic planning and organization development has focused exclusively on either one or the other of these two concepts.

There is a need to integrate the strategic planning concept with the organizational development. Literature calls the combination "strategic management" (strategic planning and control). The argument is that uncertainty about the
future cannot be eliminated but can be managed through the development of a more flexible strategy.

Flexible strategy should emphasize that organizations can learn and adapt to their environment. The issue here is to understand the behavior of organizations and, more importantly, the behavior of top management.

Das (1986) explains that the theoretical concerns of strategic planning should be expanded to consider two different dimensions: (1) the rational analytical concept, and (2) the subjective side which deals with sociological and psychological types of the members of organizations. It is essential to develop and plan intervention, control, and command in the strategic plans for transportation organizations.

The following section introduces the contingency theory and the cybernetic concept as an integral part for the proposed ideal transportation planning process. The aim is to improve the ability of the organization to deal with discontinuities in their external environment. The solution is to provide a control and command tool for top management to achieve a dynamic equilibrium with the external and emerging environment (self regulation and adoption of capabilities).

6.4 PERFORMANCE CHANGE

6.4.1 Integrating strategic planning and control using the contingency theory

The essential success of any proposed process will depend upon a valid theoretical framework that provides support for such processes; more importantly, to understand the expected change in performance and its effect on organizational behavior. The ability of any organization to adopt a new strategy is influenced by the nature of change demanded by such strategy and the external environment. There is a strong correlation between the nature of the environment and the adaptation type that fits within these circumstances (Kagono et al., 1985).

In the literature about organizational development, contingency theory has been proven through several experimental researches (Thompson, 1967;
These studies, based on social indication of suitability, suggest that the contingency theory is a theoretical framework to establish grounds for any proposed performance change (Kagono et al., 1985; Jackson, 1985; Morgan, 1986). Contingency theory and cybernetic concept serve as a starting point for our proposition for organizational performance change. In this regard, we argue for the suitability and applicability to integrate the strategic concept with the concept of control and command (cybernetic concept). It is a combination of the contingency theory and the strategic planning concept and its aim is "to contract normative propositions concerning the kind of fit that is necessary between the organizational environment and its strategy and structure" (Kagono, et al., 1985, p. 11).

The argument of the contingency theory is that "good organizational achievement is made possible by effectively reducing environmental uncertainties through systematic processing of information." In other words, the concept of command and control. Empirical research suggests the cybernetic concept of command and control.

Early cybernetic research dealt with the science of control and communication in animals and machines (Wiener, 1948). The cybernetic concept emphasizes that information is the true cement holding organizations together (Jackson, 1985). The idea is to allow organizations to have a continuous command, control, and feedback by top management in order to provide a self-regulated planning process. This research perceives the cybernetic concept based on Ashby's law of "required variety." Ashby (1956) defines the word "variety" as "the number of distinct elements relevant to choice of action and response." The argument here is that when the law of required variety is applied to the relationship between an organization and its environment, the organization must interact with the variety that is generated by the environment through building variety into its own organizational structure and process (Kagono et al., 1985). In this regard, the meaning of variety is "the number of possible states." In large organizations with huge responsibilities (in analogy, the transportation organization), the organization experiences greater pressure on its decision making and information processing. A suggested approach in reducing this pressure is to ensure and allow organizations to establish internal capabilities for processing diverse information. In other words, the reduction of pressure depends on the ability of
an organization to command and control processed information. Beer (1966) calls this the building of a dynamic equilibrium between the environmental variety, $v_E$, and the organization variety, $v_0$. This dynamic equilibrium is called a variety engineering where

$$v_E = v_0.$$  

The issue here is how to design organizational structures and formulate strategies that help organizations fit into their environment. A prerequisite for such change in performance is the establishment of a dynamic equilibrium.

In short, the contingency theory provides grounds to account for interdependent relationships and an extensive variety of organizational phenomena. Moreover, it corresponds with this research definition of transportation planning as a cycle of processing information. The cybernetic concept provides grounds for operational control through the control and command available to top management. Figure 6.4 illustrates the conceptual relationship for the organizational performance change.

6.5 BASIC FEATURES ADOPTED IN THE PROPOSED FRAMEWORK

The basic feature of the proposed ideal transportation planning paradigm is simply a continuous interaction and feedback among the various planning phases. This includes a set of strategic planning steps that lead to formulating a set of action plans. The implementation of the action plan aims at minimizing the gap between the initial objective and the final implemented plan. The continuous interaction among these phases is bounded with a set of articulated top management and societal views. These boundaries guide the transportation organizations to achieve their missions while considering given environmental mandates, regulations, and constraints.

In order to maintain the dynamic equilibrium between organizational functions and performance in a changing environment, several mechanisms of control and command (decision making and feedback for the processed information) are aimed to create internal capability to internalize the future uncertainty (i.e., adopt and learn). The reason for creating an internal capacity is to answer
Figure 6.4 Model of the conceptual relationship for the performance change in an ideal transportation planning process.

The diagram illustrates the theoretical framework linking strategic planning, contingency theory, and traditional planning rationales. It highlights the dynamic fit or equilibrium planning and control of information processing, influenced by various environmental factors such as legislative, institutional, political, public expectations, and resource allocation. The nature of the changing environment is also a key component in this model.
such questions as: How do we know if we are on track? How can we adapt to the environment? and How do we provide top management with the required information to achieve organizational performance adjustment?

Based on available knowledge and literature, this research tries to integrate three major areas and establish a theoretical foundation for the proposed ideal transportation planning framework. The areas include: (1) the successful model applications of the strategic planning concept in the private sector; (2) the organizational development theory; and (3) the planning theory. From each area, successful planning concepts are investigated and several features are adopted. The measure of selection is based on successful application in the real world and its suitability to transportation planning problems. This research investigates a set of successful concepts in different models within these areas and, as a result, several planning features and concepts are adopted and then integrated to establish a theoretical foundation. The integrated features include: (1) strategic vision, (2) adoption and learning capability of the strategic alliance, and (3) preparation and participation ("environmental scanning"). Figure 6.5 depicts the investigated modes and the adoption and integration of the above basic features.

6.6 THE PROPOSED STRATEGIC PLANNING PARADIGM

In order to keep balance and achieve dynamic fit for the proposed framework, it is essential to stress the internal capability to learn and adopt with the internal/external climate. The proposed framework is based on several critical assumptions (requirements) that have a significant ramification and require careful consideration.

1. The necessity and possibility of conducting a participatory and preparation phase as a major source of obtaining information.

2. The definition of "insider" and "outsider" among legitimate partners (stakeholder analysis).

3. The commitment of top management to the process.

4. Careful consideration of the required resources (time, money, skills).
Figure 6.5 The theoretical foundation for the proposed framework
5. The feasibility to construct vision and general consensus among partners (different planning organizations).

