

SOCIAL CHANGE AND DEMAND FOR MOBILITY

Kenneth Button

George Mason University, Fairfax, Virginia, USA

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Summary

People, on average, travel more often than they did in the past and also cover longer distances. There is an inevitable link between social change and the ways in which transport is now viewed and used. The current pattern of transportation use is strongly influenced by long standing trends such as income growth and urbanization, although the exact links have changed over time in the face of shifts in technology. But, at the turn of the twenty-first century, social trends that affect patterns of mobility are present. These include the aging of the populations of most industrialized countries and the increased leisure time that accompanies this. The role of women in society has undergone significant change and they now seek far more mobility in their lifestyles. The advent of the information age now raises questions about whether social interaction requires the same level of mobility as in the past. This is a theme also linked to society's expanding awareness of the environmental costs of mobility. Finally, the institutions linking social change and mobility have been changing as new ideas of governance have emerged and as society has sought different attributes from its transport systems.

1. Introduction

Transportation provides mobility and access. As such, the demand for transportation is usually seen by economists and many social scientists as derived in its nature: people want transportation to move about and reach destinations while companies require it as part of their overall production activities. But there are important differences between

mobility and access. The former is concerned with the general ability of individuals to move around. Access, in contrast, is concerned with the ability of individuals to reach specified destinations or to undertake certain activities, for example, employment opportunities or schools. The distinction is an important one for policy. Most public policy is aimed at improving accessibility and this may mean providing options at different locations rather than improving transportation. Access can be enhanced by moving the objectives (jobs or schools) or by making it easier to reach the existing ones. Here we are concerned with matters of mobility and not so much with questions of relocation. To ignore issues of access entirely, however, would be too limiting.

Mobility is not just a matter of where one can travel to but also entails the ease of travel. In many cases, it is the quality of travel that is important rather than the simple ability to get somewhere. This raises issues of how transportation networks are used and managed as well as the size and capacity of the network. Congestion is often a major constraint on mobility even over large networks simply because the system is poorly managed. In some cases, this is the result of poor controls over access and, especially, inappropriate pricing. The simple fact is that one individual's mobility is not independent of another's and without an awareness of this and measures to force individuals to take account of it in their decision making, infrastructure simply becomes overloaded.

Transportation of goods also often interacts with that of individuals: cars and trucks both use streets while passenger and freight trains often share common track. Although not dealt with here in any great depth, social changes inevitably affect the types and quantity of goods that are transported and this, in turn, has indirect effects on the mobility of individuals. The congestion caused by trucks is one factor but new distribution systems (for instance large shopping malls) often means that the distinction between personal movements and freight distribution blurs as people distribute goods to their homes as part of their own travel.

Social change itself is not a simple, nor indeed a single concept. In a narrow sense, social change is seen in terms of sociological change, how interactions in society take place, and how they change. For a number of reasons, this has become isolated from a wider definition that embraces economic change, although the latter has a long tradition as a premier social science. These economic changes can be seen in terms of how markets function and how economic institutions change. Here the broader, much older, tradition of including economic changes as part of social change is adopted.

A crucial thing about social change, whichever definition is used, is that it is strictly wrong to try to completely separate components of it in the way that is attempted for pedagogic reasons below. The various elements of social change are interactive and these interactions can vary with time, context, and location. This is what makes planning future transportation systems so difficult and what makes forecasting changing policies with regard current systems so challenging. We do make divisions, however, because the human mind finds this a convenient way of trying to come to grips with complex phenomena.

The coverage of the social changes that affect mobility is not entirely balanced. The emphasis is to give more weight to those factors that are becoming increasingly

important rather than on those that have been influential for a longer time. Economic growth, for example, is possibly the greatest single factor affecting mobility, but of more contemporary interest are the effects of this growth on the way mobility is viewed and how it affects different groups in society.

2. Economic Growth and Urbanization

Economic prosperity is not the only goal that society pursues but it is an important one. In many poorer countries, economic growth is quite literally an imperative for survival. Without it there is starvation, disease, and low life expectancy. In more prosperous societies, economic growth is often important for the maintenance of political stability and the creation of a socially acceptable income distribution. Mobility is linked with growth both as an input into the process (households need mobility to access employment opportunities and to consume goods and services) and as an output of the process (wealth stimulates higher levels of car use and ownership and travel in general).

