RESOURCE ALLOCATION AND THE SYSTEM PLANNING PROCESS

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This paper addresses the question of how a state highway or transportation agency divides or allocates resources among a number of regional districts. The discussion concerns itself with how various allocation methods affect the size and location of proposed projects and how allocation affects the disposition of regional agency personnel to interact with communities and respond to their needs. Beginning with a range of idealized allocation methods intended to expose issues in allocation, the paper shows how such simple schemes illuminate the description of an actual state allocation method—that used in California for allocation of the California State Highway Fund. The paper then develops some requirements on allocation methods that derive from the need to make planning more responsive to a range of community and environmental factors. Finally the paper analyzes the incentives that operate on planners when allocation is based on programs proposed by the regions to the state for implementation and when it is based on non-program factors.

•THE highway system planning process at state and local levels has experienced considerable change over the past 15 years or so as tools and techniques for planning have been developed and improved. As America moves into a complex post-industrial age, it is evident that the present process, based in the traditions of the late 1950's and 1960's, will have to undergo as rapid and profound a change in the next few years as the whole 15 years before if it is to respond to this complexity and to the increasing demands of citizens for involvement in decision-making. An essential component of this response should be a thorough analysis of the components of a system planning process and of the role each can play in determining the outputs and behavior of a system planning process. Some process components, such as the institutional structure and the funding sources, are recognized by all. This paper addresses the implications for designing a planning process responsive to community and environmental concerns of a less obvious component: the method used by the process for allocating state-level funds to regional agencies for use in transportation planning and implementation.

This research is part of a larger effort devoted to the problems of incorporating community and environmental factors into statewide transportation planning (1, 2). The primary concern of this paper is to investigate the important implications of allocation for the process outputs and behavior, taking the total amount of resources to be allocated as fixed. The major emphasis will be the influence that allocation has (a) on project location and (b) on a planning agency's incentive to interact with and respond to community concerns.

To facilitate presentation of the issues in allocation, the discussion will begin with a presentation of a variety of conceptually "pure" allocation schemes, where any actual allocation scheme can be viewed as a combination of these pure processes. Reviewing possible alternative allocation schemes leads naturally then to a typology of allocation schemes. The allocation process used for a particular state's highway fund will then

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be described and its relationship to the alternatives defined. The description will also identify some significant problems with the present allocation process.

The final sections present some important requirements for allocation that are implied if the system planning process is to respond to future uncertainties, especially the uncertainty of community acceptance.

ALTERNATIVE MODELS FOR THE ALLOCATION PROCESS

To familiarize the reader with the issues raised by various allocation methods, it is appropriate to present six rather extreme, simplified allocation schemes that are conceptually pure and whose biases can be easily understood. These alternative schemes can be combined to yield most of the existing allocation methods for federal and state programs. The six allocation schemes are

1. Economic efficiency,
2. Benefit/cost ratios,
3. Consistency of resources and statewide level of service,
4. Equity,
5. Individual project, and
6. Political allocation.

The first five are based on analysis techniques applied by the state agency either to projects proposed by regional agencies or to socioeconomic data. They view allocation as a technical analysis problem. The sixth scheme is radically different in that it views allocation as a political process, as a mechanism for negotiation of the inevitable conflicts of interest that always occur between state and regional levels. It recognizes explicitly the bargaining or conflict that would occur in the other five methods but is obscured by their analytical definitions.

We believe that a political allocation process is much more appropriate to a system planning process designed to incorporate community and environmental factors than an allocation based solely on technical analysis.

The following sections describe the six models in detail.

ALLOCATION BASED ON ECONOMIC EFFICIENCY

A very attractive conceptual method for performing allocation is based on the concept of economic efficiency (Fig. 1). That is, a state highway agency may choose to maximize aggregate net benefits to the state for a given amount of resources, without regard for their distribution among regions. For the present, project size or scale (2, 4, 6 lanes) can be assumed to change continuously. The conditions of economic efficiency require in theory that the marginal benefit/cost ratios for all projects funded be equal. In other words, projects are designed so that the additional increments in benefits for an extra dollar of investment for any one project are equal for all projects. If project benefits go up with project cost (or size) in dollars (Fig. 2), this means that the slope of the benefit versus cost curve will be the same for all funded projects in an economic efficiency allocation. Note that the ratio of total project costs to total benefits may not be the same for all funded projects. Given total resources and a number of candidate projects, each with a benefit versus cost curve, the marginal conditions above establish which locations receive projects and the optimal or best project size at each location. In general, the scale of each project will vary with the aggregate resources available.

Because of this, efficiency allocation requires that the state send each region an allocation guideline or approximate allocation. The state also specifies the variables that make up the benefits and costs to be considered in evaluating projects. Benefits would include time savings, accident reductions, etc.; costs would include construction, maintenance, impact amelioration measures, and so on. The regions then calculate their facility locations and sizes to arrive at candidate projects and a candidate program for review by the state. Because the marginal benefits from candidate projects will tend to diminish with increasing project size, the regions each try to allocate funds to projects so as to preserve the highest common marginal benefits possible and still spend

the amount of their guidelines. Note that benefits and costs of projects will also account for those derived from project interdependence or network effects.

