

## **ETHICAL ISSUES IN TRANSPORTATION**

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Ethics is a discipline dealing with the set of rules, principles, and beliefs used to judge the value of human actions. Ethics are relevant in the transportation sector because of the diversity and the social relevance of its effects, both positive and negative. Normative assessments of transportation plans and policies invoked by policy-makers, researchers, and activists often use concepts such as equality, equity, fairness, and justice, which are informed by ethical views. Despite the increased interest in these issues in policy debates and research, there are few examples of actual attempts to explicitly address them in transport planning.

This entry presents contemporary perspectives around ethical question in transportation, including social understandings of accessibility, risk, and environmental effects, as well as a review of transportation project evaluation methods and the implications of ethics for policymakers, researchers, and individuals and companies making decisions in the transportation market.

### **Transportation's Positive Effects**

The purpose of transportation is to move people or objects from one place to another. Although in theory transportation systems enhance people's physical mobility, the design of the infrastructure may fail to address the specific needs of individuals who already face limitations to their physical mobility, such as the elderly and disabled people. If one accepts the propositions that all individuals have a right to mobility and that the individuals more vulnerable to losses of mobility should be given special attention, then society has the moral responsibility to meet the needs to these individuals.

Addressing these needs presupposes the implementation of proactive strategies to remove the barriers individuals face in accessing the transportation network, such as the introduction of buses without steps or the redesign of the street network to meet the limitations of elderly or disabled pedestrians. It can also involve measures of positive discrimination at the level of spatial planning, such as the attachment of priority status to the provision of public transportation in areas with high proportions of elderly people.

A broader view would also consider factors that prevent individuals from fully realizing the mobility potential offered by the transportation system. For economic reasons, young people and low-income or unemployed individuals may have limited access to private vehicles and are more vulnerable to increases in the costs of public transportation. Social and cultural aspects add to these factors to place other groups, such as women and ethnic minorities, at a potential disadvantage in the use of the transportation system.

The disadvantage of some groups may also have a geographic dimension, if they face limitations in the access of specific destinations such as jobs, schools, and facilities such as hospitals, parks, or food shops. Research shows that the processes of suburbanization and decentralization of jobs in many cities in North America and Australia and in some European cities have in many cases created a "spatial mismatch" between the places and residence and work of low-income groups and racial minorities. The problem is compounded by lack of

access to private vehicles and, in some cases, by the relatively low levels of provision of public transport in the areas where these groups are more concentrated. In most industrialized countries, the concentration of jobs and facilities in medium-sized towns and the closure of facilities in smaller towns and villages have also led to accessibility problems in rural areas, contributing to the isolation of the population in these places.

Disadvantages in accessibility levels depend not only on public policies in the transportation and other sectors but also on the decisions of individuals and companies (including transportation providers) in the free market. However, the problem is socially and politically relevant because unfulfilled mobility may contribute to the social exclusion of some individuals. This is because transportation fails to allow individuals to participate in activities and access goods, services, and opportunities, with potential effects on their income, education and employment prospects, health condition, levels of social interaction, and overall life satisfaction. Once one considers exclusion as a social problem, then a need arises to consider the role of transportation in solving it. Policy makers and researchers have given more attention to the relationship between transportation and social inclusion in recent years and emphasized the relevance of providing transportation and removing barriers that limit the use of the system by some groups.

The recognition of society's moral responsibility to ensure the inclusion of all individuals can be justified with the fact that social exclusion is linked to wider problems, such as unemployment and social unrest. The problem can also be understood in terms of concepts of equity or social justice. For example, John Rawls's theory of justice emphasizes the need for society to provide all individuals with a minimum level of a set of "primary" or essential goods, in which we can include mobility and accessibility.

The concept can also be covered by Amartya Sen's theory of justice, which focuses on individual capabilities to use primary goods to derive welfare. In the cases where a specific group is systematically at disadvantage in many regions, across time or as a result of several projects, the issue can also be framed in terms of the value of non-discrimination. In fact, in the United States, activists and grassroots movements often use the term *transportation racism* to draw attention to the failure of the transportation system to meet the needs of racial minorities.

Social differences in mobility and accessibility levels can also be understood as "goods" that are distributed by society, distribution that is partly determined by policy makers. Theories of distributive justice or equity that are often used in economics can be applied to judge the distributive outcomes of the transportation system. Although these theories tend to include a concept of equality, they are better described as justifications for departing from equality. A usual distinction is that between horizontal and vertical equity. In the case of transportation, the application of principles of horizontal equity compares the distribution of mobility and accessibility across individuals judged to be comparable, while the application of principles of vertical equity would give higher priority to the individuals judged to be at a disadvantage.

