SOCIAL AND ENVIRONMENTAL IMPACTS OF THE BART SYSTEM: NEEDED RESEARCH

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The social impacts of BART is not a separate topic from, say, economic impacts or land use impacts but rather a different set of viewpoints for looking at many of the same phenomena. As we spell out these viewpoints, it will be clear that they particularly adhere to the central questions: Who gets served by BART? Hence, who benefits? Who is not served by BART? Hence who, indeed, bears the costs? Note that the viewpoints we propose start with all of the residents (and visitors) in the Bay Area and examine how BART impinges on them, their lives, and their desires to carry out various activities.

An important viewpoint influencing our approach to needed research is that the study of nonusers and infrequent or irregular users of BART is as important as the study of regular or heavy users of the system. A pivotal question is, What are the blockages to use (or to greater use) of BART? Also, What are discrepancies between the use that was envisioned by the designers of BART and the use that is actually being made of BART? Interestingly, such questions have various connotations: theoretical, public policy, and pragmatic—the last, perhaps, virtually akin to market research. They zero in on the importance of understanding why potential service is not used rather than of emphasizing the characteristics of trips that are made on the system (1).

Perhaps an even more central viewpoint providing a theme for our approach stresses the differentials in the relative use made of BART by different categories of persons in the Bay Area-categories judged to be socially significant. We would argue-and we develop this point further later-that, in terms of social impact of BART, understanding these differentials in usage may be more important than concentrating on aggregated, total, or average measures of usage. We suggest that it may be particularly important to know whether the relatively greater use is by the socially advantaged or by the socially disadvantaged segments of the population. Other differentials are also of very great importance, and we sense that these differentials are not commonly ferreted out and stressed as social impacts in the typical transportation study. It is also evident that BART will inevitably have very wide-reaching impacts on countless nonusers, or more accurately, on persons in their nonuser roles who also may or may not be users of the system.

We shall now expand these main points, and we shall then suggest examples of possible research that would seem promising. Our interest is in encouraging research that will monitor the early and evolving operations of BART in the spirit of providing inputs for possible policy and administrative modifications in the system. There is little point to research for research's sake; we urgently need research that will further the improvement of service to BART's users and potential users.

DISTRIBUTIONAL IMPACTS OF BART

A focus on differential usage or impact paves the way for analysis of the actual distributional impacts of BART and for possible review of public policy setting forth intended distributional impacts (2). These types of questions follow:

1. What benefits do persons in various social categories receive from BART? Usage, perhaps preferably expressed as a rate of use, i.e., actual users as numerator and potential users as denominator, is one direct measure. There are other less direct measures, e.g., store owners, employers, or property owners may receive benefits, often indirect. 2. What costs are borne by persons in these various categories? These may be direct monetary costs, taxation, or user charges; or they may be social costs borne by those who are relocated or adversely affected by the proximity of the BART route.

3. What is or should be the public policy regarding the direct or indirect distributional effects of BART? With changing times, we are witnessing possible shifts in the public priorities as to the social categories of persons to be served. We can readily envisage further shifts in the future. Such public policy deserves to be openly aired. If subsidies are intended, are they getting through to those for whom they were intended? Or do the benefits flow, rather, to those who do not need to be subsidized?

The social categories employed will have to be carefully thought out, and heuristic criteria employed in their selection. If emphasis is to be placed on disadvantaged persons, categories must be employed that offer operational definitions of disadvantage. Examples of social categories of persons are age and sex, income, occupation, place of residence, homeowner or renter, employment, place of work, student or nonstudent, ethnic status (whether member of minority group), automobile accessibility, and other special conditions affecting or limiting access to transportation facilities. Characteristically, the most significant social categories may represent combinations or cross classifications of these categories (e.g., persons of older age and low income; persons of low income and of ethnic minority and, possibly, residing in a ghetto district of a central city). Other categories, perhaps relating more properly to the trip than to the person taking the trip, include usual trip length, degree of familiarity with the BART system, and times of day when trips are usually made. Such breakdowns aid in differentiating types of users and trips.

IMPACTS ON USERS AND NONUSERS

Certainly a major dichotomy is between user and nonuser of the BART system. This is viewed as a distinction between social roles. A particular person may conceivably occupy both roles, e.g., as periodic rider on the system and as homeowner or store manager in locations near the system.

