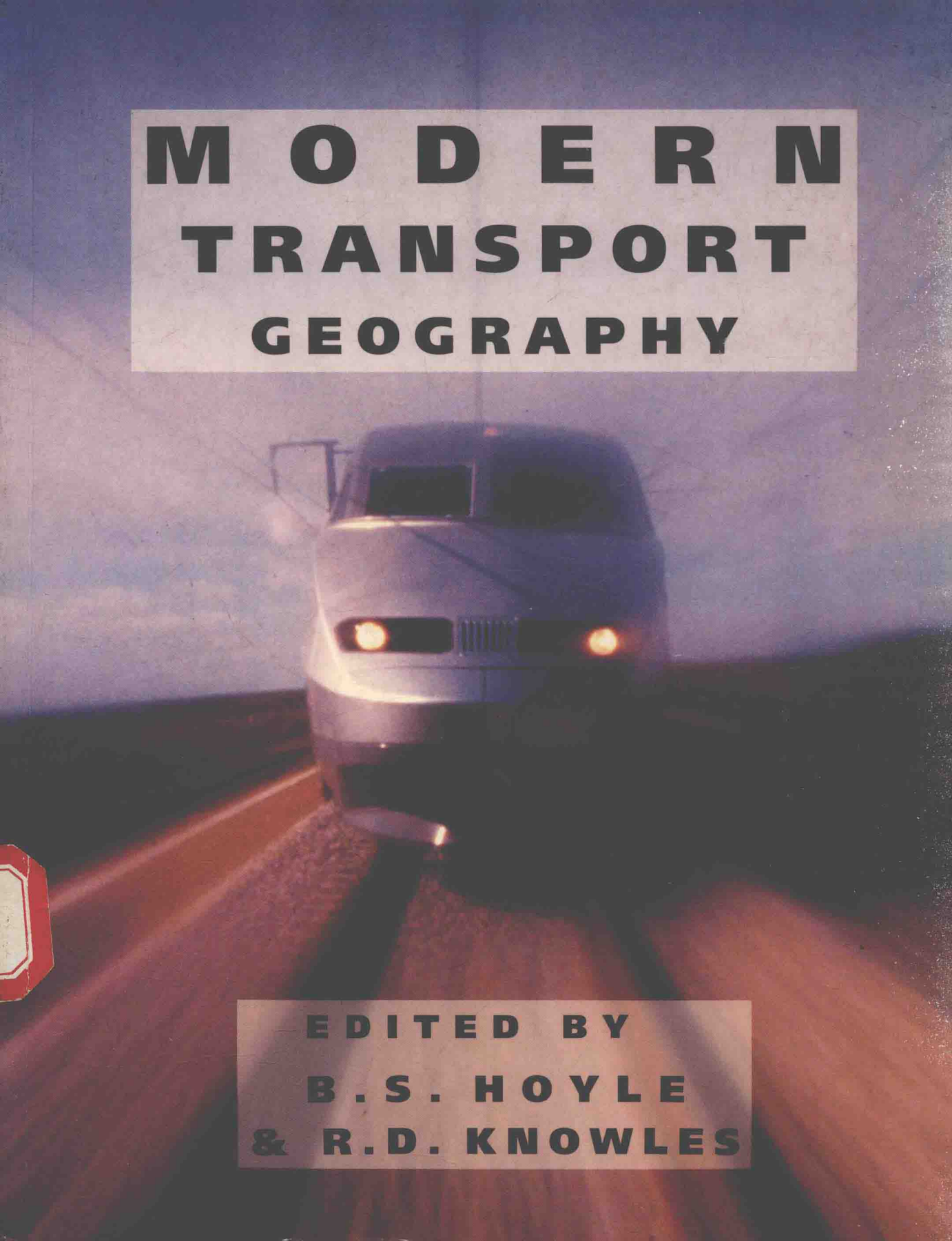


# **M O D E R N T R A N S P O R T G E O G R A P H Y**

A high-speed train, possibly a Shinkansen, is shown from a front-facing perspective, approaching on a set of tracks. The train is white with a blue stripe and has its headlights on. The background is a hazy, twilight sky. To the left of the tracks, there is a red octagonal sign with a white border. The overall mood is one of modern transportation in a natural setting.