Each region then sends the state its candidate programs, consisting of a list of candidate projects, and the region's marginal benefit/cost ratio. In general, the marginal ratios calculated in each region on the basis of the allocation guidelines will not be the same since each region has different investment opportunities. The state then changes the guidelines to move funds from those regions with lower marginal benefit/cost ratios to those with higher ratios and issues new guidelines to the regions. New candidate programs are then developed by each region in response to these new adjusted guidelines, and project sizes and locations will change in some regions. New regional candidate programs are then submitted to the state, marginal benefit/cost ratios are again checked for consistency, and the process is repeated until the ratios are equal for all regions. This method of allocation is discussed more fully as the Lange-Lerner approach to investment planning by Marglin (3).

The equilibrium marginal benefit/cost ratio will probably be greater than 1, indicating that scarce resources for transportation prevent building projects out to the optimal marginal benefit/cost ratio of 1. In other words, all projects are profitable in a benefit/cost sense, and more resources could be devoted to transportation.

The essential point about allocation based on economic efficiency is that the project locations and sizes prepared by the regions are a function of the size of their allocations.

An important implication of an efficiency allocation scheme is that the candidate projects used for the allocation do not, in general, provide a uniform level of service distribution (speed distribution) across the state. Due to their greater valuation of time savings, the relatively richer regions receive higher levels of service than do poorer regions. This is because a higher level of service must be reached before the marginal benefits of additional project investment are the same as for lower income areas. Denser regions tend to have lower travel speeds because trips there are short and building costs high. Thus, efficiency allocation provides for aggregate efficiency but essentially ignores issues of incidence of benefits or equity.

ALLOCATION BASED ON BENEFIT/COST RATIOS

An economic efficiency allocation scheme assumes that project size and location are variable. In practice, this freedom is usually not available due to restricted project locations, size, or design standards. It is useful then to sketch out a second allocation scheme that generates the economically most efficient allocation given that size and location of candidate projects are fixed for each region. The allocation is based on fixed location project benefit/cost ratios. Figure 3 shows how this allocation scheme would function.

Each region develops benefits and costs for a large number of specific projects it would like to build. These regional project benefits and costs depend to some degree on project interdependence, but within a range of allocations the benefits and costs of projects are taken as independent of each other. In the case of transportation projects where network effects can be important, this assumption sometimes may be extremely difficult to justify.

Each region ranks its list of candidate projects by aggregate benefit/cost ratio, and the state combines these regional project lists together into a master state project list containing all projects from all regions ranked by benefit/cost ratio. This list is then funded as far down as resources permit, each region receiving as its allocation the costs of its projects that appear on the funded list. Each region's funded projects constitute its candidate program.

An important assumption here is that there are a great many projects in the funded list, with no one project being a significant percentage of the budget. Thus, project indivisibilities do not prevent allocation of the whole budget. In the ideal case where every region has many projects, and where benefit/cost ratios are distributed randomly over the state, the last funded project in each region's candidate program would have roughly the same benefit/cost ratio. This last project can be viewed as the marginal regional investment, and the method ensures, under ideal conditions, that the marginal

Figure 1. Allocation based on economic efficiency.

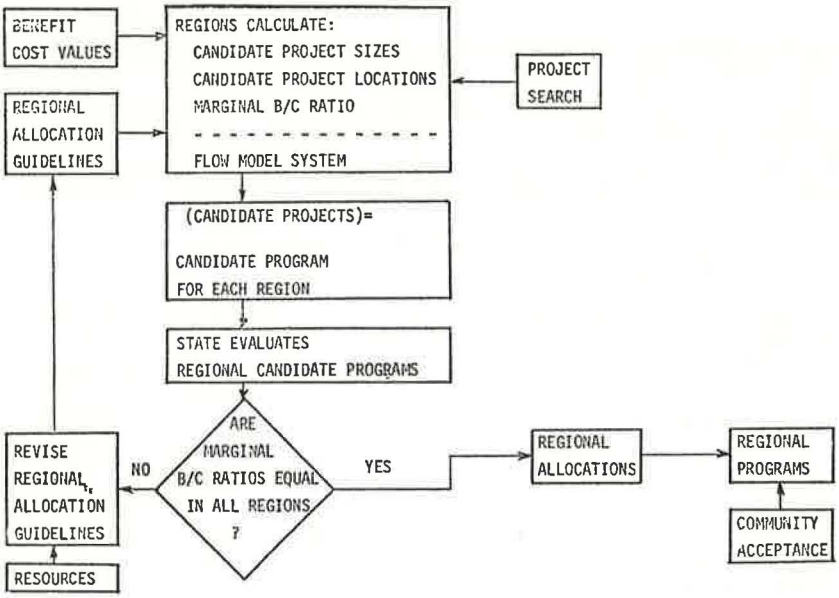


Figure 2. Project benefit versus cost curve.