Whether transportation leads economic growth or the other way around is endlessly disputed. The Industrial Revolution in eighteenth century Britain was only possible, some claim, because of a prior transportation revolution that produced canals, navigable waterways, and turnpike roads. Others maintain that the prosperity resulting from more efficient production generated a social surplus that was invested and added to mobility. The main point is, however, whatever the direction of causality, economic growth leads to more transportation.

Economic growth has also been associated with urbanization. The increased demand for transportation combined with urbanization poses a major dilemma for mobility policy. Cities themselves could only grow as transportation allowed supplies to be brought in and as internal transportation systems permitted distribution. The larger megacities with populations in the tens of millions that are becoming a feature of many developing economies in Asia and South America pose major challenges for maintaining mobility levels. Congestion is a common feature of these cities and public transportation systems seldom expand at a pace to cope with rising demands.

The problems associated with increased numbers of automobiles in countries that are experiencing economic growth are already serious. For an individual, the automobile increases personal mobility but also slows the travel of others and the movement of goods. In some countries, such as the US, the absolute number of cars on the road at any one time is stabilizing, although the pattern of use is becoming more problematic. In many poorer countries, the issue is there are more and more car owners as incomes increase and people seek greater personal mobility. The street patterns of many cities in these countries are particularly unsuited to this type of transportation.

But as incomes rise, so the social perception of car ownership also tends to change, adding to problems of mobility. The positive, nontransport effects of automobile travel can be seen in terms of its “club effect.” What any person gains from joining the club are the network externalities, and there are parallels with membership in the “Internet club.” A driver’s license provides an identity card and a sign of independence and adulthood. A vehicle allows a driver to realize freedom and independence to travel at speed and

increase accessibility relative to those who do not have a car. Benefits increase as the number of cars in the fleet increase, for instance, driving a popular car means accessibility to spare parts, roadside service, and other services that are less accessible for a unique vehicle. Experience shows that the more people using the road network the better the quality of road and the denser the traffic network. Also, facilities become more accessible to car users relative to nondrivers. The outcome is that while congestion may be a cost of being a member, the overall situation is one of benefit to the car commuter.

City forms are also changing, in part to economic growth and the types of activity that underlie it. In the traditionally industrial world, the inner cores of many cities have lost some of their economic vitality. Populations have dispersed toward city edges as a result of this and also as rising incomes have fostered a desire for more living space. This process is called suburbanization. These trends are not entirely new but there are two new elements that would seem relevant to mobility in the longer term.

First, there is the phenomenon of the edge city, or “suburban downtown.” These are self-contained spatial economic entities located in areas adjacent to older traditional urban areas. The number of significant agglomerations of this type may be as high as 18 for the largest metropolitan areas in the US. They provide access to a range of employment, social, educational, and retail activities for those that live around them. This means that those living away from the city core enjoy a high level of accessibility but, because of congestion in areas surrounding the edge city, their mobility may actually be lower than previous residents enjoyed. The nature of urban architecture often leads to more complex travel behavior that ultimately can adversely affect mobility.

Second, there is empirical evidence, supported by emerging economic theories, that rather than urban areas suffering from depopulation and economic decline as congestion grows, there is a sort of cumulative effect where wealthier areas continue to expand while areas already in decline continue to do so, at least in industrialized countries. The new “Information Age” leads to a greater divergence of economies. The regions or cities with an initial advantage in information systems enjoy a variety of benefits that allow them to develop their advantages further. This analysis is supported by a body of empirical findings showing that the economic performance of different regions are not converging significantly in and certainly not in a way consistent with traditional neoclassical economic analysis.

3. Globalization and Internationalization

Globalization and internationalization are two major industrial trends of the late twentieth century. Part of this is reflected in the significant trade growth that took place in the 1990s, with real export growth in the industrialized countries that make up the Organization for Economic Cooperation and Development (OECD) at over 7% per annum. Comparatively, from 1964 to 1992, the production of developed countries was up 9% per annum, exports 12%, and cross-border lending 23%. Equally, there has been a significant rise in foreign ownership of assets that are now estimated to total about US\$1.7 trillion.