### **Transportation's Negative Effects**

The outcomes of planning and policies in the transportation system can also be judged in terms of the level and the distribution of their negative effects. An important effect regards the negative environmental effects on the neighborhoods crossed by transport infrastructure, especially in the sections with high traffic levels, which are associated with high levels of air pollution and noise. The exposure to these impacts poses significant health risks for the population exposed.

The issue is often discussed using the concept of environmental justice. One interpretation of this concept is that there is a universal right to a clean local environment. In fact, like mobility and accessibility, environmental quality can be assigned the "primary" good status proposed in Rawls's theory of justice. A possible way to translate this principle into transportation policies is to focus on "socially unacceptable" levels of transport pollution and noise. Justice would then be achieved through the definition of regulations or through the allocation of resources that ensure that those levels are maintained.

Examples are zone standards for pollution concentrations in each area or emission standards for vehicles. The definition of these standards is theoretically related to the effects of pollution on human health, but in practice, they vary across countries, showing that there are relevant contextual (often political) factors in their interpretation.

An alternative perspective on environmental justice is the identification of cases of unbalanced distribution of environmental effects. Research in a large number of cities in North America and Europe has shown that low-income and racial minority communities tend to be disproportionately exposed to these effects. Grassroots activists and environmental organizations often justify the relevance of these patterns with the principle that the social distribution of environmental quality should not be detrimental to groups that are already at disadvantage in terms of the distribution of other resources, usually income or political power. This concept has been given increased political attention and has crawled into legislation in some countries. For example, in the United States, Executive Order 12898 outlines the actions to address environmental effects of public policies on low-income groups and racial minorities. Despite these initiatives, the issue remains subject of intensive discussion among politicians, researchers, and activists, especially regarding the question of whether rights and distributive justice should refer to individuals only or to groups of individuals defined by ethnic or socioeconomic attributes.

At a wider level, transport pollution can also undermine long-term environmental sustainability and have consequences on the welfare of future generations. Motorized transportation contributes to the emission of carbon dioxide (CO<sub>2</sub>), which is linked to climate changes such as global warming. Most transportation modes also contribute to the depletion of nonrenewable resources such as fossil fuel, while the use of biofuels has costs of opportunity in terms of resources diverted from food production. As the negative environmental effects are shifted into the future, issues of intergenerational justice arise. An often-used principle to approach this kind of problems is that future generations are vulnerable to the actions of the current generation and so the latter are morally responsible for irreversible environmental effects affecting the former. However, this general principle leaves many open questions, such as how far into the future should one be concerned about and whether and how to consider uncertainty over future developments that may revert current processes of environmental deterioration

The problem becomes more complex if we consider that developed countries are currently responsible for a disproportionate proportion of greenhouse gas emissions while the most severe effects of global warming are likely to occur in developing countries, due to their geographic location in more vulnerable areas of the globe. Questions of international justice also arise in relation to current levels of pollution, as some pollutants are dispersed in the atmosphere and may cross state and country borders. Arguments of environmental justice made at the level of individuals can therefore apply when looking at countries and are often summoned in negotiations of international environmental agreements.

The transportation system also has impacts on nonhuman beings. Land and water transportation disrupts wildlife and destroys habitats, and the short-term effects of air pollution and the long term effects of global warming also affect biodiversity. Whether these impacts are morally relevant depends on one's understanding of whether nonhuman beings

have moral status and whether the assignment of this status can override considerations of human welfare.

## **Safety Issues**

Ethical issues also come into play when addressing accident risks. Society usually imposes safety regulations concerning vehicles, passengers, and passengers' use of vehicles. These regulations address the well-being of society in general, through the minimization of the number and gravity of accidents. Some of the regulations, such as the use of safety belt, can, however, be regarded as paternalistic, as society imposes behavior to protect individuals from risks that are not shared with the rest of society, although even in this case, regulations can be justified in terms of the rationalization of emergency and public health resources.

In the context of population aging in most developed countries, another important issue is whether society should promote or restrict driving by individuals of advanced age. The resolution of this question needs to balance competing societal objectives. Elderly drivers have a higher probability than average of being involved in accidents and are more vulnerable in the case of accident. On the other hand, the ability to drive is a crucial factor for independent mobility, life satisfaction, and overall well-being in this age group. The imposition of regulations on driving license renewal and the mandatory screening and assessment of older drivers are therefore controversial measures.