6. The careful consideration of control vs. flexibility.

7. The understanding of internal/external nature or environmental change.

Based on these requirements, the central issue of success in applying this proposed framework is to: (1) rely on internal strengths and weaknesses, (2) involve all stakeholders, not just top management, (3) utilize the benefit of future opportunities to avoid threats, and (4) discuss and deliberate, in an open fashion, a prerequisite for formulating a final decision.

6.6.1 Procedural design of the proposed framework

Careful consideration of these major assumptions and requirements is crucial to the success and validity of the proposed framework. The procedural design of the framework contains two levels: (1) the level of input (represented by a broad strategic planning phase or level), and (2) the level of output (represented by broad strategic planning logic). The broad strategic planning phases include four components: (1) participation and preparation (environment scanning), (2) strategic vision, (3) strategic alliance, and (4) results. The strategic planning logic includes four components: (1) mission and policy direction, (2) strategic analysis and issue, (3) strategy formulation, and (4) execution of operational plan. The following is a brief specification of the broad strategic planning phase:

Phase I: Participation and Preparation is the first critical step of the broad strategic phase and involves all legitimate partners (insiders and outsiders). The concern is to obtain consensus and to understand and decide on the organization's mission and its short/long range objectives and goals. Environmental scanning is the tool to investigate major factors and conditions that contribute to the mission statement, needs identification, decision and utilization of the political environment, mandates, regulations, and resources.

These phases require collective efforts that involve different transportation planning organizations.
Phase II: Strategic Vision is the heart of the proposed framework. It addresses both the internal and external dynamic environment. This phase includes two primary steps: Strategic analysis and strategic issue. The strategic analysis is conducted through the application of the "SWOT" analysis. The strategic issue is a complimentary step to the "SWOT" analysis before advancing the project to a more detailed design. The objective of this phase allows the organization to capitalize on its mission statements, mandates, and resources in light of environmental assessment, i.e. a situation analysis. It is important to obtain the feedback of the stakeholders before making a final decision, i.e. decide on issues that are to be advanced to the plan formulation stage.

Phase III: Strategic Alliance addresses three critical aspects: (1) action plan, (2) assignment of responsibility, and (3) building support for the implementation effort. The major goal is to translate the specified strategic issues into alternative solutions, i.e. an operational plan. This plan aims to achieve organizational objectives (DOT, MPO, districts). After designing the action plan and assigning responsibility, it is the job of the organization to build public support and formulate agreement among potential decision makers to execute the action plan.

Phase IV: Result involves the actual execution of the operational plan. The procedure of the framework utilizes these four phases as a means to generate a cycle of information. This information is used as input to obtain the broad strategic logic for the transportation planning process. In this sense, broad strategic logic is an output of processing obtained information that represents strategic questions.

Figure 6.6 depicts the four phases of the proposed ideal strategic transportation planning paradigm. It is important to understand that although the graphical relationship among these phases is presented in linear or sequential fashion, the essence of the framework is to assure a continuous interaction process among them.

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6This step requires a collective effort to decide on emerging strategic issues.
Figure 6.6 The proposed ideal transportation strategic planning framework
Figure 6.7 illustrates the procedural design of the strategic planning paradigm. The four phases of the strategic planning paradigm act as an input and the four strategic logic phases act as an output. The four phases of the proposed framework are established as a tool to generate the needed information as an input for the transportation decision making process. The successful integration and utilization of the generated information will allow the transportation organization to obtain a set of answers which represent the strategic logic output of the proposed framework. It is essential to understand that the strategic planning phase is a tool to generate specific information. The grouping and careful consideration of this information enables transportation organizations to obtain critical output that will guide and facilitate final decision making (implementation). Figure 6.8 shows the strategic planning phases and the needed information output for the proposed framework. Figure 6.9 shows how this information answers questions that provide strategic logic for the proposed framework.

6.7 MAJOR TRANSPORTATION STRATEGY PLANNING PHASE

The following is a brief discussion of strategic planning phases and logic. The objective is to provide insight into the proposed framework and its suitability in handling the transportation planning problem.

6.7.1 Participation and preparation

This phase requires initial agreement among legitimate decision makers to obtain basic information and data that will set an organization's mission and potential policy direction. The framework integrates several aspects of strategic planning as a prerequisite to generate an output, this includes environmental assessment, stakeholder analysis, public support, and building consensus. The generated output of this phase addresses four major areas: (1) mission statement, (2) political environment, (3) regulations and mandates, and (4) need identification. In other words, there are several crucial questions to be answered. What is the mission specification? What are the required needs? What are the given constraints? and What are our resources? To answer such questions the applicability and credibility of the generated flow of information will be based
Figure 6.7 Procedural design of the strategic planning paradigm. Strategic planning phases as input and strategic planning logic as output.
Design of Strategic Planning Paradigm as a Tool to Obtain Input and Generate Information as an Output

**PHASE I**
Participation in & Preparation of Environmental Scanning

**PHASE II**
Strategic Vision

**PHASE III**
Strategic Alliance & Preparation for Implementation

**PHASE IV**
Results

**MISSION & POLICY DIRECTION**
- Mission statement
- Needs identification
- Political environment, regulation, and mandates

**STRATEGIC ANALYSIS & ISSUES**
- Strategic Analysis
  - Analysis and evaluate internal capabilities
  - Analyze current situations & future opportunities and threats
- Strategic Issues
  - Compare need vs. resources
  - Set priorities
  - Investigate principle alternatives
  - Apply constraints and mandates
  - Contrast Issue vs. Mission

**STRATEGIC FORMULATION**
- Action Plan
  - Refine principle alternatives
  - Provide a detailed design of the plan
  - Approve final plan
- Assign responsibilities
- Build Coalition Support for Implementation
  - Political consideration
  - Analytical consideration

**EXECUTE OPERATIONAL PLAN**
- Execute the Approved Plan
- Analyze Gaps in "Objective vs. Implemented Plan"
- Feedback and control and its mechanisms

Figure 6.8 Design of the output of the planning process
BROAD STRATEGIC PLANNING LOGIC
The Hierarchy of the Strategic Planning Paradigm and Its Logical Output

1. PURPOSE STATEMENT
How do we see our business and what is our function?

2. SITUATION ANALYSIS
Where are we now and what will the future look like?

3. OBJECTIVES/GOALS
Where do we want to go?

4. STRATEGY
What is the broad map and what is the vehicle to carry our objectives and goals?
What are the critical issues to be considered?

5. OPERATIONAL PLANNING/IMPLEMENTATION
What are the detailed specifications of the strategy to achieve our goals? Why?

6. CONTROL
What is the observed gap between goals and objectives and the operational plan in terms of implementation?
How can we adapt to the environment?

Figure 6.9 Broad strategic planning logic
on how successfully we establish the participation and preparation phase and its prerequisite aspects. The objective is to build consensus among potential decision-makers and obtain information that will articulate the mission statement, the political environment, and the needs.