This globalization process has clear implications for mobility demands of freight transportation. There is an ever increasing volume of traditional goods being moved by land and sea across national boundaries with air transportation now playing a significant role in value terms as low weight, low volume high-technology products form a major component of trade. But air transportation is also serving a second mobility role of transport of the personnel involved in this globalization process. Globalization means that buyers seek out the cheapest (in the general sense) sources of supply and suppliers seek the most lucrative client. This inevitably means more mobility in terms of sales, marketing, and purchasing even for traditional sectors. Modern economy sectors such as telecommunications and biotechnology involve even more personnel mobility with the average high-technology employee in the US, for instance, making 60% more trips per annum than his blue collar counterpart. Much of the increased trade by value, however, is in the service sector and, although a significant part of this can be conducted electronically, it requires additional business travel.

As a result of this process, it seems that much of the demand for enhanced international mobility falls on the air transportation sector. This expansion seems likely to continue into the foreseeable future, albeit at differential rates in various geographical submarkets. A number of international agencies, aircraft manufacturers, and airlines regularly produce forecasts of aviation traffic. While forecasting remains an art rather than a science, it seems likely that passenger traffic will grow at a rate between 5% and 7% into the foreseeable future, much of it in the Asian–Pacific region (up to 9% a year). Forecasts foresee slower growths in the more mature US and European markets.

In line with other sectors, aviation has experienced significant internal moves towards globalization and internationalization. Indeed, it is the stated objective of the UK carrier British Airways to become a “global carrier.” In pursuit of wider market coverage and in an effort to enhance their own internal efficiency, other airlines have followed similar strategies. The most recent development is the creation of various forms of airline alliances with carriers coordinating services and customer loyalty schemes such as frequent flier programs.

4. Household and Gender Issues

There are important changes taking place within households that influence the overall level and nature of travel demand. There has been a long standing move towards smaller household units in western society. In the US, for example, average household size fell from 2.76 in 1980, to 2.63 in 1990, and 2.62 in 1998. This, combined with an increase in population size meant that the number of households rose from 80 776 million to 102 528 million over the same period. The increase in the number of households is not evenly spaced across all types of urban area. In Europe and Asia, planning and land-use policies, coupled with tight physical constraints on land availability, have contained much of the growth in traditional cities; but even here, urban sprawl is common. In the US, Canada, and South America where land constraints are often less binding, many of the new households have formed in suburbia. In the US, for instance, the 2000 census indicates that virtually all new-household formation has been in suburban areas.

The number of links within a transport network required to maintain the same level of access for each household, however, rises much more than linearly. This makes it particularly difficult to maintain public transport systems in low-density suburban areas. In consequence, most urban suburbs are car oriented, limiting the mobility of those without vehicles and making those, such as children, the aged and the infirm (in households with a car) dependent on household members who drive.

The decrease in household size is due to many factors including rising incomes, more spatially diverse job opportunities, the aging of populations, changes in social attitudes on divorce, and new roles for various members of the household. Each of these factors have micro-implications for household mobility. The changing role and status of women in many societies has perhaps the most important implications. The role of women in many societies has changed profoundly over the past century and this is likely to continue. These changes have both an immediate effect on travel patterns and a potentially longer-term effect on the ways that mobility is viewed.

The mobility patterns and travel needs of women have several implications for sustainable development. These patterns differ in a number of important ways from that of men. In particular, gender differences arise in the distance traveled, the mode of travel, and the complexity and purpose of trips. While there has been some convergence between genders regarding the first two differences, the last difference does not show signs of convergence. Future demographic changes, in particular those that relate to the aging of the population, are likely to further these trends, but also create new patterns based on the travel needs and desires of elderly women.

Women have traditionally been less active in the formal workplace than men, but this has been changing in recent times. While in the US in 1980 only 51.5% of women worked outside the home, 60.0% did in 1999. (This contrasts with a fall in the male participation rate from 77.6% to 74.7% over the same period.) This now means that there are more households with multiple workers. This not only has short-term implications for travel patterns, but additionally has implications for location as couples seek to meet their combined commuting needs. At the extreme, it often involves one member of a household living away during the week.