The ethical aspects of transportation safety become more relevant when accident risks are not evenly distributed across society. For example, children and the elderly tend to be more vulnerable to pedestrian accidents. The concept of "justice as care" can be applied to defend that society should give priority to the protection of individuals in these age groups. In addition, empirical research suggests that the spatial distribution of pedestrian risk is also uneven and that individuals in low-income or racial minority communities tend to be disproportionately exposed to risk, due to higher traffic levels in these communities or to higher exposure times. The moral assessment of this pattern shares the same problems as the assessment of the distribution of other positive and negative impacts of transportation, especially the question of whether the racial and socioeconomic characteristics of the victims are morally relevant or if society should focus solely on the minimization of overall risk.

## **Public Intervention**

Governments in most countries have some type of intervention in the transportation sector. At a broad level, this intervention needs to consider a balance between different societal objectives, such as economic efficiency, social justice and environmental sustainability. At the level of each policy, there are also trade-offs among the welfare of users and non-users of the system, among different types of users, and among different types of nonusers.

Competing ethical principles may apply in the resolution of these conflicts. These principles are not necessarily universal, as each society has different concerns at each moment in time. There are also different ways to frame the objective of social justice in public policies. For example, adopting consequential views, the achievement of justice relies on the judgment of policy outcomes, while applying procedural views of justice implies the fairness of the decision-making processes leading to the definition of policies.

Conflicts may arise in the allocation of investment in the transportation system in different regions. The concept of territorial justice is often applied in these cases. This concept may be supported by economic arguments but also by the moral responsibility of governments to promote regional cohesion and correct for imbalances in variables such as economic or

demographic vitality of each region, given the crucial role played by transportation investment in the determination of these variables.

Further ethical issues arise in decisions about the construction of new transportation infrastructure. The choice of investment on private versus public transportation or of motorized versus nonmotorized transportation depends not only on economic principles but also on the governments' normative assessment on the relative merits of different types of mobility and on the priority that should be attached to the needs of different type of users. Conflicts may be resolved by promoting policies addressing multiple social objectives. For example, the provision of infrastructure for walking and cycling, such as urban trail systems, can address accessibility and environmental issues simultaneously. At the level of each project, other subjective questions are whether, how, and how much to compensate the individuals affected by the negative effects, including expropriations and safety and environmental effects.

The policies to address accessibility problems affecting some groups or areas may also be questioned on moral grounds, when they collide with other societal objectives. The provision of public transportation and transport subsidies has effects in terms of the use and distribution of public resources, depending on the way such programs are financed. The provision of bus services in areas with low demand may also clash with the objective of environmental sustainability, as buses running with few passengers are responsible for a relatively high level of pollutant emissions per passenger.

The issue is also relevant in the case of traffic policies. Measures such as road pricing and traffic restriction are often applied with the objective of reducing safety and environmental effects in the areas of concern. However, this is only achieved by limiting the mobility of car users. It can be argued that these limitations violate their right or freedom of movement. The methods used to implement certain policies such as road pricing may also be questioned regarding their intrusion on road users' privacy. The rights of road users then clash with the rights of mobility and safety of pedestrians and cyclists and with the rights of safety and environmental quality of the residents in the areas where traffic decreases following the application of policies. This dilemma is resolved in practice by the application of principles regulating the allocation of space among different users and the regulation of the circulation of some users in some areas.

Traffic policies also have efficiency and distributional dimensions, as they imply the use and redistribution of resources. Traffic restriction policies reduce accessibility of both individuals and freight transportation and cause congestion. In some contexts, the people at disadvantage in terms of mobility and accessibility may be disproportionately affected. Regulations on traffic speed also imply a trade-off between safety benefits and time losses. Economic methods such as taxes have further distributional implications, depending on the base on which the tax is applied (ownership or use of private vehicles, distance travelled, or level of emissions). The revenues of the system may or may not be applied to improvements of the transportation system.

Regardless of the philosophical standings used to judge the desirability of public interventions, one should consider that policy makers are not a neutral apparatus applying policies to achieve the maximum social good. Controversial policies, such as policies with important distributional effects, may not have sociopolitical feasibility. The identification of fairness in policy outcomes and decision-making processes are important factors determining people's acceptability of these policies, and the need for public participation is increasingly called upon, especially in projects affect social exclusion. There are also questions regarding the legitimacy of applying paternalistic policies that go against society's preferences. This can be the case of anticar policies, which yield environmental benefits that may not be recognized

or valued by people. It may also be the case of policies subsidizing public transportation, as they represent a choice made by public planners on the set of choices faced by individuals.