**EDITED BY  
B. S. HOYLE  
& R. D. KNOWLES**

# MODERN TRANSPORT GEOGRAPHY

***Edited by***  
***B. S. Hoyle and R. D. Knowles***

*on behalf of the*  
*Transport Geography Study Group*  
*of the*  
*Institute of British Geographers*



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# Preface and Acknowledgements

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Transport is a subject of universal interest and importance. The investigation and analysis of transport is therefore of concern to a wide variety of students, researchers and planners as well as to those directly involved in the operation of transport systems. The variety and complexity of issues involved, however, is such that no single author can realistically be expected authoritatively to cover the subject as a whole.

From its inception in the early 1970s the Transport Geography Study Group of the Institute of British Geographers has developed and maintained a close interest in the spatial aspects of transport phenomena, and its members have published extensively within the field of transport geography. The basic purpose of this book, which represents the outcome of a long-held ambition on the part of TGSG members, is to draw on the collective expertise of the Group and to present a wide-ranging contribution to the study of modern transport geography which we hope will be of use and value to students in a variety of inter-related disciplines.

Our policy as editors has been to encourage contributors to draw upon their own experience in the context of a particular problem or specific area of reference within modern transport geography. We have attempted to cover the major components of

the subject, at a level appropriate to undergraduates following courses in transport geography and other cognate subjects, in an open-ended manner indicating where more detailed information may be located and where further research is needed.

It is a pleasure to record our gratitude to our fellow contributors for their cooperation in the preparation of this book, and to Iain Stevenson and his colleagues at Belhaven Press for their support and encouragement. Some of the maps and diagrams were prepared or amended in the Cartographic Unit of the University of Southampton, under the direction of Mr Alan S. Burn, and some were drawn in the Department of Geography at the University of Salford; others were submitted by authors in a finished condition, thus accounting for some variation in cartographic style. We also record our appreciation of secretarial help provided by Mrs Judy Rhodes at Southampton and by Mrs Marie Partington and Mrs Moira Armitt at Salford.

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# 1

## Transport Geography: an Introduction

Brian Hoyle and Richard Knowles

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*Transport is part of the daily rhythm of life. Mobility is a fundamental human activity and need, but is restricted by the friction of distance. As a complex industry in terms of land use, employment and functions, transport is a major factor interlinked with the environment and with the spatial distribution and development of all other forms of economic and social activity. Geographical theories, methods and perspectives contribute significantly towards an understanding of transport problems and their eventual solution.*

### Introduction

Transport is a topic of universal interest and importance. Most people wish to travel from one place to another, regularly or occasionally. Goods collected, extracted or manufactured, almost without exception, are distributed from place to place before consumption. If people need or wish to use services, which are generally provided at a limited number of places, they must travel in order to do so. Transport industries exist to provide for the movement of people and goods, and for the provision and distribution of services; and transport thereby fulfils one of the most important functions and is one of the most pervasive activities in any society or economy. 'There is no escape

from transport . . .' (Munby, 1968, 7). In advanced countries, modern transport systems involving road, rail and air networks are generally well-developed; global economic integration relies upon efficient maritime transport; and the development of the less-developed parts of the world is substantially dependent upon transport. 'Even in the most remote and least developed of inhabited regions, transport in some form is a fundamental part of the daily rhythm of life' (Hoyle, 1973, 9).

The general importance of transport is not in doubt, but its very ordinariness leads to its general acceptance and to a widespread assumption that transport is not a particularly interesting subject of study, except when things go wrong. Transport is a focus of media attention when disasters occur, when strikes paralyse services, or when exciting innovations capture public interest or become the subject of controversy.

Transport services cannot operate perfectly all the time, and to a greater or lesser degree the travelling public always has a ready-made target for complaints, justified or otherwise. Yet most rational people would agree that the vast majority of transport services operate at a reasonable level of efficiency for most of the time: were this not so, economic and social systems would grind to a halt.