6.7.1.1 The mission statement

The mission statement is designed to formulate a product, but is not a product in itself. It includes the purpose of the transportation activities and the definition of insiders and outsiders in the stakeholder’s analysis, decision on the appropriate activities (cooperation, coordination, integration), the values that control the activities, and the investigation of alternative resources (taxpayers, employees, etc.).

6.7.1.2 Political environment, regulations and mandates

This output focuses on the clarification and understanding of all existing constraints, mainly, the political commitment, fund availability, and Federal legislation. It is important to understand the consequence of selection. (A good example of the selection and consequence is complying with environmental conformity or not. If we don’t comply, what are the consequences in terms of the environmental quality impact, the Federal actions on future expansion, and the restrictions on industrial allocations?)

6.7.1.3 Needs identification

This output is an assessment of current and future transportation needs, i.e. the capacity for transportation infrastructure and future transportation service expansion. It also identifies ways to integrate local and state needs (urban vs. rural) and the type of improvements (expand, maintain, upgrade).

6.7.2 Strategic vision

Knowing the given constraints and the mission statement, the organization has to decide on what needs will be addressed. First, they should look at the impact of both internal and external forces. The framework uses the strategic vision concept as a guide for organizational choices and a way to determine the
nature of future directions (Mercer, 1991). Strategic vision is the major advantage of the proposed framework. It involves all types of "what if" questions. The output of this phase includes strategic analysis and strategic issues. These two primary outputs will be addressed in the following sub-sections.

6.7.2.1 Strategic analysis

It is essential to understand that there is a significant difference between strategic analysis in the private and public sector. The public sector performs within an institutional system which must represent people with various socio-economic and political objectives (i.e. equity social acceptance) while the private sector mainly responds to market needs and focuses on competitiveness.

Strategic analysis in transportation planning has to consider the interaction of the different levels of transportation organizations within the constitutional hierarchy. It is critical to have a set of criteria, priorities, standards, procedures, and initial plans to make decisions. On the other hand, strategic analysis in transportation organizations faces a serious resource constraint. Strategic analysis is a systematic method of analysis with emphasis on choice and direction for action by top management (and to an extent, by the planners and consultants). Within the proposed framework, the basic tool for strategic analysis is "SWOT." The focus is on both the external and internal environment, i.e. analyze and evaluate internal capabilities, analyze current situations and future opportunities and threats.

A Internal strategic analysis

Internal strategic analysis focuses on the strengths and weaknesses of an organization's current capabilities and its structural hierarchy. It decides on the factors influencing internal interaction (i.e., relationships among divisions and departments). It looks at the organization's product, and its current and past system performance. This analysis is to consider all controllable factors that affect the organization's performance in achieving its mission, goals, and objectives.
B External strategic analysis

External strategic analysis focuses on understanding external opportunities and future threats. This includes the transportation service delivery approach, technological change, and socio-political conditions. Its main focus is on uncontrollable factors and how an organization should position itself in the future environment.

In both internal and external strategy analysis, the product is a statement to guide objectives in specific directions. It includes the establishment of performance measures and criteria for the preferred directions and alternative resource allocations. Marrus (1984) argues that strategic analysis has several crucial aspects which provide insight into the process.

1. The strategy is (strictly) a top management issue

2. Each partner in the process, especially the internal staff, should be aware of and understand the strategy.

3. The strategic perspective acts as a planning process.

6.7.2.2 Strategic Issues

The concept of strategic issues first emerged in the private sector as a complimentary step to SWOT analysis. It is essential to decide upon identifying strategic issues prior to deciding and proposing operational strategy or action plans (Mercer, 1991).

The strategic issue is to determine the feasibility of various strategic analyses and propose broader future directions. It integrates both top down (management and policy direction) and bottom up (internal staff, divisions, MPO, districts and their internal capabilities). This phase is to decide on critical issues. This includes needs vs. resources, setting priorities, investigating principle alternatives, and contracts the issue vs. mission and guides future planning activities. It has to establish clear answers to such questions as: What is the best strategy? What are the barriers for an effective performance? and What
are the possible technical and non-technical means to support the current activities?

The strategic issue allows an organization to utilize its missions and mandates in the context of environmental scanning. The emphasis is on two primary aspects: consequence and selection, where consequence is the guide for selection (Eadie, 1993). The basic task of the strategic issue is to establish reasons for success and provide support for emerging action plans. Consequently, it is to decide upon potential future benefits, performance criteria, and decision rules, i.e. initiate strategy steps and determine an action plan.

6.7.3 Strategic alliance

Strategic vision is just a broad direction (Marrus, 1984). In order to continue progress toward implementation, shared vision in objectives and issues needs to be translated into a detailed action plan. In the strategic alliance phase, emphasis is on the process of translating the broad direction into an operational plan.

Some authors argue that in the private sector there is still controversy over the concept of strategic alliance, as it may be considered as the second best choice. The strategic alliance concept is supposed to be a coordinated, cooperative, and integrated effort to arrive at (1) an action plan (operational plan), (2) an understanding of implementation, and (3) an assignment of responsibilities among legitimate actors (DOT, MPO, district, private sector). It is expected that the concept of strategic alliance among independent departments will have a significant impact on the designation of detailed action plans and the assignment of responsibility. For all of these, the strategic alliance concept is designed for a dynamic, uncertain environment. Dynamic and uncertainty in transportation planning occurs due to:

1. The uncertainty of revenue generation and fund allocation.
2. Changes in demand for transportation services among different geographical areas (MPO, urban areas vs. district, rural areas).
3. Land use development and its implication on transportation needs, especially when the development is determined by the private sector, while the provision of services are made by public organizations.

4. Changes in government regulations, especially with regard to the physical environment.

The job of a transportation organization (ODOT) does not end with the design of a detailed action plan. There is a need to continue the dynamic fit through achieving a more cooperative planning process. The strategic alliance is a tool to consolidate political consideration and increase a line of communication without losing the rationale of the process. It is an initial step to decide upon implementation. The major advantage of the cooperative process is to speed implementation and link it with goal setting (Lorange, 1993). The development of strategic alliance has three primary outputs: action plan, assignment of responsibilities, and coalition building. These are described in the following pages.

6.7.3.1 Action plan

The purpose of the action plan is to decide upon three major elements: (1) the realism of the plan, (2) the form of the plan, and (3) the detailed design of the plan (Faludi, 1973). One of the critical steps in action planning is to use common criteria for implementation, resource assignment, and identification of potential support for the detailed plan. In light of this, it is recommended that the action plan should give careful consideration to establishing alternative solutions to the identified needs. The selected alternative must be representable to societal needs. And finally, contract costs to benefit as a measure of selection among alternative solutions.

6.7.3.2 Assigning responsibility

Strategic planning approaches argue for the necessity of lower level managers and staff within each organization to have a clear understanding of their role in the overall planning process. It is important to assure their understanding and commitment to implementation. A clear line of communication among the different planning levels and their process is critical. This means that lower levels of operational divisions, who have a role in day-to-
day operational planning, should be aware of the policy direction and the expected responsibilities that will result in success or delay of the transportation planning process.