User

All individuals are potentially users of the system. Some may never actually use the system but remain potential users, and the concern of impact research is then with why they do not use it. Some may be essentially excluded from the start as being outside the range of the system, but they may, nonetheless, occasionally use BART. Other individuals may use the system for certain purposes, e.g., for recreation trips only or for work trips only. Others may be heavy users who make trips for multiple purposes. Thus, actual usage is distributed in some way over the population, and the zero-users are simply at one end. Rates of usage and changes in rates or levels of usage include as backdrop or base all individuals or, more precisely, all individuals of the social category being examined. Within the user category are the following:

1. Captive or dependent users who have no alternative access to an automobile; i.e., there is no automobile in the household, an automobile but needed and used by other members, no license to drive, physical infirmity. Demand by such users may in part be latent, for, not having ready access to transportation, they may have grown accustomed to not using transportation.

2. Marginal users and nonusers who would be gained or lost by the system depending on marginal changes in the system or possible changes in users' resources or situation. Marginality may involve different parameters: price and ability to pay, speed and time constraints, comfort, and the like. Much may depend on the feeder systems at one or both ends of the BART trip.

3. Optional users who have access to an automobile or other transit mode but may select BART some or most of the time. This may be selective by type of trip, e.g., only for the trip to work.

Nonuser

Virtually all individuals are affected by the BART system quite apart from being actual or potential riders on BART trains. We suggest some of the following types of nonusers:

1. Property owner whose property may gain or lose in value or be otherwise affected and who must pay property taxes for support of BART.

2. Resident whose home or neighborhood is affected by proximity to a BART line.

3. Person in business, manufacturing, or service activity in which the activity is affected by proximity to a BART line.

4. Persons in or moving about the city for whom the physical presence of BART lines, stations, trains, and equipment constitute a part of the urban environment.

SUBSTITUTION AND INCOME EFFECTS

Conceptually, impacts on the activity patterns of users can be separated into 2 kinds.

1. Substitution-changes that result in substituting BART, because BART offers a relative price change, for some other transportation activity, such as decreasing automobile usage and increasing transit usage, or some nontransportation activity, such as using BART to attend games at Candlestick Park and having fewer backyard barbeques.

2. Income effect—changes that result in increased personal resources to spend and consequently lead to more activity; e.g., using BART leaves people with more time or money that becomes available for other things. This could lead to (a) new trips on BART neither previously possible nor thought of; (b) new opportunities that increase total income and lead to increased use of transit or transportation in general; and (c) new nontransportation activities generated as a result of increased actual budget or increased residual budget because BART has made the transportation budget smaller.

POSSIBLE STUDY DESIGNS TO BE CONSIDERED

We now suggest ideas for research on the social impact of BART. These vary, proposal by proposal, in relative balance as between substantive focus and methodology. Greater stress is placed on methodology by the first three than by the remaining ten. Some of the proposals toward the end of the list verge toward rather precise topics and might be absorbed into larger projects.

1. In-depth longitudinal study of persons representing both user and nonuser blocs and representing a range of social characteristics. If possible, a before-and-after design would have advantages. A comparison of informants who do use BART with those who rely entirely on the automobile would also be desirable. This study would seek to make a comparative assessment of the many ways in which the quality of people's urban life is affected by the BART system. There have been many claims for and against transit systems. In the Bay Area we will have a chance to compare transit and automobile systems that are in equally good condition. Such a study could, over time, focus on the changing life space of a system user, his evolving activity patterns, his perception of the system, and his attitudes toward the system. Main emphasis could be on the transit system, but attention would need to be paid in a comparative sense to users of the highway system. The study should determine whether the new transit system expands the life space of most inhabitants or whether it contracts it. How are the travel patterns affected? Do people travel farther and more often? For what purposes do they travel, other than commuting? Is transit used on weekends? Does using transit force users into more rigid and routine patterns? Or into greater flexibility in travel patterns? How does its impact on persons of lower income compare with that on more affluent users? How do users and nonusers learn about the system? What are their images of the system? Does use of the transit system affect users' comprehension of the larger city? (There is some evidence that transit travelers find it difficult to piece together a ready comprehension of the larger city.) What will travelers see as the effective environment of the transit system? Will they be more concerned with vehicular design or with stations? Where will the points of high attention and vulnerability to

failure be from the users' viewpoints (3)? Will BART travelers come into more or less contact with members of other social groups, with accidents, and with the natural environment than those who travel by automobile?