All transport systems, however, are capable of improvement: more extensive, faster and above all more efficient services are constantly in demand. The level of efficiency and customer satisfaction achieved by any transport service is fundamentally a political issue, for it rests largely on the level and pattern of public-sector resource allocation to transport as opposed to other economic sectors and on the conditions under which private-sector investment in transport is permitted or encouraged. It follows that 'almost every transport decision is a public issue' (Munby, 1968, 7); and that transport is 'an enormously varied, exciting and controversial area of study' (Whitelegg, 1981, 4).

The study of transport is not the sole prerogative of any one academic discipline, and transport is too important to be left entirely in the hands of its practitioners. Transport, by its very nature, lends itself to multidisciplinary study and to interaction between those who operate or use transport systems and those who control or seek to analyse them. Geographers have much to contribute to the study of transport, and transport geography is increasingly widely recognized as a useful and important component in the broad field of transport analysis.

### Why transport geography?

Why is transport *geography* important? There are two main reasons. First, transport industries, facilities, infrastructures and networks occupy substantial areas of geographical space, constitute complex spatial systems and provide substantial numbers of widely spread jobs. Second, geography is concerned with interrelationships between phenomena in a spatial setting and with the explanation of spatial patterns; and transport is frequently one of the most potent explanatory factors. Transport is a measure of the interactions between areas; it also enables a division of labour to occur. Spatial differentiation, wider market areas and economies of scale in production are

partly a product of transport availability and use; and the demand for transport, in turn, is partly a product of these factors (Gauthier, 1970; Hay, 1973; Button and Gillingwater, 1983).

Transport geography is thus concerned with the explanation, from a spatial perspective, of the socioeconomic, industrial and settlement frameworks within which transport networks develop and transport systems operate. The subject therefore centres upon dynamic interrelationships within transport itself and in transport-related contexts. A substantial and growing literature and an increasing interdisciplinary involvement on the part of transport geographers have led to an enhanced awareness of the importance of the spatial dimension in transport studies, and of the contributions transport geographers are making, individually and severally, to the further understanding and eventual solution of transport problems.

Some of these issues have been highlighted at a series of conferences organized by the Transport Geography Study Group of the Institute of British Geographers. For example, in the early 1980s, transport geographers and planners examined a wide range of transport and recreation issues at a meeting in 1982 (Halsall, 1982). As the Conservative government's policies of privatization, deregulation and competition were beginning to change the framework in which British transport operates, a range of public issues in transport were discussed by transport geographers (Turton, 1983). Transport geographers joined with planners, Transport 2000 and British Rail to identify problems of and prospects for rail-based rapid transit in Britain's increasingly congested and decentralized conurbations (Williams, 1985). Implications of the then imminent deregulation of local bus services were examined in depth at a symposium of transport geographers and economists (Knowles, 1985).

More recently, the Channel Tunnel and its estimated impacts on short Channel crossings and ferry terminals were evaluated by

transport geographers, economists and planners together with representatives of Euro-tunnel, British Rail, ferry companies and Dover Harbour Board (Tolley and Turton, 1987). The effects of technological innovation in transport on spatial change were examined in relation to high-speed railways, minibuses, unconventional modes, small ports, retailing and telecommunications (Tolley, 1988). Green modes of transport and traffic-calming measures were analysed on a European scale at a symposium of transport geographers, planners and transport pressure groups (Tolley, 1990). A joint British-Italian seminar of geographers, economists and mathematicians evaluated aspects of transport policy and urban development (Knowles, 1989). The revitalization of derelict docklands and waterfronts was examined on an international scale at a symposium of transport geographers, planners and political scientists (Hoyle, 1990).

## **Mobility**

The study of transport rests essentially on two cardinal principles. The first is that *mobility is a fundamental human activity and need*. In all societies, environments and economies the movement of goods and people is a necessary element in functional and developmental terms. The word 'transport' describes this activity, whether in terms of a relatively straightforward transfer of people or goods from one location to another, over a short distance, or in terms of the infinitely more complex systems involving many different directions, modes and locations on an international scale. The transport industries constitute, basically, a response to these activities and needs; transport facilities are normally provided in response to, rather than in anticipation of, demand. As in all demand-led industries, there can rarely if ever be a perfect match between the transport facilities and services required or desired by a population or economy and the available infrastructure at a particular time.