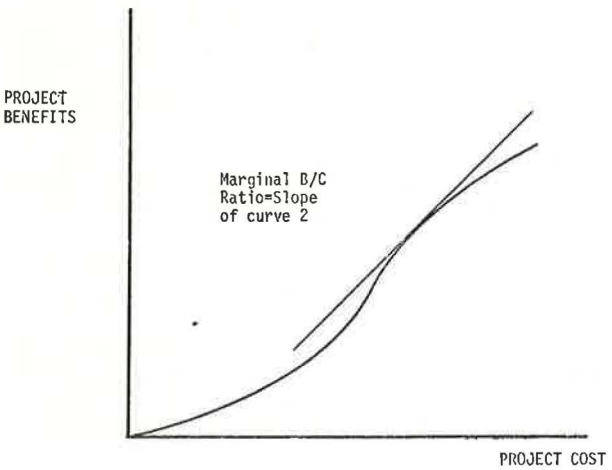
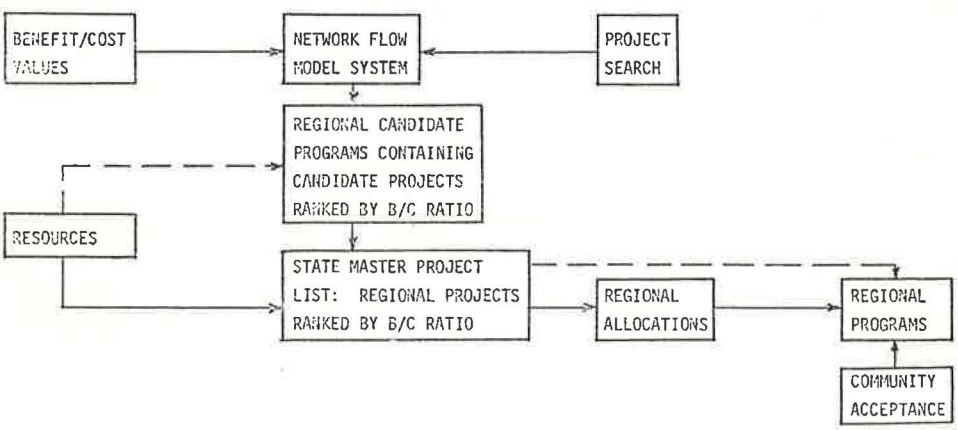


Figure 3. Allocation based on benefit/cost ratios.



benefit/cost ratio in each region will be roughly the same. In general, however, these conditions would not be likely to hold.

Benefit/cost allocation is a cruder measure than true efficiency allocation, which requires the marginal benefit/cost ratio of each project to be equal. Benefit/cost ratio allocation is an approximation to true economic allocation where project size and location are given and shares most of the strengths and weaknesses of efficiency allocation.

ALLOCATION BASED ON CONSISTENCY OF RESOURCES AND STATEWIDE LEVEL OF SERVICE

The third allocation scheme is based on maintaining a given transportation level of service (LOS) distribution over the state, which is similar to many state allocation schemes. Such a distribution could be specified as required speeds on the links of the master plan. Or it could be specified as an inter-facility spacing requirement, perhaps dependent on trip end density. The LOS distribution may or may not be similar to the one that falls out of an efficiency or benefit/cost ratio allocation. Figure 4 shows the allocation process based on a LOS distribution assumption.

To predict the facilities needed to meet the LOS in each region, a sophisticated traffic flow prediction model is required. The model must be able to handle congestion and express travel demand as a function of LOS because, if the costs of project construction projected by the model are higher than resources available, the calculation must be rerun with lower levels of service (LOSL) until the costs of service can be met. It is important to note that adjusting the LOS down to LOSL to reflect scarce resources yields a different list of candidate projects than merely truncating a list derived for higher levels of service (LOSH) to reflect a binding resource constraint. The shift in project list is similar to what happened in economic efficiency allocation when different candidate programs were developed for different allocation guidelines. Both project location and size could change. In this case, the LOSL calculation might result in a list of projects of financial magnitude (arbitrary units) 10, 8, 7, 6, 6, 4. The LOSH calculation might generate a project list of 12, 11, 10, 8, 8, 7, 6, which would be truncated by the resources constraint down to 12, 11, 10, 8. The truncated list can be met by existing resources, but its individual projects are fewer, larger, and perhaps in different places than those in the more correct LOSL list. California's State Highway Fund allocation process contains a similar truncation.

After a candidate project list reflecting consistent LOS and resources has been derived, the allocation then pays each region the cost of its projects that appear on this list, and the projects become the region's candidate program.

Consistency allocation may not give deterministic allocations if demand is highly responsive to supply. Due to induced travel demand, there may be several funding levels that result in roughly the same LOS distribution over space. Also, there is no inherent check on the desirability of individual projects as there is in the efficiency allocation and benefit/cost ratio allocation.

EQUITY ALLOCATION

The fourth major criterion that might be chosen for allocation is one based on equity considerations. There are several possible definitions of equity:

1. Equal LOS distribution in all regions (with an urban-rural subdivision);
2. Equal expenditure per capita, per mile of road, per mile of travel, per political district, etc.;
3. Regional expenditures equal to taxes paid; or
4. A special case of the previous alternative, LOS/resource consistency.