2. Sample survey of all households, perhaps with a sample design featuring oversampling of certain disadvantaged households, aiming to reach actual and potential users of transit. The main spirit of such a survey might probe why BART is not used, if that is the case, or how BART works out in use, if in fact the informant does use it. If BART is not used, what are the blockages that seem to stand between potential users and effective use? Questioning should be directed not only at trips made by other modes of transportation but also at trips that the informant would like to be able to make but finds he cannot. A careful investigation into the types of people who use and do not use BART could be very useful. Apart from the usual social categories of class, income, and the like mentioned earlier, determinations by survey means of general environmental dispositions might show whether, for example, urban or rural dispositions or security seekers were the more frequent users of the system (4).

Because good survey research is expensive, it would be desirable to tie such a survey with other ongoing surveys to take advantage of sample designs already developed. Perhaps this could be through the Regional Transportation Planning Committee, or perhaps through an organization like the Survey Research Center, which is on this campus, that is seeking to develop a continuing Bay Area sample survey. In addition to a single broad survey, a continuing series of interviews through a panel approach would have clear advantages. Such a panel might approach the spirit of study 1, already suggested, or it might emphasize the repeated use of similar questions so as to monitor reactions over time. The character and completeness of the system, including the ties with feeder lines, would be expected to evolve gradually, people's knowledge of the system will grow with time, and use of the system may grow or change.

3. Longitudinal studies featuring statistical indicators and empirical data on trips. These may range from macro-analytic to micro-analytic. Macro-analytic studies could follow BART statistics through time and compare them with other indicators to determine, for example, to what extent demand follows supply and vice versa, or how relative shares of usage among user groups shift over time. Micro-analytic studies might follow individuals through the system from the time they leave their places of origin until they reach their destinations. Comparable trips by other travel modes may also be studied to see where BART's advantages and disadvantages are with respect to client groups. These studies may show where feeder systems are unsatisfactory, where particularly irritating or uncomfortable events may occur such as excessive waiting time and real or imagined opportunities for crime, and where individuals fail to receive efficient service from the system either because of their own ignorance or because of weaknesses in the system.

4. A study of reverse commuting and of trips in directions other than the main inward commuting trips to the main centers of San Francisco and Oakland. Particular emphasis could be directed to the problems of getting to destinations beyond ready walking distance from outer BART stations where regular inward commuters can park or to which they can be driven. How do outward-trip passengers get service in suburban lowdensity districts? There are land-use impact aspects of such a study as well. The original rationale for the BART system was to foster the development of strong, compact centers near those BART stations deliberately located in these centers. A very large question is whether this is occurring and whether an appreciable number of destinations are thus brought within ready walking distance or otherwise conveniently available.

5. A study of the service provided for persons in low-income households. How effectively does BART serve low-income residents and, particularly, the residents of ghetto districts? According to Kain and Meyer (5):

Many proposed new systems, such as the BART system in San Francisco and the transit extensions in Boston, will provide only nominal benefits for the poor In fact, it is probable that both systems will have a highly regressive impact. They are to be subsidized out of the property tax, which is heavily regressive, and virtually all of the benefits will accrue to high-income, longdistance commuters traveling between high-income suburbs and central employment centers. They will do practically nothing to improve accessibility between centrally located ghettos and suburban employment centers.

This undoubtedly also opens up the whole question of the services provided by the main local transit systems. It is unreasonable to assume that BART, as an intercity express system, will by itself rectify inherent weaknesses in local systems. But it is important to see how the total transit system is used and viewed by low-income residents. Either this study or a separate study should also focus on older persons, many of whom are also struggling to get along on very low incomes. How do they make out in their travel? How does the transit system work for them? What blockages remain to satisfactory service through reliance on transit?