It follows that, although transport in one form or another is part of the daily rhythm of human life in all societies and economies, most places and people suffer from restrictions on mobility. Such restrictions may be temporary or long-lasting – even, in personal terms, permanent; they may be very seriously disruptive or only marginally inconvenient. Most commonly these restrictions arise from economic factors, especially the cost of transport: most individuals and families cannot afford to make all the journeys they would ideally wish to undertake. In developed countries the mobility gap is widening, especially in rural areas, between the growing majority with regular access to a private car and the minority who are entirely dependent on declining public transport for access to shops, medical services, families and friends (Moseley, 1979). Industries and businesses naturally attempt to reduce transport costs by limiting movements and few governments can afford to provide modern transport facilities and services to satisfy existing demand, let alone to cater for anticipated future requirements. Of course, demand for transport is in a sense a function of available facilities and services: people always want more than they can have. Similarly, the services and facilities provided are clearly a function of demand, for unless demand exists there is no point in providing them.

Restricted mobility is inevitably a brake on development, in every sense. In modern Western cities, particularly, people are increasingly used to seeing, expecting and perhaps using transport facilities for mobility-deprived individuals and groups: those confined to wheelchairs, for example, or who have difficulty in using public transport and need specially adapted vehicles and access points to buildings and public spaces. Political factors, too, directly restrict the movement of individuals – refugees, hostages, guest workers, would-be immigrants – and in some countries it is still difficult or not permitted for most people to travel beyond national boundaries. Indirectly, political decisions underpin

resource allocation to the transport sector, so that governments can restrict or enhance mobility by withholding or advancing investment in transport facilities and services. More generally, however, it is usually the broad level of economic development, together with the technological level of transport provision, that create a restrictive environment in transport terms.

Factors affecting the relative restriction of mobility are clearly interrelated, but we should also consider *the friction or restrictive impact of distance* itself. Everyone is aware that some places are more expensive than others to live and work in, or to trade from; and a major factor contributing to these spatial variations is the cost of transporting people to work and goods to market. Inland countries in West Africa, such as Mali and Niger, suffer economically because of the cost of transporting trade goods to or from coastal ports in neighbouring countries. The downward economic gradient which runs northwards from the coasts of Ghana, Côte d'Ivoire or Nigeria reflects ever-rising transport costs, as well as deteriorating environmental conditions, as distance from the sea increases.

In Australia, where the phrase 'the tyranny of distance' has gained a certain currency, 'the distance of one part of the Australian coast from another, or the distance of the dry interior from the coast, was and is a problem as obstinate as Australia's isolation from Europe' (Blainey, 1966, viii). The peripheral distribution of population, urbanization and economic development is an expression of the high cost of transport between coastal ports and distant hinterlands, as well as of the attractions of the coastal zones as compared with the frequently less-favourable environments of interior areas. The Norwegian maxim 'the forests divide, the mountain plateaux unite' reflects the fact that before mechanical transport became available, forests constituted a greater barrier to movement (Steen, 1942, translated in Knowles, 1976). The mountains also linked economically complementary areas thereby generating a demand for movement, unlike

the valleys which linked areas with similar economies. Distance – and its chief enemy, efficient transport – are potent factors in any explanation of the geography of economic and social activity.

### Multidisciplinary

The second cardinal principle on which the study of transport rests is that *transport studies are essentially multidisciplinary*. Well-developed components within transport studies include *transport engineering*, concerned with the design and development of transport infrastructures and facilities; *transport economics*, dealing with the analysis of transport demand and the costs of meeting that demand in relation to other forms of economic activity; and *transport history*, concerned with the evolution of transport facilities, partly in terms of their intrinsic interest, in relation to past societies and economies, and partly as an explanation of the origins of modern transport systems. Politics and law are other major fields of study, as well as activity, in which transport issues loom large; for in all societies and economies, in various ways, transport is necessarily subject to some forms of political control and legal regulation, yet is itself a factor in the modification of political and legal systems (Banister and Hall, 1981).

Transport studies are therefore *multi-disciplinary* in character, and are sometimes *interdisciplinary* as well. Fields of enquiry and activity such as transport economics and transport law are necessarily discrete, up to a point, reserving to themselves a specific body of information and a specific range of methods or techniques derived from the wider experience of their particular disciplines. Yet the evolution of transport law, for example, is conditioned by transport economics; the history of transport is an expression of transport technology; and transport technology, in turn, is intimately connected with transport engineering, which is dependent upon transport economics.