The second scheme suggests an allocation process based on formulas using socioeconomic data (Fig. 5). Income transfers may occur under this scheme. Indeed, the formula might even overcompensate poorer regions to make up for previous deprivation. The third scheme would prevent any income transfers between regions and, in the case of gas tax funding, would discriminate heavily against rural areas. This is especially true if maintenance funds are handled through allocation from the state level.

The results of an allocation based solely on a definition of equity will probably be significantly different from either of the procedures based on economic efficiency. The latter are likely to emphasize investment in growth areas (the urban fringe) at the expense of rural and central urban areas, whereas the former is likely to spread resources more evenly across urban, suburban, and rural areas. Distributional objectives almost always come at the cost of a certain amount of aggregate economic efficiency.

INDIVIDUAL PROJECT ALLOCATION

One of the most significant problems with statewide allocation lies in the area of community acceptance of the projects used as candidates in allocation calculations. One obvious way to avoid the problem is to fund local projects directly from the state level. Local agencies would negotiate projects knowing that state money would become available at some point if agreement could be reached in a proper manner among local groups and this fact could be demonstrated to the state (Fig. 6).

Individual project allocation takes the view that people's needs are what they want and can agree on. The advantage of this is that it removes a lot of the pressure on planners to build something. The disadvantage is that, even with regional allocation ceilings, areas with little opposition will still get most of the money actually allocated. There is little incentive for planners to seek agreement in regions containing conflict.

POLITICAL ALLOCATION

All of the allocation methods presented above deal with abstract characteristics of potential projects or their environment. As shown by flow charts, all the processes have the atmosphere of detached analysis about them. They imply that allocation occurring at the state level (before actual programming and implementation occur) is not a place for political decisions over what should be built.

But the choice of allocation process is itself a political decision, for different allocation methods will bias actual project decisions in different directions. This is evident from the previous sections. There is no objectively "right" way to perform allocation; it is basically a political process.

It is useful, then, to sketch out an allocation scheme that explicitly views the allocation process as a political process aimed at working out conflicts of interest between state and regional levels. Such a political allocation requires that there be a state-level body to review regional proposals that is representative of and responsive to statewide interests. This review body bargains politically with the regional agencies. The bargaining could restrict itself to decisions about parameter values to be used in the various models described in the foregoing sections, but this would limit discussion to those few project attributes that are convenient for analytical modeling. By its nature, political allocation will want to deal with the political issues implied by transportation, and today these often revolve around the community and environmental factors affected by transportation. The state also wants to concern itself with the differential impacts of proposed projects and programs, with who gains and who loses when particular allocations are made. Therefore, the bargaining in political allocation must proceed directly from specific project proposals.

Political allocation, then, is based on a comprehensive analysis of what the regions receiving allocation intend to do with the money (Fig. 7). The state requests candidate programs from the region, providing allocation guidelines for cost and for the particular type of transportation the state would like to see emphasized. The regions respond with candidate programs designed to meet state guidelines but also to further what the regions see as their regional interests. Naturally, there is potential statewide regional conflict here, and bargaining over the candidate programs will generally occur. Candidate programs may be returned to the regions as unacceptable or may be renegotiated by them if they are likely to receive low allocations. The regions can also pressure the state to accept their programs.

The bargaining over candidates is inseparable from the actual allocation decisions to be reached at the state level by the responsive and representative decision body

Figure 4. Allocation based on resource and LOS consistency.

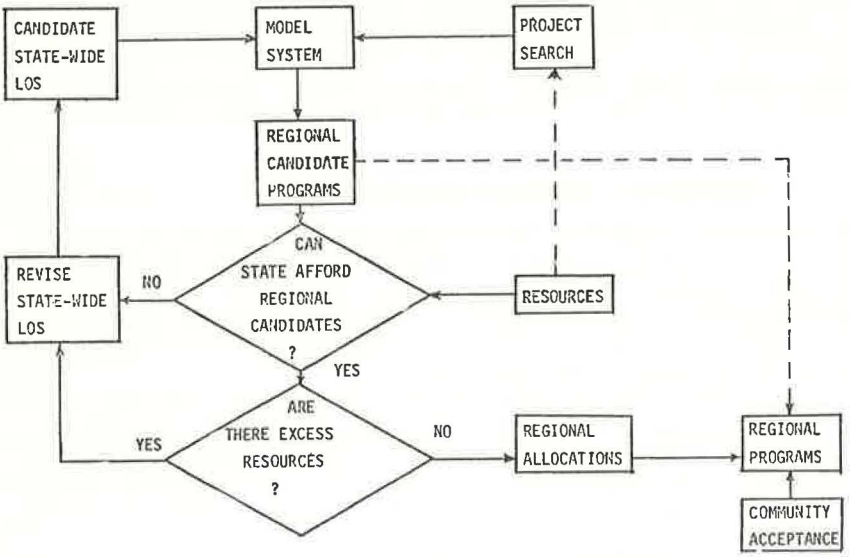


Figure 5. Socioeconomic allocation.