In most societies, because women do not work outside the home, they are less mobile than men, although, again, this situation is changing. In the UK for example, women in all age groups are increasing the distances that they travel by mechanized transport and especially as car and van drivers. Over the last several decades, the mobility of US women in the US in all age groups has also improved. Between 1969 and 1995, the average annual person trips taken by women increased by 11%. This rate of increase was less for men, despite the fact that the population growth rates of men and women were both about 40% over the same time of period.

Improvements in mobility can be largely attributed to the increase in female licensed drivers. Since 1969, the number of licensed female drivers in the US has increased by 95%, while for men it has only increased by 53%. Furthermore, in the 1980s and 1990s, the increase in women drivers exceeded that of men drivers. This situation is not unique to the US. In the UK, there was a 90% increase in the proportion of women with driving

licenses between the mid-1970s and mid-1990s, but only a 17% increase in the proportion of license-holding men. In 1975–1976 women drove 17% of the miles driven by men, but by 1994–1996 this proportion increased to 37%. Further, in 1975–1976 almost twice as many men were licensed to drive as women but by 1993–1995 81% of men and 55% of women held driver's licenses. The situation is similar in Germany, where women aged 25–34 have the highest levels of vehicle ownership. In addition, women aged 18–40 are catching up with men's levels of driving license holding: 80% of women and 90% of men aged 18–40 are licensed to drive compared to 82% of men and 52% of women of all ages.

These trends could reflect the declining quality and availability of public transport in some countries or more general trends of greater population dispersion as incomes rise, labor force participation rates increase, and family structure changes. A more geographically dispersed population, for instance, requires more complex travel patterns to meet traditional household care-taking and family obligations, let alone labor force participation.

Despite their increasing access to automobiles and enhanced mobility, women still travel shorter distances than men and when they do travel, they travel on what are generally considered less prestigious modes of transport. In the U.S., women drive only 60–70% as many miles as men and on average they travel 27.8 person miles a day, slightly less than the 35.2 person miles a day of men. In the UK in 1994–1996, women traveled less total distance than men by all modes except buses, walking, and as passengers in private cars. Statistics on aircraft, ship, and channel tunnel journeys according to gender are not available for the UK, but they would probably tell the same story. In addition, women are passengers for about half of travel they do, while men are only one-fourth of the time. In 1975–1976 women drove about one-fifth of the miles driven by men, but by 1994–1996 the gap had closed somewhat, and women drove about two-fifths of the miles that men drove.

In Germany, many adult women have less car availability than men and are therefore more likely to be captive transit riders. Fewer women, both unemployed and employed, have a car available. The biggest differences between men and women, however, are for those who have a car available to them in the household, but do not have a driving license.

Overall, women seem to have somewhat different reasons for travelling than men. Women's entry into the workplace has created a new set of trips, referred to here as "knock-on" trips, or trips generated by moving from home production to market production. Statistics show that women are more prone than men to make these types of trips. Approximately 50% of all person trips made by women in the US are for family and personal business and two-thirds of the trips women make are to take someone else someplace. In 1994–1996 women in the UK made 28% fewer commuter journeys and 68% fewer trips during their work than men. Evidence in the US shows that women take a greater share of household responsibilities, and, linked to this, they make 65% more journeys to take children to school and approximately 30% more shopping trips. The same pattern appears across the previous ten years. Category changes make longer comparisons impossible for the UK.

In the UK, there also appears to be a correlation between the distance traveled by women and the need to care for children, the elderly, and other domestic responsibilities. In this sense, the pattern has changed little in recent years. In 1994–1996, women younger than 20 in the UK were typically travelling the same distance as men. In 1995–1996, women between the ages of 26–59 (the prime years of domestic caring responsibilities) traveled just over half the distance that men did, a pattern that was broadly the same as twenty years earlier. The pattern is not unique to the UK or US.

Complex travel behavior such as trip chaining is also more common for women than men. This is certainly the case in the US even when both males and females are in employment. Women stop more for running household errands than men do, on both inward and outward commutes and irrespective of the number of persons in a household or its structure. On average, two in three American women make stops on their way home and 25% make more than one stop. The places visited also differ, with women more often visiting schools, day-care centers, and shops than men, who are twice as likely to go to a restaurant or bar. These more complex commuting patterns are increasing. In the US, the number of intermediate stops on the way to work has grown by about 50% and the number on the way home by about 20% since 1980.