In all these ways, no specific academic

discipline, no subject-defined body of theory or methodology, can ever be totally self-contained; each must work with others, to a greater or lesser degree, drawing as required on a common fund of knowledge, in the pursuit of objectivity and truth. As in some other fields of study where interdependence is potentially a key to success, transport analysis requires that the scope and nature of an enquiry must be defined by the problem set, not by any preconceived notions of what is or is not relevant to a particular discipline.

### The role of transport geography

Transport geography lies at the heart of this interlocking web of relationships; for, as an integrative science, geography draws some of its materials from related subjects and focuses upon the analysis of interrelationships, especially those expressed in spatial dimensions. It is obvious that so vast, exciting and varied a field as the study of transport geography encompasses a great variety of approaches. 'The skills which geographers have to offer are by definition useful ones and need no sterile efforts at carving out some indefensible space of disciplinary exclusivity' (Whitelegg, 1981, 4).

Transport geography, like the study of transport as a whole, rests on two essential ideas. The first is that *transport is itself a major complex industry in terms of land use, employment and functions*. Transport infrastructures and facilities occupy large areas of land and water space, and transport services provide substantial employment. In both these dimensions, transport is highly significant geographically. The second idea is that *transport facilities and services, taken as a whole or in terms of their component parts, are a major factor affecting the environment and the spatial distribution and development of all other forms of economic and social activity*. In this sense, transport is a major influence on virtually all other phenomena capable of analysis in terms of spatial variations and structures (Taaffe and Gauthier, 1973).

In this context, it is possible to approach the study of transport geography from several different directions. Perhaps the most common method is the *modal* approach which looks separately at road, rail, air and maritime transport systems and problems. This method is exemplified by Bird's studies of seaports (1963, 1971) and Sealy's work on air transport (1966). Such an approach is necessary for some purposes, especially the examination of specific issues, but it disregards the basic underlying intermodal interdependence of transport systems serving an area, however limited their degree of integration might appear to be. Another common approach to transport geography is through the study of factors – environment, economy, etc. – affecting the demand for, and the development of, transport networks (White and Senior, 1983). While this is a necessary element in an appreciation of the potentialities and limitations of transport systems, emphasis upon specific factors must avoid losing sight of the interdependent web of relationships of which they form a part. In this book traditional approaches based on modes and factors are largely rejected in favour of integrated analysis based on issues, problems, principles and examples. This approach, transcending factors and modes *per se*, shows how geographical dimensions can contribute significantly towards an understanding of transport problems and towards their eventual solution.

### Explanation and assessment

It is, however, useful at the outset to suggest a broad, conceptual factor-based framework within which most if not all of the diverse elements of modern transport geography can be said to find a place. Figure 1.1 describes such a framework. The present-day transport system of any country or area cannot normally be explained by one factor alone. Explanations can be found, however, in a series of interrelated factors. Some of the more important factors are indicated in Figure 1.1 which shows how transport