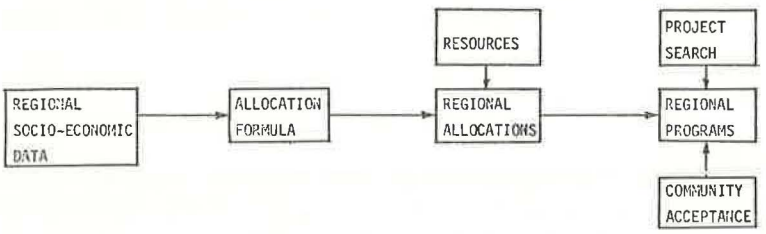
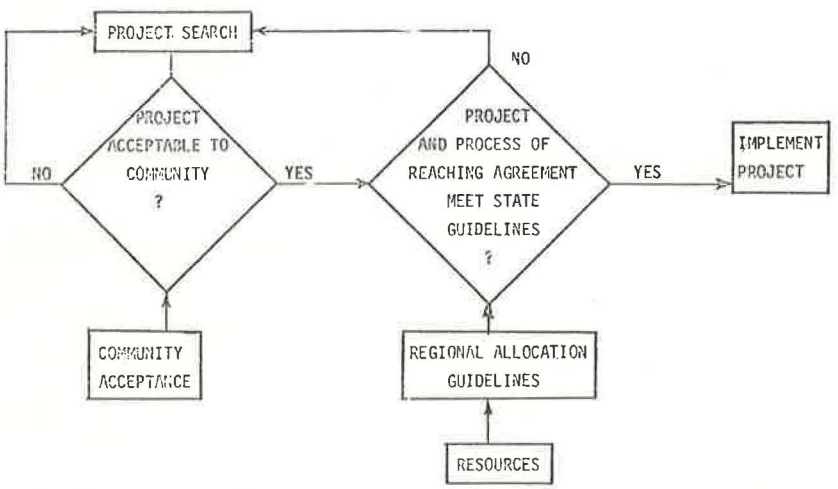


Figure 6. Individual project allocation.



mentioned earlier. Aspects of the candidate program are aggregated and compared to expose the differential aspects of proposed projects. The state uses a variety of analysis techniques, perhaps those in all of the allocation processes described above, to arrive at decisions about candidate programs and allocations.

Eventually the political process arrives at a negotiated settlement in which the state agrees to allocate given moneys for given candidate programs and the regions agree to build the candidate programs.

The political allocation process represents a mechanism for inter-level bargaining between state and regional levels. Perhaps such behavior would occur spontaneously in the other candidate program-based processes mentioned. But in the political allocation process, it is explicitly recognized and viewed as a possible benefit.

Because it is not restricted to narrow methods of analysis, political allocation is capable of considering a much wider range of community and environmental factors than the other allocation models mentioned. As a result, we believe that the political allocation model is most appropriate for system planning processes that seek to incorporate community and environmental factors in their planning.

A TYPOLOGY FOR ALTERNATIVE ALLOCATION PROCESSES

The foregoing alternative allocation schemes can be ordered into a typology that is useful for comparative purposes. The basic subdivision depends on whether or not an allocation scheme involves consideration by the state of candidate programs submitted by the regions in response to state guidelines. Within candidate program-based allocations, processes may be further categorized depending on how the resource constraints at the state level are applied. In some cases the regions are required to respect the resources constraint in developing their candidate programs. In some cases, candidate programs are not constrained by resources; allocation may be performed on the unabridged candidate programs, following which the regions truncate their programs to respect the limits of their allocations. This is what is done in allocation of one specific state highway fund, the California Highway Fund. Finally, the state may apply the resource constraint to a master list of projects from all regions ranked by desirability (benefit/cost allocation).

Alternatively, allocation can be based on non-program factors such as population, income, miles of road, miles of travel (socioeconomic allocation). The typology is given in Figure 8, with the example allocation methods corresponding to each subdivision given in parentheses.

ALLOCATION OF THE CALIFORNIA STATE HIGHWAY FUND

The major purpose for developing the six allocation schemes in the previous sections is to facilitate description of existing state transportation allocation schemes. A good example of such a scheme is the allocation of the California State Highway Fund, the primary source of funds for the California state highway system.

The choice of California does not imply special condemnation or concern. Rather the California allocation scheme is chosen because it is believed to be exemplary of a great many allocation methods used by state highway agencies. In fact, the California Division of Highways has a reputation as one of the most professional and innovative highway departments in the United States. The Division is already becoming aware of some of the implications of allocation for its decision-making process (4).

California's State Highway Fund is allocated to regional districts for construction and maintenance of the California state highway system (Fig. 9). California's highway planning objective ostensibly is to maintain a constant distribution of LOS on the system in urban and in rural areas. Thus, allocation contains elements of an "equity" allocation based on constant LOS. We will see that the allocation also contains elements of benefit/cost allocation.