We recognize that related to the questions of services for low-income households and questions of subsidy are questions relating to the various forms that subsidy or redistribution can take. Redistribution may be brought about by the form of tax support employed or by the character of the fare structure. Service for lower income persons, if judged politically desirable, raises significant questions as to the manner in which this is accomplished and the character of the accounting. To what degree is it reasonable to expect that BART will itself provide subsidies? To what degree should BART be maintained on a basis of breaking even financially and the subsidies come to the lower income population through forms of income maintenance, negative income tax, or other devices? We do not know or suggest the answer; research is needed to resolve this question. But we are convinced that, by whatever appropriate means, good service to lower income persons should be a public concern with a very high priority.

6. A study of the ties between BART and feeder transit systems. [The degree of coordination that will be achieved is yet to be determined. Selected proposals are presented in a northern California transit demonstration project (6).] Clearly, this is implicit in other studies being proposed. A specific focus on this topic might encourage, and take advantage of, deliberate experiments that should be conducted cooperatively by BART and others of the transit systems. Such experiments could then be carefully observed and reported. These experiments could take a variety of forms: fares and transfer privileges, ticket taking, scheduling and routing of feeder buses, and internal physical arrangements of terminals or transfer points. A study of the effectiveness of the information output might also be possible. Suppose a person travels on BART for some distance and needs to get on to the right bus or buses on leaving the BART train. How is he informed about the larger system beyond BART? How does he know which BART stop he might best use? How is he told the possible connections that he can make at each BART stop? Take the opposite situation. How does a person some distance from the BART line know how best to get to a BART station? How does he know for sure that he should, in fact, be heading to a BART station? (See also study 10.)

7. A study of BART terminals and their operation. Here observational studies could be helpful. What do people do? How do they get along? What problems do they have? How do they obtain information or directions? Observations, questioning, or other methods must be used to determine whether people find their waiting period and their use of the terminal pleasant experiences. It will be important to know, conversely, what the unpleasant features may be. How safe do they find or think the terminal to be? How clean? How convenient is the access to shops and other services that may logically be associated with terminals? (This will probably take us, in most cases, to the outer development adjacent to or near the terminal.)

How well does the terminal work as a point of transfer? Various permutations of the transfer matrix can be conceived. How do signs and information-output devices work? What do the terminals communicate through their architecture, maintenance, or the social symbolism of the tone and mix of persons likely to be waiting or present? In what ways do terminals provide important social-status clues as to the nature of the system's clientele? The large number of terminals in the system offer marvelous opportunities for comparative studies. The objectives and predictions of those architects, engineers, and designers as to how the terminals would be used can serve as an important backdrop; these could then be reexamined in the light of subsequent studies of actual use. 8. The direct effects of the BART system on the natural ecology of the Bay Area. Within the next few years, a comprehensive survey of the Bay Area's natural environment will likely be mounted. The direct and indirect effects of the BART system on the natural environment—on flooding, landslides, vegetation, wildlife, climate, pollution patterns, and visual amenity of the surrounding country—could be monitored. So, too, could the environmental effects of the development that is bound to occur around BART terminals. If any stations are located in fragile natural environments, these effects could be serious.

9. The careful study of various features associated with actual use of BART. We have in mind such features as flexibility in taking or altering trips, accommodations for groups traveling together or for persons carrying packages, and personal conduct and helpfulness of BART personnel. Automobile use coupled with walking provides very great flexibility. We need to understand how BART and the associated transit systems score in offering equivalent flexibility. Can people make out reasonably well in embarking on trips impulsively or casually (rather than deliberately waiting for scheduled vehicles)? Can people make unanticipated stops or alter their intended trip pattern? Can they conveniently and economically break their overall trip into several legs rather than a simple to-and-from pair of trip legs? Clearly, these questions touch on a number of features of the transit system: its overall completeness, its fare patterns, its interchange points, and its frequency and reliability of service.

The automobile accommodates groups of persons with a considerable sense of privacy; it is like a moving room. How do pairs or groups of riders get accommodated on transit vehicles? Is there some semblance of privacy for conversation, hand-holding, or pleasant association? Are compartments possible? An advantage? A danger? (We think of the compartments of European-type trains, for example.) How do people handle packages, suitcases, briefcases, toolboxes, or other bulky items on BART trains? Many of these are, of course, the very items that are so conveniently carried by private automobile. What do people do with their time while traveling on BART? Is time used more productively in a BART train than in a private automobile? What are the psychological gains or losses as compared with driving or riding as a passenger in an automobile? Are there advantages to transit riding that compensate for the possible satisfaction that the driver of an automobile can have in his sense of mastery and of decision?