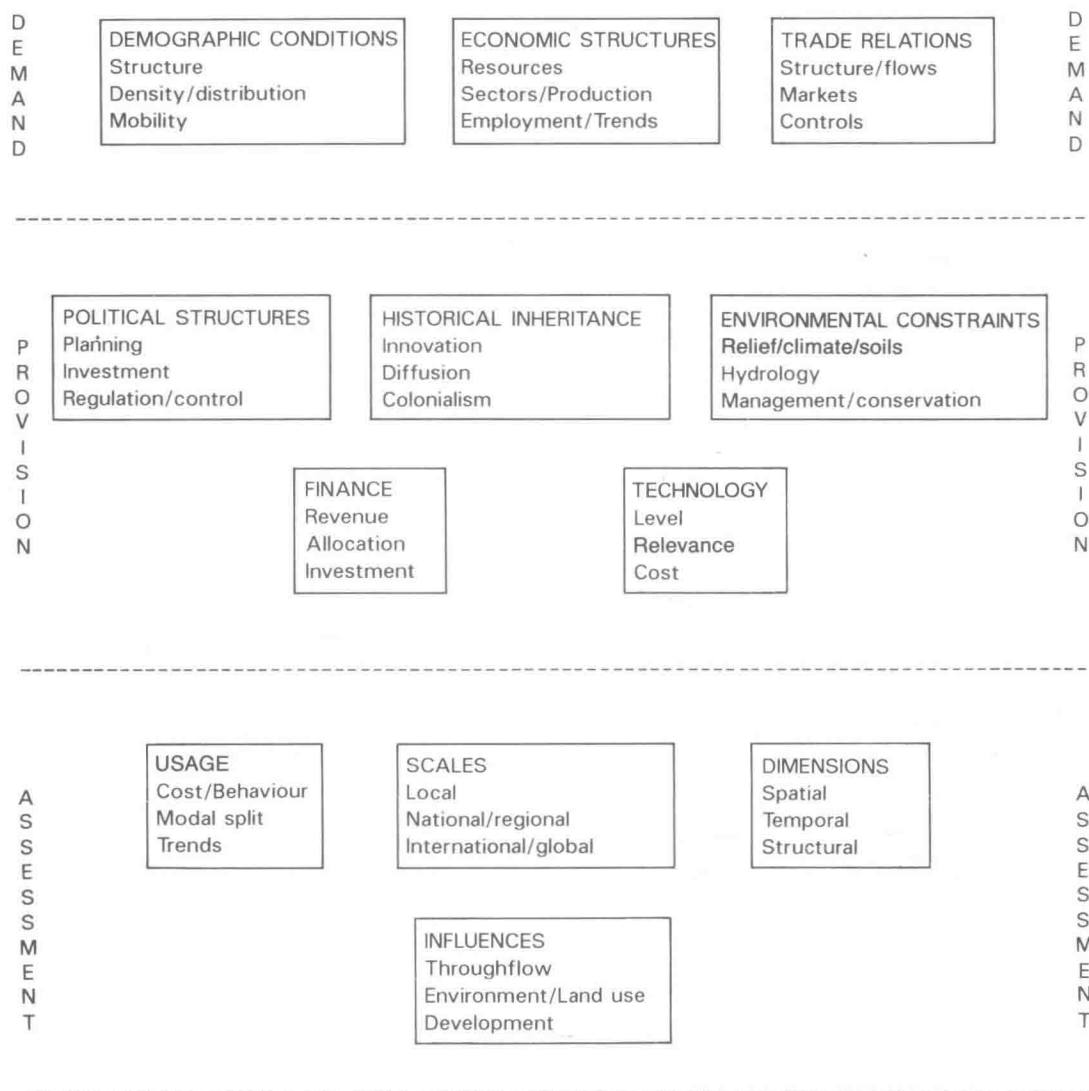


Figure 1.1 Some factors involved in transport demand, provision and assessment.

demand is influenced by economic and demographic circumstances and by trading conditions; how transport provision is constrained by political structures, inherited transport networks, environmental factors, available technology and finance; what affects transport usage and modal split; how the effects of transport are assessed at

different scales and in different dimensions; and what influence transport has on land use, volume of activity, economic development and the environment (Fullerton, 1975; Blunden and Black, 1984; Barke, 1986).

These factors affect transport in different ways, influencing each other as well as affecting transport systems directly and indirectly.



Transport systems themselves also influence all these different areas of human activity and the physical environment within which they are set. Each factor may operate in positive, negative or neutral ways; each may affect transport on different scales, from the local to the global; and two basic dimensions – time and space – are involved. Such factors are not only useful as sources of explanation and understanding of transport systems and patterns, past and present; they are also prominent areas of influence and concern in terms of assessment, traffic forecasting and planning for the future.

Changes in transport demand usually originate with changes in the pattern of resource exploitation and are often stimulated by changes in population structure, density, distribution or mobility as well as by people's desire to improve living standards. Resource exploitation involves the extraction, processing and marketing of resources, requires an increasingly specialized division of labour to generate higher living standards and although stimulated by trading opportunities is limited by trade constraints.