The task of responsibility assignment requires that:

1. Sufficient information regarding detailed design and overall processes be available at all organizational levels.

2. Clear specifications of the tasks of each unit are developed.

3. There is sufficient training (capabilities) which allows individuals to achieve their assigned responsibilities.

4. An effective line of communication is in place.

6.7.3.3 Coalition building for implementation

A coalition building for implementation requires a consensus on what the transportation needs are and how to satisfy those needs. It must encompass both political and analytical consideration.

Political consideration includes two groups, the internal stakeholder, (where the emphasis is to obtain initial agreement among the potential decision makers, i.e. top management and elected officials, lower and middle level management) and the external stakeholder, where the aim is to seek public support and satisfaction. Both groups must receive some benefit from the final implementation of the action plan.

To achieve this, the process should include internal discussions and educational outreach programs. These will increase the likelihood that major stakeholders will interact and support the proposed action plans. Figure 6.10 illustrates the conceptual framework to build coalition as an application of the strategic alliance concept. In this stage, the organization has already decided on its objectives and key performance measures and is attempting to obtain support for the action plan. The desired outcome is the action plan with widespread support for implementation.

To organize a strategic alliance among different transportation planning levels, there is a need to establish a common, technical and analytical base for
STRATEGIC ALLIANCE APPLICATION

Figure 6.10 Conceptual framework to build coalition for implementation
support and cooperative effort. This is essential in providing a compatible format which allows independent organizations to interact, using the same data, information, and measures. Applying the strategic alliance concept at the analytical level will enforce a cooperative planning process among independent levels of planning. Critical aspects to build an analytical coalition include:

1. Creating a detailed action plan, including planning format, to avoid conflict.
2. Establishing a clear understanding of state objectives vs. local objectives.
3. Considering the trade-off analysis and the selection criteria.
4. Realizing that the strategic planning process is a continuous effort and provides groundwork for gathering and generating detailed information.

6.7.4 Results of the action plan

The results is the fourth phase in the framework. It targets three main components: execution of the final approved plan, gap study analysis, and feedback and control. The output of this phase is affected by three decisions which address:

1. The implementation mechanisms;
2. The appropriate schedule of the implementation; and
3. The actual allocations of funding and management efforts.

6.7.4.1 Execute approved plan

This phase raises the question of the relationship between policy direction and day-to-day management activities. Consequently, several critical issues are addressed, including (1) the establishment of responsibility vs. authority (i.e. jurisdictional conflict) and (2) scheduling of implementation vs. flexibility. Once these questions are properly addressed, the next steps are the gap study analysis and the feedback and control process.

6.7.4.2 Gap study analysis

In the gap study analysis, an organization's responsibility includes investigation and identification of the breaking points in the transportation
system. It is essential to avoid major failures of transportation services by preventing backup situations through early warning systems. This includes the assessment of system performance of the already implemented system. A comparison between with and without implementation situations provides a warning sign to identify future needs.

6.7.4.3 Feedback and control

The major output of analyzing the gap is to provide a clear assessment on how an organization achieved its objectives and how much the implemented plan achieved the organization's mission. The feedback and control concept allows for functional change in current transportation planning processes and, more importantly, provides top management with a continuous cycle of information that enables the organization to build or adapt new capabilities to adjust with a dynamic environment. Achieving performance change through the control and feedback concept is essential in keeping a continuous monitoring of the transportation system and its performance. In this context, three major steps are necessary to maintain the control and command over the process and help organizational performance, they are: (1) a continuous assessment of current and future impacts in relation to implementation results, (2) obtaining individual and social values and (3) establishing updated data management files to provide up-to-date information for decision makers.

In the proposed paradigm, Figure 6.8 illustrates feedback, control, and command concepts as a basic tools to develop an organization's internal capability to adjust with the dynamic environment. The first loop integrates the critical strategic issue phase with the participation process and the second loop integrates the feedback and gap analysis with the planning process and SWOT analysis. Figure 6.11 illustrates the preferred planning characteristics of the concept of strategic thinking as an example of using feedback and control as a requirement for the strategic transportation planning process. It stresses that strategic planning and strategic thinking is aimed to anticipate future problems and develop a more creative method to solve present problems. In this regard, the concept of a two-loop analogy is illustrated as strategic thinking. Figure 6.12 abstracts the strategic planning paradigm as a process, action, and result with a set of controls and feedbacks to provide capabilities to learn and adapt with an
THE CONCEPT OF STRATEGIC THINKING

1st Loop  Use the solution method development for past/present problems to anticipate the problem for "tomorrow"

2nd Loop  Develop a new method for solutions to anticipated problems, then apply the proposed method to "today's" problem

Figure 6.11 Preferred characteristics for a successful transportation planning process: strategic thinking
THE CONCEPT OF STRATEGIC THINKING

Figure 6.12 Preferred characteristics for a successful transportation planning process: Concept of strategic planning and control.
external/internal environment. The key issue is the definition of insider/outsider and the organization's performance. Intention is to stress the fact that the strategic planning paradigm is an action/result-oriented process.

6.8 CONCLUDING REMARKS

The transportation community faces severe challenges in the preparation of an adequate statewide transportation planning process that can meet the goals of the dynamic society. The transportation planning process and its plan product should be viewed as societal instruments that can both enhance and damage the quality of life; it can either stimulate or pacify growth and development.

In a highly polarized and political environment there is controversy regarding the search for a better approach to transportation problems. Literature reviews suggest several appropriate avenues to meet the challenges, including institutional and organizational changes. Both approaches appear to be effective. However, our search for a better methodology stresses more emphasis on the planning process and its elements as a potential tool to achieve an action plan. Consequently, the suggested strategic planning approach is a combination of these elements (institution, organization, planning process), with more emphasis being placed on the process and organizational development and analyzing the new institutional change.

The basic principle of the proposed paradigm is that transportation planning activities are an implicit contract between planner/engineer/public citizens and officials. Consequently, we are facing three major challenges: (1) Building a political coalition to support the transportation plan; (2) establishing a sound technical process that utilizes the internal/external effect of the transportation system; and (3) stretch the transportation organization structure in terms of planning, programming, and operational procedure capabilities.

In today's transportation environment, several aspects have a noticeable influence on our ability to implement a new transportation planning paradigm at the state level. These aspects include (1) the increased pressure for action where current state-of-the-practice is slow; (2) the rapidly changing environment the transportation output is facing; and (3) the noticeable fragmentation of planning
activities the current practice is accompanied by both in vertical hierarchy (DOT, MPO, district) and horizontal hierarchy.

Our objective here is to strengthen the decentralization of the planning approach. Rather than the current sequential planning process, the proposed paradigm stresses a continuous parallel process on all transportation levels to foster the process and more horizontal integration within each planning organization (i.e. internal management). The basic requirements for achieving performance change are: (1) the clear conceptualization of transportation problems and objectives, (2) the proper method to perceive individual and community preference (strategic vision), and (3) the cooperative effort to deliver the transportation services (strategic alliance). In specific, the philosophy of the proposed paradigm is to ensure the interrelationship between the components of planning and interaction between planning and implementation activities. Consequently, we view the transportation planning process as an integral process that cannot be treated independently. Contributions from technical, as well as policy making and institutional types of professionals, are necessary.