10. A focused study of the information materials and symbols employed by BART. These include signs, maps, schedules, direction markers, instructions about fare payment, and the like. This study should include all the symbols employed in communicating how the system works and how people find their way around in the system. What images of the overall system layout and its connections with feeder systems are provided? What images of the metropolitan area or of large sections? Can the system be reasonably self-explanatory and essentially foolproof? Or does it depend heavily on explanations by persons? What, too, of the interpersonal contacts between system users and representatives of BART? Are personal representatives available to provide information or reassurance? (One thinks of the countless times airport users take advantage of strategically placed airline representatives to ask questions that the sophisticated and accustomed user may think quite unneeded.) Indeed, in a very highly bureaucratized urban world, BART may appear to be just another bureaucracy: unresponsive, relentlessly impersonal, coldly uncaring. How can the traveler be encouraged to think that there can be some responsiveness to complaints or suggestions? How can the traveler receive some reassurance about a direction that he thought he knew but about which he was not certain? We hear that older people, even though still driving, may hesitate to venture onto a complex metropolitan freeway system. Is it possible that they might hesitate to venture onto BART?

The single act by the London underground system of providing a highly simplified and diagrammatic route contributed immeasurably to an imageable understanding of how to find one's way around London. Reassurance that one knew how to proceed was buttressed by the provision of large diagrams within the cars on which one could trace one's position according to the stops, also well marked. Are there corresponding, simplifying diagrammatic maps of the BART system and clear supplementary diagrams of the other transit systems? Are there attractive guidebooks that show users how they can get to the downtown air terminal, the city hall, the art museum, the sports stadium? 11. A study of the connections between BART and major transportation terminals such as airports, out-of-town bus depots, railroad stations, heliports, and ship or ferry terminals. Here we suggest the study of the connections between the internal Bay Area transit system (BART plus integrated transit systems) and various other systems for long-distance or intermetropolitan travel. Airport and heliport usage comprises special but highly significant trip destinations and origins that deserve full study. The potentials for alleviating parking problems at the airports and for providing convenient, fast service, especially for persons who do not necessarily know the ins and outs of the freeway system, are great. The service must provide assurance of reliable service, including service at off hours; the person arriving at the airport could expect service round-the-clock.

12. The study of trips for other than work, shopping, or school. This could include uses made of BART for getting to leisure-time activities—sporting events, cultural affairs, or places to be visited. Weekend and holiday usage might be especially studied. Such analysis would help to determine the ways in which BART succeeds, or fails to succeed, in providing convenient transportation for other than workday, peak-hour usage. A variant of such study would be to determine the degree to which traveling by BART trains might be undertaken partly for the trip as such. Certainly, people go out riding in an automobile partly or wholly for the ride, perhaps combining stops but possibly making stops that were selected after being under way rather than as predetermined destinations. Would BART provide any of this function? This would be an interesting test of the pleasantness of the ride. (One may note that London buses may be taken because of the marvelous views they provide; but one would seldom take the underground, while it is traveling underground, just for the ride.) Will it prove disappointing to some travelers or tourists that the trans-Bay trip is below the Bay? What will prove to be the most scenic parts of the system to take for the ride?

13. A study of the designers of the system. Finally we propose a study of the attitudes and perceptions of the engineers, the architects, the landscape architects, the planners, and the other professionals responsible for developing the BART system as it has emerged. The point would be to identify their perceptions of the system to be provided, the future users, and the environment. It would be important to learn how they went about predicting user behavior and how they proceeded to simulate the future system in their design planning. It would be possible to assess the accuracy of these predictions by means of post-construction and operating comparisons; this could be an extremely useful aid to the designers of future systems. Little is known of the psychological makeup and disposition of environmental decision-makers, yet the one thing that emerges from the few studies to date is that their perceptions of the environment differ from those of the ultimate users (7).

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