Finally, policies are designed and applied by politicians and may reflect the ideology of their political party or be influenced by influential individuals or groups, leading to biased decisions. Powerful lobbies such as car manufacturers may influence decisions on traffic restriction policies. Different levels of political mobilization among the groups sharing the benefits and costs of transportation projects may also influence the type and characteristics of these projects. For example road alignments and the location of railways stations may be determined by political support or protest faced by policy makers in the affected areas.

## **Project Assessment and Evaluation**

The inclusion of explicit ethical principles in the assessment and evaluation of transportation projects is usually limited to the acknowledgement of distributional concerns. In the United States, the Transportation Equity Act for the 21st century (TEA-21) recognizes distributional impacts as required factors to assess regional transportation plans. A range of developed countries, such as England and Japan, have also attempted to include these concerns in their national transportation evaluation frameworks. Nevertheless, little consensus exist on the integration of the necessarily abstract and subjective principles of equity into current methods of evaluation, which are based on rigorous economic principles and methods.

Cost Benefit Analysis (CBA) is by far the most frequently used method to evaluate transportation projects. This method is built around the hypothesis that a project should maximize total welfare across society. At its most simple, the benefits and costs of a project or policy are given monetary values, summed, and then compared. If the aggregate benefits exceed aggregate costs, the project is identified as having social worth and, in theory, should be implemented. The rationale for this formula relies on the principle stated by economists Nicholas Kaldor and John Hicks, which states that an outcome (such as the set of effects of a transport project) is desirable if the people who are made better off are able to potentially compensate the people who are worse off and still be better off. In practice, the final decisions over the implementation of the project are political and the results of CBA are treated as an indicator of the economic efficiency of the project, which is balanced against other social objectives.

As many of the effects of transport projects and policies are intangible, the application of CBA in this field relies on a series of well-developed methods to derive their monetary values. These methods are based on economic theory and intend to capture people's preferences, measured as willingness to pay or accept marginal units of the physical units of the effects of the project (such as, for example, minutes of travel time, percent probability of accident risk, or noise decibels). Preferences can be estimated by using surveys (stated preference methods) or by looking at the prices of goods and services related to the effects and assuming that they reveal people's preferences over these effects (for example, looking at differentials in rents or house prices to value differentials in noise levels).

Despite its widespread use, CBA suffers from several weaknesses, identified in a large number of academic studies. Part of the criticism of the method revolves around the absence of links with ethical concerns. The argument is that any evaluation method incorporates judgment values, which should be made explicit. The focus on CBA on welfare maximization and people's preference reduces the normative assessment of projects to the principle of utilitarianism developed in the 19th century by Jeremy Bentham and John Stuart Mill. Economists have more recently studied possibilities of addressing other principles of distribute justice within the framework provided by CBA, for example, by attaching weights

to the effects of the project on different social groups, but the use of these methods in actual project evaluation is still limited.

The necessity of translating all effects in monetary value has also attracted a fair deal of criticism. The assignment of a value to the increase of health and environmental risks and to lives saved and lost (usually measured as "statistical lives") is a sensitive issue. In addition, willingness to pay depends not only on individual preferences but also on ability to pay and so the values assigned to the benefits and costs of a project are biased towards the preferences of individuals of higher income.

The reliance on the estimation of people's preferences may fail to address ethical concerns even when these preferences are not measured in monetary terms. Philosophers such as Jon Elster have drawn attention to the concept of "adaptive preferences", that is, preferences that are determined by context. This concept is relevant in the transportation field, as there is evidence that disadvantage groups may not recognize their disadvantage in terms of mobility and accessibility or the degree to which they are exposed to transport pollution.

Issues of intergenerational equity are also not made explicit in CBA. Benefits and costs occurring in the future are usually discounted by calculating their net present value, but the definition of the methods and parameters used in this procedure are far from being consensual.

In order to overcome the limitations of CBA methods to address equity concerns, alternative approaches have been developed, of which the most important is multi-criteria analysis (MCA). This method is based on the definition of a set of indicators in the assessment that are combined by a structured set of weights measuring society's preferences. The indicators are not necessarily measured in the same unit. This approach has the potential of including diverse ethical concerns in project assessment, although this may also be regarded as a weakness, given the subjectivity in the determination of weights.