The intended objective of the proposed paradigm is to provide a tool which will assist top management in deciding upon the execution of the transportation plan. It is to facilitate decisions to adjust transportation organization's performance with political reality. Thus, the objective has a significant implication, especially where public support or voter rejection has a clear-cut impact on decision formulations and provides credibility for plan formulation.

The expected advantages of implementing the proposed paradigm are, first, to identify and remove deficiencies in current statewide transportation performances. Secondly, to increase the likelihood of performing an efficient and equitable transportation service.

In this manner, our basic assumption is that the proposed performance improvement of the current state-of-the-practice is expected to be slow. However, it is important to proceed toward incremental improvement based upon a better understanding of the transportation environment and available knowledge about the transportation planning process. Taking the deficiency of the current state-of-the-practice and the proposed paradigm, there are several
steps that need careful consideration and should be included in the preparation efforts:

1. The interactive participation process is intended to improve communications and incorporate public officials, planning organizations, and citizens in order to provide a consensus and unified vision and represent information to facilitate decision making.

2. There is a need for top management commitment to integrate different planning agency's efforts at different levels to establish a permanent link between the components of the proposed paradigm.

3. There is a need for a shared effort to establish internal capabilities to process diverse information and coordinate the implementation process.

4. In an era of dynamic change, the lack of a consistent data base is a significant shortcoming that affects the credibility of the planning process. The concept of data management is inevitable.

5. To integrate a dynamic decision making process which will execute the planning process, careful consideration of the issue of control vs. flexibility is a critical assumption.
CHAPTER VII

RECOMMENDED GUIDELINES TO IMPROVE THE EXISTING STATEWIDE TRANSPORTATION PROCESS IN OHIO

7.1 OBJECTIVE

The objective of this chapter is to identify and recommend ways that ODOT can improve its current performance. The basic idea is to incorporate the principles of the proposed ideal transportation planning paradigm into ODOT's current practice by establishing a more pro-active management process. This will assure support for the statewide plan as well as a better evaluation of different alternatives. Moreover, it will enable MPOs to participate in the statewide planning effort in a more cooperative effort.

We believe that the proposed ideal transportation planning paradigm presented in Chapter VI can mitigate ODOT's current performance problems. It is important to understand that there are no institutional or legal constraints that prohibit ODOT from using the ideal paradigm. However, we expect that ODOT has to interpret these suggestions based on actual circumstances and find its own answers in implementing the proposed recommendations.

It is critical to remember that achieving any strategic change will require a combined effort among the various transportation planning organizations. Also, the proposed change is expected to consume resources in terms of time, money, and training.

7.2 PERFORMANCE CHANGE MODEL

In order to provide new directions for ODOT's statewide planning, it is necessary to assess its effectiveness and assure its willingness to change. In this section emphasis is on performance change. Figure 7.1 depicts the major components and procedures to achieve the proposed performance change.
Proposed Performance Improvement Process for the STATEWIDE TRANSPORTATION PLANNING PROCESS

- State-of-the-Practice
  - Literature Review
  - Descriptive Model
- State-of-the-Art
  - Ideal Transportation Planning Process

Comparison & Investigation

THERE IS A SIGNIFICANT DIFFERENCE

What is the possible set of improvements?

- Institutional Change
  - New Acts or Mandates
- Organizational Adjustment
- Planning Strategy & Process

Figure 7.1 The performance change model for ODOT
In order to comply with the model requirements, the focus of this research has been on three stages: assessment, decision, and intervention.

In the first stage, assessment, research is concerned with the current state-of-the-practice and available options for change. Assessment has been divided into two primary phases:

**State-of-the-Practice: What is the status?**

1. Literature Review
   Chapter III established a theoretical framework of the current statewide transportation planning practice.

   Chapter IV investigates different perspectives and methods of statewide planning in different state levels.

2. Systematic analysis of ODOT's current state-of-the-practice
   Chapter V is where we investigate the descriptive model and identify ODOT's current performance problems.

**State-of-the-Art: What are the options?**

1. Literature Review
   Chapter II explores the evolutionary development of the transportation planning process in the US.

2. Chapter VI is where we propose a new strategic transportation planning paradigm at the state level.

In the second stage, decision, the question is "should we change the current performance or not?" To answer this, we compare the state-of-the-practice with the proposed ideal transportation planning paradigm. The comparison indicates a gap between the two, consequently, there is a need for performance change.

In the third stage, intervention, we decide on how to change direction and performance. The objective of this chapter is to use the basic principles in the proposed ideal model to improve ODOT's current state-of-the-practice.
7.3 IMPLEMENTING THE STRATEGIC APPROACH: THE GAP BETWEEN "INTENTION" AND "RESULT"

In a large organization such as ODOT there is an increasing need for practical statewide transportation planning. It is expected that certain realities of the organization's mission and mandates will affect the scope and level of details characterizing an applicable strategic planning process.

We argue that the existing inadequacies are due to the lack of a consensus in transportation planning activities as well as limited ties between the plan and the action. More critical is the absence of effective feedback mechanisms. The following is a brief identification and specification of some significant problems in ODOT's current performance.

1. There is no clear planning function for ODOT Central Office in the overall statewide transportation planning process.

2. There is either conflict or insufficient information to coordinate the sixteen TIPs into one consolidated STIP, especially regarding

   2.1 jurisdictional responsibilities;

   2.2 lack of a clear line of communication among the planning organizations (ODOT/district/MPO);

   2.3 lack of a clear internal line of communication within the current ODOT structure (Division of Modes vs. Bureau of Planning).

3. There is both a lack of unified guidelines to provide a common format and procedures to establish a cooperative process between TIP and STIP, as a result:

   3.1 there is no clear strategy as to how to face the problems of air quality, public involvement, and fiscal constraints;

   3.2 there is no consistent project development format between the MPO's and ODOT's, which affects deadlines and delays final approval, and

   3.3 there is a lack of unified technical analysis to investigate the deficiencies in STIP.
7.4 LINKING VISION WITH REALITY

Implementing strategic planning requires a variety of complex procedures and techniques which vary according to the planning situation. Consequently, there is no unified way of implementing strategic planning. Taking advantage of the proposed paradigm, we identify several key activities that must be performed to facilitate the implementation of the principles of the proposed ideal transportation planning process:

1. Clarify the responsibilities of the different planning organizations;

2. Integrate and utilize the internal/external factors that affect the planning process. To do this, ODOT must:
   2.1 strengthen the sense of ownership, participation, and involvement;
   2.2 support internal capabilities that deal with training and development;
   2.3 take advantage of future opportunities, innovations, technology, and intuition, and;
   2.4 establish a suitable control process between the planning output and its consequences, i.e. performance.