Women's experience of travelling at night often makes them feel unsafe when compared to travelling in the day. For example, 10% of women in the UK felt "unsafe" or "very unsafe" waiting on a railway platform in the day, but this figure rose to 53% at night. Similarly, heightened fears were experienced by women waiting for underground trains, walking to a car in open or multistoried parking lots, etc. More attacks happen during the day, but the probability of attack at night is higher because fewer women are traveling then. Thus, the common perception that traveling after dark is dangerous is grounded in actuality. Women, however, are more often attacked by people they know and in the home than by strangers outside. Yet the fear of public spaces and "stranger danger" in them dominates the lives of particular groups of women, especially middle class and younger women, "whose fears reflect the geographies of risk less accurately." Thus, as Pain notes, ideologies of public and private space distort perceptions of safety.

Despite these concerns, more women are now travelling at later hours in the evening. Currently, about half of all "moonlighters" in the US, for example, are women. Furthermore, for many women who work during the day, trips for household and domestic duties must be completed in the evening hours. These trends raise security issues for women, particularly for those who choose to travel by public transit. Security will increasingly be a concern as more women demand transportation. This increase in demand has been and will continue to be precipitated by the new post-Fordist economy.

These patterns in women's use of transportation have implications for sustainability, or our ability to move closer to sustainable development. From an environmental perspective, multiple stops could adversely impact atmospheric pollution because of the larger amount of "cold running" of cars that it entails. Trip chaining helps reduce emissions by reducing the number of cold starts and reducing vehicle miles traveled. The types of diversions undertaken by women also suggest a larger amount of time spent in noise sensitive areas and areas with higher levels of exhaust gas emissions.

From a transport policy perspective, there are also problems that the diversity of variations in trip patterns is larger for females. The multiple purposes of trips also means that many forms of fixed track transport are not so suited to women's travel needs. As a consequence, women are increasingly relying upon automobiles as a primary mode of transportation. Some would argue however, that complex travel behavior, like trip chaining, is the product of creative problem solving on the part of women.

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Biographical Sketch

Kenneth Button, BA (East Anglia), MA (Leeds), PhD (Loughborough), is a Fellow of the Institute of Logistics and Transport, the Institution of Highways and Transportation, and the Chartered Institute of Transport, and has been Professor of Public Policy and Director of the Center for Transportation Policy and Operations in the School of Public Policy, George Mason University, since 1997. From 1994 to 1996 he was Conseiller in the Advisory Unit to the Secretary General of the Organization for Economic Cooperation and Development in Paris, where he headed work on international aviation policy. He was at that time on leave from being concurrently Professor of Applied Economics and Transport at Loughborough University, UK, and VSB Visiting Professor of Transport and the Environment at the Tinbergen Institute, Amsterdam. He was also at the time Director of the Center for Research in Economics and Finance at Loughborough University. He was the Special Advisor to the UK House of Commons Transport Committee between 1993 and 1994. In 1990 he was full time Consultant to the Organization for Economic Cooperation and Development Environmental Directorate. Prior to that he directed the Center for Applied Economics and Finance at Loughborough University. He has held visiting

posts at the University of British Columbia, the University of California at Berkeley, and the University of Forlì.

Dr. Button's academic training is in the fields of economics, econometrics, and transportation planning. He has published, or has in press, some 80 books (which include standard textbooks on *Transport Economics* and *Urban Economics* as well as research volumes), over 400 papers in leading academic journals, and forecasting software. He has also given written and oral evidence to the US Congressional Transportation Committee and to both the UK House of Lords and House of Commons Transport Committees. He is editor of the academic journals *Transportation Research D: Transport and the Environment* and the *Journal of Air Transport Management* and is on the editorial boards of nine other journals. He is on the scientific committee of the World Conference on Transport Research. He is currently contributing to the US congressionally mandated study of future research needs in the field of transportation and the environment that will be published in 2002 and on a Transportation Research Board analysis, *The Future Capacity Needs of Freight Transport*.

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