Allocation of the Fund is primarily a function of the resources the districts say they need to remedy "deficiencies" in the system—i.e., parts of the system presently offering LOS below statewide standards. The Fund is subject to a legislatively defined north-south split; the northern part of the state presently gets 40 percent of the Fund,

Figure 7. Political allocation.

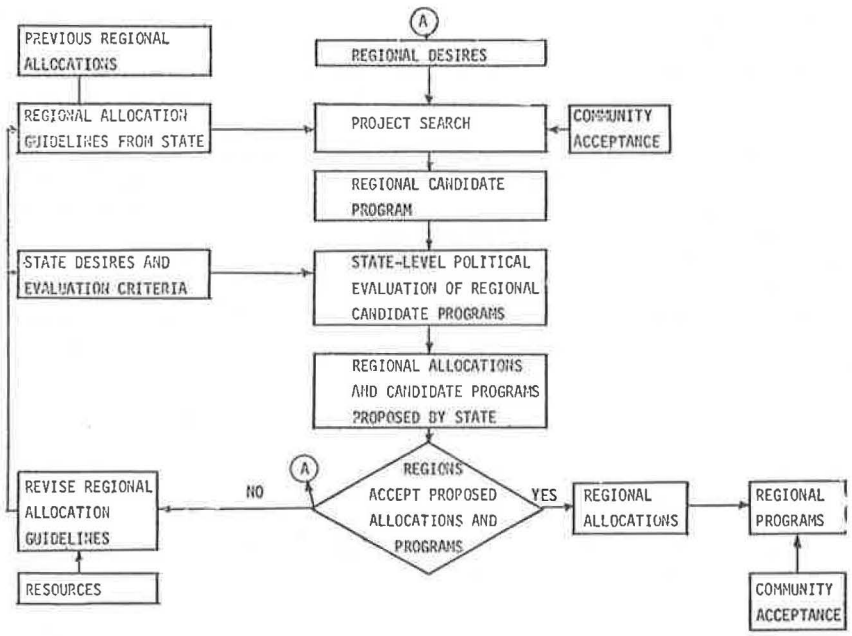


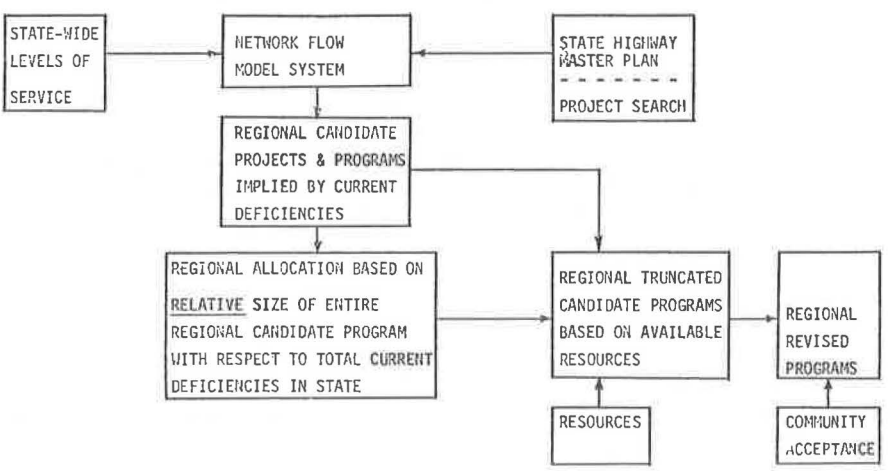
Figure 8. Typology of allocation methods.

A. Program-based allocation with resource constraint before allocation
   1. Constraint imposed by allocation guidelines (economic efficiency, single projects, political allocations)
   2. Constraint imposed by iteration and adjustment of quality guidelines (LOS/resource consistency allocation)
   3. Constraint applied to state master list (benefit/cost allocation)

B. Program-based allocation with resource constraint after allocation (allocation of California Highway Fund)

C. Non-program-based allocation (socioeconomic allocation)

Figure 9. Allocation of California State Highway Fund.



the southern part 60 percent. Within each part, allocation of 70 percent of the money must be based on "needs"; the allocation process described here is the "needs" allocation. These deficiencies are determined by the state transportation network flow model but, although existing traffic generators are used, no link capacities are used, only travel speeds, in specifying the network. And links occurring in the freeway and expressway system master plan are included in the assigned network whether or not a road presently exists in the alignment. Thus the model predicts the travel that would occur on the state network if travelers experienced no congestion and could travel at statewide LOS levels. Naturally, the flow model delivers many link flows that, were they to use existing facilities, would experience service below statewide LOS. Such links are called deficiencies.

Once the locations of present deficiencies are established, the network flow model is then used to predict how big the improved facilities must be to remain uncongested for 20 years. As deficiencies, the districts report the cost of these improved facilities. Allocation is then based on the relative size of the entire reported deficiency lists from the districts. After allocation, the districts rank their separate deficiencies by indexes similar to benefit/cost ratios and fund their lists as far down as possible.