3. Careful consideration of flexibility and control to avoid over-planning and the mis-allocation of resources;

4. Focus on teamwork and learning capabilities, i.e. education and outreach programs.

It is important to understand that the strategic approach is an action/result oriented process. The critical issue is that the component of the proposed strategic paradigm (i.e. participation and preparation, strategic vision, strategic alliance, and results) should be executed at all levels of the transportation improvement program. It is not a one-shot process, especially when the environment is changing constantly. ODOT should assure the continuity of the planning process. In this regard, the strategic approach is a cycle of decision and information processing.
There are several advantages in applying the strategic paradigm to assist ODOT in linking its vision to reality:

1. It would comply with the new Federal mandates (ISTEA) to establish a statewide transportation improvement program as a cooperative effort between ODOT Central Office and MPOs.

2. It would integrate the current planning effort at the MPO level, with the policy direction at the state level.

3. It would contribute to the assessment of ODOT's planning activities and to the development of transportation system future direction, service options and delivery system of the state.

4. It would facilitate improved budget planning.

5. It would provide a systematic approach to investigate alternative policies and program choices, resolve controversial issues, and adjust to the external environment.

6. It would include an anticipatory process to avoid crises.

These advantages suggest the need for intervention. The question is how to link strategy to implementation. In other words, how to modify ODOT's current practice and how to accommodate strategic transportation planning paradigm in ODOT. There are three basic aspects that require careful consideration: procedural rationality; governmental capacity; and strategic management (Gargan, 1993). The emphasis here is to deal with the two questions: What do we want to achieve? and How do we go about doing it? The "what" part focuses on the organization's future and the "how" on implementing the proposed vision. In reality, there are several possible relationships between "what" and "how." Weiss (1990) points out four possible combinations. Based on our argument about actual circumstances, however, we establish a matrix combination between four possible situations. In each situation, we distinguish three major factors: (1) The state-of-the-practice. Is there a suitable strategy or not, and is there a capability to implement the strategy?, (2) Performance status. Is the relationship between "what" and "how" clear?, and (3) What is the required performance change based on the above two
<table>
<thead>
<tr>
<th>WHAT</th>
<th>future &quot;strategies&quot;</th>
<th>(-)</th>
</tr>
</thead>
</table>
| (+)  | **STATE-OF-THE-PRACTICE**  
- organization has a clear strategy  
- organization has implementation capabilities for strategy |
| (+)  | **PERFORMANCE STATUS**  
- consistent and capable  
- "what" and "how" questions are clear |
| (+)  | **PERFORMANCE CHANGE**  
- translate strategy into operating reality |
| (+)  | **ADVANTAGE**  
There is system operating, including procedure value, attitude, vision that provides successful implementations |
| (-)  | **STATE-OF-THE-PRACTICE**  
- organizations do not have a strategy, but  
- still operate well |
| (-)  | **PERFORMANCE STATUS**  
- try to do as well as or better than yesterday |
| (-)  | **PERFORMANCE CHANGE**  
- search for strategy to anticipate the dynamic future |
| (-)  | **STATE-OF-THE-PRACTICE**  
- organization have a vague strategy  
- there is a lack of organizational capability to utilize a correct strategy |
| (-)  | **PERFORMANCE STATUS**  
- there is a vague and uncertain environment |
| (-)  | **PERFORMANCE CHANGE**  
- clarify the what and how question, i.e. establish the strategy and build capabilities to use the strategy. Use outside help |
| (-)  | **DISADVANTAGE**  
- even if we provide a strategy, there is a lack of internal capabilities to use this strategy |

Figure 7.2 Matrix of combined possible relationship between what and how
factors. Figure 7.2 shows the four possible combinations between "what" and "how" and the degree of problem intensity. Concerning ODOT's state-of-the-practice, in the matrix, the upper left-hand corner represents the ideal situation, the lower right-hand corner represents the worst situation. Both upper right-hand corner and lower left-hand corner represents cases where the performance change is needed.

The last two cases, there is a need to establish a clear strategy direction or to establish a mechanism (procedure) and build internal capabilities to implement the existing strategic direction.

Contrasting the four possible combinations with ODOT's current state-of-the-practice, we argue that Access Ohio, in the macro phase, formulates a clear mission for ODOT's future planning activities. However, it is still critical for ODOT to integrate several strategic planning aspects to be able to capitalize on its specified mission as well as to comply with the mandates that require a statewide transportation improvement program. The most significant cost is expected to be the staff training and the commitment to build internal capabilities to learn-and-adapt with the changing environment.

7.5 SUGGESTED PROCEDURES TO UTILIZE THE STRATEGIC PLANNING PARADIGM IN ODOT

Through the application of the four phases (participation, strategic vision, strategic alliance results), ODOT will be able to assess its internal capabilities. In this regard, a successful and appropriate consideration of these four phases will enable ODOT to achieve strategic logic as an output of processing the obtained information out of each phase. For ODOT to be able to enhance its current organizational performance "crisis management and anticipatory process" are the key component for performance change.

To utilize the proposed strategic approach, it is necessary for ODOT to establish a general outline of issues that confront transportation activities and to prepare a rough timetable for implementation.

Taking advantage of the six management data bases (congestion, safety, pavement, bridge, public transportation, and intermodal system) and other
ISTEA requirements creates a suitable environment for the proposed performance change. Given the initial data collection, there is a need for input from a broad cross-section of elected officials and special interest groups to accommodate an open participatory process. Consequently, ODOT has to conduct an open planning forum to discuss and deliberate its future. Toward this goal, ODOT's top management must clarify the role of various legitimate players, such as ODOT's Central Office, the twelve districts, the sixteen MPO's in urbanized areas, and outside development and planning groups.

The goal is to achieve public involvement and obtain support for the proposed statewide plan. A second critical issue concerns internal capabilities. Pete Marwick (1988) finds that at the pre-construction level it is very difficult to hold the consulting firms to project schedule in timely fashions, especially where ODOT is unable to perform its own internal functions. The third critical issue is how to link vision with reality. Figure 7.3 depicts the proposed procedures for ODOT to utilize the four phases of the strategic planning paradigm. The following is a brief discussion of the requirements and the advantage of implementing each phase:

Participation is the key input that reflects ODOT's willingness to change and utilize all legitimate groups (insider and outsider). It is a step to establish stakeholder analysis and to build a general consensus. Given the initial data collection, ODOT has to establish an open forum to plan and develop understanding and discuss its internal and external environment. Building consensus has to be done with regard to ODOT's current mission, the level of service required, need identification, service development, and the cost effectiveness of the proposed direction. As an initial requirement of this phase, we need to attain a commitment from top management of all planning levels and obtain data such as forecasts of population shifts, economic developments, private/public sector coordination (Meyer, 1988). The basic requirement for the participation plan is to educate the public; where the objective is to develop mutual understanding and trust.