The use of MCA has been growing in recent years, especially in the assessment of large-scale transport projects. The combination of CBA and MCA methods within the same evaluation framework has also produced encouraging results, such as in the case of the planning of the trans-European transport network (TEN-T).

At the level of measurement of benefits and costs, there is also growing academic research on methods that surpass the need for monetization and attempt to measure the "value of use" of effects such as mobility and accessibility. As with other approaches capturing ethical concerns, the main limitation to these methods is the high degree of subjectivity and perhaps paternalism in their application.

## **Ethics in Transportation Research**

Ethical issues are also relevant at the level of research conducted by academics and consultants. An important aspect regards the independence and impartiality of the studies, as researchers may be influenced by the institutions commissioning projects or awarding funding. Codes of conduct are common in academic research and are especially important in the case of transportation research. Transportation projects are expensive infrastructures with large and far-reaching effects. The resolution of dilemmas over the redistribution of resources and welfare linked to these projects is informed by the results of research. Therefore, a degree of moral responsibility for the consequences of the project lies with researchers, who may face personal dilemmas over which methods to use and which results to report. The common good, the interests of the commissioners of the research project, and the researcher's own ethical views may differ.

The role of ethics comes into play at the stages of both data collection and analysis. This may involve the decisions regarding the object of analysis, for example, individuals at risk of

social exclusion tend to be underrepresented in surveys and interviews. Ethical presuppositions are also unavoidable in the choices of the scenarios studied and the variables used in the assessments of benefits and costs, as researchers may feel pressured to obtain and report optimistic results. This may lead to biased estimates for the project's demand or to a discrepancy between forecasts and actual costs. The selection of which external costs to include in the analysis and of the methods to measure the level and distribution of those costs are also subjective decisions. The models generally used in transportation research also have implicit assumptions, as they tend to be based on economic theory and rely on quantitative data, which may prevent the analysis of intangible costs and questions of social justice.

### **Ethical Aspects of Individual Behavior**

While ethical considerations are relevant for policy makers and researchers judging the social worth of transport projects and policies, they may also inform the preferences and choices of individuals and companies making decisions in the transportation market.

Ethical motivations are especially relevant in decisions over modal choice, such as the use of public transit (versus private vehicle) and land transport (versus air transport). These decisions may be partially based on altruistic or environmental reasons. These reasons may also be applied in decisions over the type of vehicle owned (such as the choice of electric cars). Individuals may also choose to reduce the number of trips or the distance travelled (for example, in commuting to work). There is still little quantitative research, however, on the role of these types of motivations in people's willingness to pay for improvements in the social and environmental aspects of transportation policies.

On the supply side, the process of deregulation of the transportation sector in many countries raises questions regarding the social responsibilities of companies in the private transportation sector. Critics of these processes often point to the fact that private companies cannot attend to these issues to the same degree that organizations in the public sector do, as this can compromise their commercial viability. The survival of these companies may be incompatible with some of society's objectives. For example, the level of the fares that maximizes economic efficiency may exclude some users from the system. Private operators also do not have the incentive to serve areas with small demand, such as rural areas, dispersed suburban areas, and areas with high rates of car ownership, while car manufacturers do not have the incentive to reduce the environmental impact of their products. Employment issues are also relevant as women and racial minorities tend to be underrepresented in managerial positions and in certain professions in companies in the transportation sector.

Some sectors in the industry face particularly complex ethical challenges. Aviation is one of the human activities with higher share of responsibility for the emission of greenhouse gas and has a substantial impact on the local environment in areas around airports. As such, the consequences of the growth of aviation companies, including the increase in air traffic and the construction or expansion of airports, are always subject to much public discussion. Safety is also a crucial aspect in air transportation, and public authorities and companies in the industry usually impose strict regulations and codes of conduct to minimize risk.

Companies in the freight transportation industry also face specific moral issues. The globalization of channels of production and distribution of goods has increased the environmental impact of the transportation of goods, contributing to the depletion of natural resources and climate change. There is no consensus on whether freight transport companies are morally responsible for these effects, as they depend on national and international regulations and, ultimately, on the demand and supply of the products carried. The transportation of some goods, such as hazardous materials, also involves public health risks.

Decisions involving the routes taken in their transport are politically sensitive, and activists have often claimed that these routes tend to cross low-income and ethnic communities.

**See also:** Benefit/Cost Analysis of Transportation; Environmental Justice; Multiple Criteria Decision Making/Aiding Social Equity and Discrimination in Transportation; Transportation and The Disadvantaged;

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