One notes immediately that the resource constraint is applied only after the actual allocations have been made. The truncation of deficiency lists means that the projects that actually are funded are larger and in different places than those that would be built by an allocation based solely on a resource/LOS consistency allocation scheme.

One can also view the California State Highway Fund allocation process as related to the benefit/cost allocation of the previous section. The deficiency lists submitted to the state are similar to the lists of high benefit/cost ratio projects they might submit for an allocation based on benefit/cost ratios. Truncating the district deficiency lists is then similar to the truncation of the master project list called for in benefit/cost allocation. As noted in a previous section, however, because of demand elasticity and network effects, project benefits and costs depend on the assumed size of the system. Because the system size assumed in the California allocation is somewhat large, the benefits and costs assumed for projects are probably unrealistic. Thus, even if California's process is viewed as an approximation to a benefit/cost allocation, its output is projects that probably are both too few and too large for the most effective use of highway funds.

The use of the high LOS values and uncapacitated flow model is the same thing as assuming an ultimate system large enough and growing fast enough to operate indefinitely without congestion. In other words, the allocation method assumes that, although present revenues fail to cover reported deficiencies (i.e., districts must truncate their reported deficiencies), in the future they will. But this is very unlikely since at the present time projected deficiencies diverge from expected revenue as target years further in the future are considered (5).

There are other problems with an allocation method such as California's. It is clear, for instance, that imposition of the resource constraint after allocation encourages districts to inflate their deficiency lists wherever possible in efforts to gain a larger allocation relative to other districts. Such maneuvering will "cancel out" of the allocation calculation only if every district's deficiencies are inflated by the same percentage.

ALLOCATION AND THE FUTURE

So far the role of time has been ignored in the discussion of allocation. It has been assumed implicitly that implementation of projects occurred immediately after allocation and thus that the benefits, costs, and LOS changes of that implementation occurred soon after allocation. But the planning and construction of major public facilities is time-consuming; the benefits and costs of these activities in fact occur over decades.

A central problem for allocation is dealing with this future. Allocation must decide which future project costs and benefits to include in its calculations. Where it is based on candidate programs, it must also decide which future projects to include.

It was noted earlier that the future benefits and costs of present and future projects may not be independent of each other. The benefits and costs of project A may depend

on whether project B is built. More generally, project benefits and costs depend on the size system assumed. If a large system is assumed, the same project may have significantly different benefits and costs than it would in a smaller system. This is especially true if demand (including land use shifts) is viewed as a function of facility supply. A prediction for future system size, however, depends to some degree on assumed future funding levels. Furthermore, because future projects are planned for specific regions, their benefits and costs depend on assuming the level of funding available to that region. This is tantamount to assuming the allocation itself. Thus there is an element of circular logic involved in allocations based on candidate programs.

Similar circularity also occurs in non-program-based allocation based on socioeconomic data. Should present or future data be used? If future data are used, these data could depend on the magnitude and distribution of public services, including transportation. Political allocation, because it must use analysis methods implied by other allocation processes, will also contain circularity.

Allocation calculations, then, must always assume a future and to some extent prejudge their own conclusions. This circularity is, of course, less serious the more society's growth and change can be taken as independent of the public service (in this case transportation) for which allocation is being performed.

In analyzing an allocation process, the planner should always ask what sort of future is being assumed. Is the future reasonable? It was noted earlier that California's State Highway Fund allocation assumes a very large future highway system.

If the allocation is based on candidate programs, one must also ask which projects are allowed in the candidate. Strictly speaking, allocation should consider only candidate programs capable of implementation in the next allocation period. But often they contain more.

The California State Highway Fund allocation is based on the total list of present deficiencies as calculated by the network flow model. This list presently contains so many projects that all present deficiencies could only be funded over several allocation periods. The assumption is that all the candidate projects will eventually be built. This is just another way of prejudging the future.

Basing allocation on near-term projects is complicated by the long project lead times characteristic of transportation. Candidate projects can only be built in the next period if planning activities have been funded in previous periods. And if allocation is to be periodic, allocation for the next period must include funds for the planning of projects in periods beyond the next one.

The obvious way to handle this problem is to view the planning phase of future facility development as a project in itself, which has some sort of payoff in benefit/cost or LOS in later allocation periods.

The notion of planning as a "project" in allocation becomes stronger if the planning activity does not presuppose a given facility but is a more general search for a transportation solution to a problem. A corridor study, for example, might not lead to any one particular facility, and thus the study's benefits are more difficult to see than those of that facility. But by aiding on some facility, the study makes a contribution to benefits or LOS in generalized terms.

In short, the logical reconciliation of candidate program-based allocation and long project lead times involves subdividing project development into phases that fit into single allocation periods.

FUTURE UNCERTAINTY AND COMMUNITY ACCEPTANCE

Allocation schemes should approach prediction of the future with caution precisely because it is so uncertain. There are large uncertainties in prediction of project benefits and costs and in forecasts of resources available. A particularly difficult form of uncertainty for allocation is community acceptance.

For consistency, an allocation based on candidate programs should be based on candidate projects acceptable to their communities. Judging community acceptance is difficult if not impossible if allocation is based on projects far in the future.