Strategic vision is a concept taken from strategic planning in the private sector. It is a fundamental policy consideration that has long range
Figure 7.3 Suggested procedure for utilizing the strategic planning paradigm in ODOT
implications. The aim here is to enable ODOT to see and understand internal capabilities and perceive future opportunities and threats. In light of its analysis, ODOT will be able to specify its strategic issues. Strategic issues are not just current problems or short term operational concerns. The nature of the strategic issue is to decide to whom, by which method, at what cost savings should be provided, and what is the financial and administrative effort (Hennepin County Strategic Plan, 1984). This phase has two major outputs: (1) policy direction, and (2) operational vision.

Both phases, participation and strategic vision, act as an assessment that enables ODOT to capitalize on its mission, recognize its strengths, avoid its weaknesses and explore and provide blueprints of its future, i.e. assess current conditions and future possibilities as a base of deciding on critical issues. One major advantage of participation and strategic vision is to restrict the set of available choices for planners and engineers, i.e. keep focused and save time and money that is consumed in developing a detailed plan and project.

Strategic alliance After obtaining the shared vision about future activities for statewide planning, ODOT must integrate top down (policy direction) and bottom up (operational vision) at different planning levels. The strategic alliance is a prerequisite for effective implementation of ODOT's collective action plans (STIP). The concept of strategic alliance is to allow flexibility for individual operating organizations (MPOs and district) and to allow feedback for modification by ODOT's Central Office. This is true, especially where different geographical locations have different perspectives of needed transportation improvements and local objectives.

We argue for integrating participation and vision to establish a common strategic perspective across all levels of planning. The current institutional relationship among the different planning levels and operating authorities in Ohio is in need of alignment (house rules) so that the strategic concept can be performed smoothly. A critical issue in implementing the strategic alliance is to take advantage of ISTEA and CAAA. Achieving this will allow the action plan to take advantage of the general consensus and shared vision developed in the previous phases.
7.6 CONCLUSION

During the discussion of issues and recommendations, we emphasize that there are three essential requirements for successful implementation of any proposed performance change: (1) How to rationalize the procedure, (2) How to strengthen internal capabilities to process implementation, and (3) How to manage crisis, i.e. strategic management. To put both the descriptive model of ODOT and the ideal paradigm in one perspective, Figure 7.4 shows a step-by-step guideline of one possible alternative to link vision with reality. The diagram integrates the four basic steps of the ideal paradigm. Although the relationships are represented in a sequential form, it is a continuous process which emphasizes anticipation rather than problem solving method.

In the overall process of implementing the strategic paradigm, ODOT must: (1) Commit to the process, (2) be user-friendly, accept advise and avoid bias, and (3) dedicate special efforts toward outreach programs to educate the public of ODOT's missions and objectives.

The strategic approach has two levels: a Global level with long term perspectives, where the result is a shared organizational mission and (2) the function level, which focuses on operational tactics and is short term in perspective. In both levels, the essential requirement is continuous scanning and searching for possible opportunities and problems to be solved. There are several transportation criteria for evaluating an alternative strategic planning processes (Table 7.1). To incorporate the proposed paradigm, ODOT must:

1. Establish internal capabilities to process diverse information:
   - plan and articulate social goals, i.e. an early warning system, a participation process, educate the public and increase their awareness of ODOT's mission.
   - strengthen the concept of partnership
   - focus on ODOT's staff training and developing program

2. Establish strategic vision and link vision with reality:
   - continue the commitment of top management
   - obtain a shared consensus
   - use the SWOT analysis
IMPLEMENTATION OF THE STRATEGIC PERSPECTIVE

Figure 7.4 Linking vision with reality: proposed steps for ODOT
Table 7.1 Proposed Criteria for Evaluating an Alternative Strategic Planning Process

1 - Degree of Commitment by Top Management
2 - Public Acceptance
3 - Compliance with Organizational Mission Statement
4 - Appropriateness of Strategic Issues
5 - Cost Effectiveness
6 - Capital Expenditure
7 - Long Term Implication and Impact
8 - Staff Requirement & Training
9 - Balance of Flexibility and Control
10 - Degree of Cooperation and Integration of Different Planning Organizations
• enforce a sense of ownership
• enforce the concept of leadership
• stress teamwork efforts as a base for planning activities

3. Establish mechanisms for implementation:

• create a participatory process to link policy direction with operational planning
• enforce the strategic alliance concept between DOTs and MPOs by establishing a clear hierarchy of the flow of information and responsibilities
• pay careful consideration to flexibility vs. control
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APPENDIX A

Details on Definitions and Abbreviations

"Nomenclature"
### NOMENCLATURE

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>3C</td>
<td>Continuing, cooperative, comprehensive urban transportation planning process</td>
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<tr>
<td>ADA</td>
<td>Americans with Disabilities Act.</td>
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<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
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<tr>
<td>Access Ohio</td>
<td>Ohio's statewide multi-modal transportation plan.</td>
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<tr>
<td>CMS</td>
<td>Congestion Management System.</td>
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<td>CAAA</td>
<td>Clean Air Act Amendments of 1990.</td>
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<tr>
<td>capacity</td>
<td>The maximum number of vehicles and/or people that can be carried past a point on a transportation system in a specific time, at a specified level of service.</td>
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<td>congestion</td>
<td>Level at which transportation system performance is no longer acceptable to the traveling public due to traffic interface.</td>
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<tr>
<td>content</td>
<td>The contents of a strategic planning process will vary from one organization to another. The issues selected and how they will be addressed generally form the content of a planning process and its resulting plan document.*</td>
</tr>
<tr>
<td>design criteria</td>
<td>Engineering standards used to guide the development of the construction plans, to provide a safe and efficient highway.</td>
</tr>
<tr>
<td>design phase</td>
<td>See final development phase</td>
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<tr>
<td>Delphi Method</td>
<td>A forecasting technique that includes surveying a panel of experts, all of which have access to the same information. The goal of this technique is to achieve a consensus as to a likely future course of action. This technique eliminates the bandwagon effect of majority option.*</td>
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<td>EIS</td>
<td>Environmental Impact Statement</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>environmental document</td>
<td>Summarizes the impacts of a project, in accordance with the National Environmental Policy Act (NEPA).</td>
</tr>
<tr>
<td>environmental scanning</td>
<td>The process of identifying major environmental factors, events, or trends that impact the organization and its internal operating systems.*</td>
</tr>
<tr>
<td>external environment</td>
<td>All relative elements (social, economic, political, and technological) external to, and having impact on, the organization.*</td>
</tr>
<tr>
<td>FTA</td>
<td>Federal Transit Administration.</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration.</td>
</tr>
</tbody>
</table>
final development phase: Stage within ODOT's Transportation Development Process during which projects are designed, detailed plans drawn for construction, and right-of-way is acquired.

goals: Those achievements towards which management wants the organization to strive as it seeks to fulfill its mission.

home rule: The type of government structure where local communities develop their own policies, as opposed to operating under statewide regulations.

Harvard Policy Model: A private sector strategic planning approach that involves an analysis of management's values and the social obligations of the firm.


Internal environment: All relevant elements (personnel, financial, communications, authority relations, and management operating systems) internal to the operation of the organization and its various components.*

issue: A trend which a group decides is important for policy-making purposes.

Level-of-Service (LOS): The measure of operating conditions on a given roadway, ranked A through F, and A being the highest level of service and F being the lowest.

MORPC: Mid-Ohio Regional Planning Commission.

MPO: Metropolitan Planning Organization.

management: Consists of two types—strategic and operational. Strategic is performed at the top of an organization's hierarchy; everything else is operational. Operational Management is organized along functional lines of responsibility. Strategic management sets directions for the organization and operational management ensures that this direction is implemented.*

mission: A statement of the role, or purpose, by which an organization plans to serve society. Mission statements may be set for different organizational components or departments. A department usually has only one mission statement.*

multi-modal transportation: Movement of goods and people on any one or more modes of travel, when more than one mode serves the transportation needs of an area.


NAAQS: National Ambient Air Quality Standards.

non-attainment area: Urban area which exceeds air quality standards set by the Clean Air Act.

ODOT: Ohio Department of Transportation.

OEPA: Ohio Environmental Protection Agency.

objectives: Talks which are deemed necessary for an organization to reach its goals.

planner: One who has the authority necessary to set action out in advance.
policy: Chosen course of action designed to significantly affect an organization's behavior in prescribed situations.

process: The direction and frequency of work and information flows linking the differential roles within and between departments of a complex organization.

preliminary development phase: State within ODOT's Transportation Development Phase during which environmental effects of proposed projects are evaluated.

ROW: Right-of-way. The land owned by or under direct control of a transportation system on which its vehicles operate.

resources: The contribution of technology, equipment, personnel, and funds that turns labor into goods and services in the marketplace.*

right-of-way: A corridor of publicly-held property, or the line or boundary of such a corridor, preserved for a public transportation facility.

SIP: State Implementation Plan.

stakeholder: Those individuals, groups, and outside parties that either affect or who are affected by the organization.*

strategic vision: The explicit, shared understanding of the nature and purpose of the organization. It specifies what the organization is and should be rather than what it does operationally. It is contained within an organization's strategy statement.*

strategy: A general direction set for an organization and its various components to achieve a desired state in the future.

strategy/structure/process: Three related components of an organization. An organization's process should fit its structure and the structure should be set forth in such a way as to enable an organization to achieve its strategic direction.*

TMC: Transportation Control Measures.

TCP: Transportation Control Plan

Title 23: Title 23 of the United States Code of Law

Transportation Development Process: Provides for a logical progression in the evolution of each project processed through ODOT.

TRB: Transportation Research Board of the National Academy of Sciences

TSM: Transportation System Management

UMTA: Urban Mass Transportation Administration of the US Department of Transportation.

USC: United States Code of Law
USEPA: United States Environmental Protection Agency.

UTPP: Urban Transportation Planning Process

UTPS: Urban Transportation Planning System

APPENDIX B

Metropolitan Transportation Planning Factors

ISTEA Requirements for MPO's in the Development of Their 20-year Metropolitan Plan
Appendix B
Metropolitan Transportation Planning Factors

1. Preservation of existing transportation facilities and, where practical, ways to meet transportation needs by using existing transportation facilities more efficiently.

2. The consistency of transportation planning with applicable federal, state, and local energy conservation programs, goals, and objectives.

3. The need to relieve congestion and prevent congestion from occurring where it does not yet occur.

4. The likely effect of transportation policy decisions on land use and development and the consistency of transportation plans and programs with the provisions of all applicable short- and long-term land use and development plans.

5. The programming of expenditures on transportation enhancement activities as required in Section 113.

6. The effects of all transportation project to be undertaken in the metropolitan area, without regard to whether such projects are publicly funded.

7. International border crossings and access to ports, airports, intermodal transportation facilities, major freight distribution routes, national parks, recreation areas, monuments, historic sites, and military installations.

8. The need for correctness of roads within the metropolitan area with roads outside the metropolitan area.

9. The transportation needs identified through use of the management systems required by Section 303 of this title.

10. Preservation of rights-of-way for construction of future transportation projects, including identification of unused rights-of-way which may be needed for future transportation corridors and identification of those corridors for which action is most needed to prevent destruction or loss.

11. Methods to enhance the efficient movement of freight.

12. The use of life-cycle costs in the design and engineering of bridges, tunnels, or pavement.

13. The overall social, economic, energy, and environmental effects of transportation decisions.

14. Methods to expand and enhance transit services and to increase the use of such services.

15. Capital investments that would result in increased security in transit systems.

(Source: U.S. Dept of Transportation, 1992, p. 250)
APPENDIX C
Statewide Transportation Planning Factors

ISTEA Requirements for DOT's to be Considered in the Statewide Process
Appendix C
Statewide Transportation Planning Factors

1. The results of the management systems required pursuant to subsection (b).

2. Any federal, state, or local energy goals, objectives, programs, or requirements.

3. Strategies for incorporating bicycle transportation and pedestrian facilities in projects where appropriate throughout the state.

4. International border crossings and access to ports, airports, intermodal transportation facilities, major freight distribution routes, national parks, recreation and scenic areas, monuments and historic sites, and military installations.

5. The transportation needs of nonmetropolitan areas through a process that includes consultation with local elected officials with jurisdiction over transportation.

6. Any metropolitan area plan developed pursuant to Section 134.

7. Connectivity between metropolitan areas within the state and with any metropolitan areas in other states.

8. Recreational travel and tourism.

9. Any state plan developed pursuant to the Federal Water Pollution Control Act.

10. Transportation system management and investment strategies designed to make the most efficient use of existing transportation facilities.

11. The overall social, economic, energy and environmental effects of transportation decisions.

12. Methods to reduce traffic congestion and to prevent traffic congestion from developing in areas where it does not yet occur, including methods to reduce motor vehicle travel, particularly single-occupant motor vehicle travel.

13. Methods to expand and enhance transit services and to increase the use of such services.

14. The effect of transportation decisions on land use and land development, including the need for consistency between transportation decision making and the provisions of all applicable short-range and long-range land use and development plans.

15. The transportation needs identified through use of the management systems required by Section 303 of this title.

16. Where appropriate, the use of innovative mechanisms for financing projects, including value capture pricing, tolls, and congestion pricing.

17. Preservation of rights-of-way for construction of future transportation projects, including identification of unused rights-of-way which may be needed for future transportation corridors, and identification those corridors for which action is most needed to prevent destruction or loss.

18. Long-range needs of the state transportation system.

19. Methods to enhance the efficient movement of commercial motor vehicles.

20. The use of life-cycle costs in the design and engineering of bridges, tunnels, or pavement.

(Source: U.S. Dept of Transportation, 1992, p. 252)