In the case of California's allocation, it is quite unlikely that some of the projects in

the candidate program will ever be built. This is because, as noted in the previous section, many of the projects used in allocation could not be implemented for several allocation periods due to resource constraints, and many probably bear no relationship to what will eventually be acceptable to communities.

Again, long-term project lead times complicate the task of basing allocation on more near-term projects that are more immediate to communities. But if project development is subdivided into project development phases, an allocation scheme more visible to communities might be achieved. Candidate programs for the next allocation period would consist of project development phases proposed for the next allocation period whose acceptance potential was high. Acceptance can best be judged by the success of planning in the current allocation period. For instance, if district programs under the present allocation contain corridor location and corridor study project development phases and if agreement with communities is reached on planning through corridor study, then the district may legitimately include the cost of the route location phase in its next candidate program for allocation. Similarly, if one allocation period achieves agreement on route location, the candidate program for the next period may contain the costs of right-of-way acquisition and even implementation. If programming uncertainties made it desirable to pursue two corridor studies, even though only one would eventually be carried to corridor agreement, the candidate program should contain both as valid expenditures.

ALLOCATION AND PLANNERS' OBJECTIVES

A major consideration in allocation process design is the effect a given allocation method will have on the day-to-day workings of regional agencies spending allocation resources in the field. In this regard, the major issue is whether or not allocation is based on a candidate program.

If allocation is based on a candidate program, regional agency personnel will tend to generate as large a candidate program as they can justify. But in order to remain consistent with their allocation, they are then under pressure actually to build the candidate projects or similar ones during the allocation period. Such pressure will be more intense the less flexibility there is to substitute projects for candidates, the further into the future the candidate program extends, and the less chance the agency has to test community acceptance in developing the candidate program. Even if a short-term candidate program is chosen and wide substitution flexibility allowed, the incentive is to build something. Regional agencies may pursue extensive community interaction activities, but such activities will not shift incentives if implementation consumes 80 to 90 percent of the budget. Planners operating under a candidate project-based allocation tend to be impatient with community resistance however altruistic their intentions might otherwise be. They become most impatient when communities simply obstruct all action because of disagreement on the very goal of implementing something. Such resistance is very different from opposition that planners can "buy off" through agreement to compensation programs or a more expensive project design.

If allocation is divorced from a candidate program, promotion and prestige at the regional level are not so closely linked to implementation. In the case of socioeconomic allocation, the regions merely have to spend their allocated resources somehow. Naturally, such an allocation results in less construction project per dollar of allocation and more process (e.g., community interaction, liaison). Allocation could result in a lot of planning activities but relatively fewer implementations. But those implementations that were agreed to would probably respect community needs in a more sensitive manner. Planners operating under non-candidate program-based allocation will be better able to handle community resistance to projects because the alternative of doing nothing does not threaten them.

If it can avoid or placate community resistance, a candidate project-based allocation will tend to deliver more system per dollar than non-candidate project-based allocation. It will also emphasize the system aspects of transportation more. Candidate program-based allocation results in an explicit "product" for resources committed by the state to transportation. This product is a given LOS distribution or a given benefit/cost

ratio at the margin. In allocation not based on candidate programs, public satisfaction with the process becomes part of the product. Process becomes itself an end, the process of carefully seeking out community transportation needs and satisfying them where agreement can be obtained. Because such agreement is most likely to be effective at local levels, non-candidate program-based allocation tends to de-emphasize the system aspects of transportation implementation.

Allocation, then, affects the bias of the system planning process toward a "product" or "process" orientation, depending on whether it is based on a candidate program or not. In the long run, this influence may be the most important issue in the choice of an allocation mechanism.

SUMMARY AND CONCLUSIONS

The allocation method used by a state highway agency periodically to divide its funds among state regions is a powerful determinant of the outputs and behavior of the planning process pursued by the agency. The allocation method heavily influences the location and size of projects that become candidates for planning and construction. It is also one of the places where the process must make assumptions about the future size of the system it will build and about the future acceptability of that system to communities.

Allocation schemes based solely on economic and technical analysis tend to obscure the fact that allocation is basically a political process and should provide an opportunity for the state and its region to negotiate their differences. An allocation that recognizes this is desirable if the system planning process as a whole is to incorporate community and environmental factors in planning.

The analysis of the allocation method used in allocation of the California State Highway Fund indicates that present allocation processes may be making uneconomic allocations and adopting assumptions about the future that are no longer very sound. It is time to review these process designs and adapt them to present demands and present visions of the future.

In doing this the problem of future uncertainty and the need to involve communities more deeply in transportation system planning must be emphasized. If allocation is based on candidate programs, these factors militate for an allocation method based primarily on candidate projects implementable in the next allocation period, for such an allocation makes the least restrictive assumptions on the future. The conflict between this objective and the long project lead times characteristic of transportation can only be resolved through the subdivision of project development into phases whose duration matches the allocation period of the process. Finally, increased emphasis on community interaction may require allocation methods based less on proposed regional candidate programs and more on socioeconomic data.

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