The form of the transport network provided and the nature of the transport system which operates upon it is a product of competing constraints. Historical factors are essential to a proper understanding of modern transport systems, for all existing transport networks have been inherited from the recent or more distant past and from decision-making processes now modified or superseded. In Britain or France, this principle applies equally to Roman road networks and to motorways currently under construction. Although it is true that, as L. P. Hartley put it, 'the past is a foreign country – they do things differently there' (Hartley, 1953, 1), the importance of inherited transport systems and of superseded decision-making processes is that they provide part of the framework within which present-day decisions are taken and future developments planned. Historical legacies, in other words, provide one set of constraints which condition, positively or negatively, the ways and methods in which future transport systems

can be designed and implemented.

The physical environment influences the development of transport infrastructures – roads, railways, seaports and airports – both directly and through the comparative costs of construction. The morphology of any specific component of a transport network – a railway station, an air terminal, a motorway, a container terminal – is set within a specific environmental context and its development raises particular environmental questions, problems and perhaps controversies.

All the factors discussed above are underpinned in many respects by technological factors. The technological characteristics of individual transport modes – pipelines, railways, canals, roads – impose limitations with regard to usage and maintenance costs, for example. Similarly, vehicles offer potentialities and impose limitations by reason of their individual or collective technological characteristics: bicycles, cars, ships, trains, aeroplanes, lorries and hovercraft all have appropriate physical, social and economic environments within which they operate and without which they either cannot operate or are unsuitable. Advanced technology is expensive and transport costs are therefore frequently a reflection of technological inputs. Together, technology and cost factors are closely related to environmental issues, for the adaptation of a transport system to physical conditions or to environmental concerns is dependent upon technological capacity and available financial resources.

There is a sense in which political factors transcend the logic of other factors discussed above and their interrelationships. Political decisions involving transport investment, like those in other spheres, hinge upon issues both broader and more specific than those outlined here. There is often a conflict between the demand for transport and the political will to provide it, or between the political objective of a transport innovation and its economic purpose or value. For example, the trans-Siberian railway completed to consolidate Russian rule over Siberia, and the widespread introduction of



railways in Africa during the early European colonial period, underscore the significance of political motivations for transport innovation. The political entity of Canada was created by the British North America Act (1867) which required the building of the Intercolonial Railway to link the four colonies of Ontario, Québec, Nova Scotia and New Brunswick so as to enable the new country to function as a political and economic unit (Leggett, 1973). The Canadian Pacific Railway was a similar but much larger-scale legal requirement. British Columbia entered the Canadian Confederation in 1871 under an agreement which guaranteed the construction of a railway connecting the Pacific coast with Ontario within ten years. The controversies surrounding the Channel Tunnel and its connecting railways in Britain and France provide a contemporary example (Tolley and Turton, 1987).

Political considerations are significant in another sense in relation to transport. Governments are a major source of capital for investment in transport infrastructure, although private investment is also very important in some countries. In addition, governments are involved in the regulation of the supply of transport services, in the control of intermodal competition (to varying degrees), in safety control, in the coordination of investment allocation between modes and areas, and in decisions concerning pay and working conditions. In all these ways, governments are often in a position to decide what happens in transport terms, but decisions can only be taken in the context of consideration, evaluation, acceptance or rejection of all the relevant factors involved.

Economic factors involve a different set of perspectives. Traditionally, economic approaches to transport have involved the assessment and analysis of traffic flows – the collection, dissection and discussion of movements along a line, through a node or within a network, in relation to demand and costs. The objective of such approaches underlines the essential economic perspective, based on demand/cost relationships and on the comparative claims of other forms of

investment or activity for available finance. These perspectives have led transport economists and planners to develop sophisticated quantitative transportation models to attempt to forecast future traffic trends and to identify interrelationships between different transport modes, expressed as the *intermodal split*. Implications have been assessed for investment and planning.

Transport can be defined not only as an economic facility but also as a social enabler, so it is therefore impossible to disregard social factors in transport analysis and planning. Social activities and characteristics constitute a basis for transport planning, and they may be developed or modified by available transport facilities. The analysis of journey-to-work patterns provides an important spatial link between economic and social factors, as does the wider question of accessibility to modern transport services, especially in rural areas. Recreational travel and shopping patterns are two other areas where social characteristics form an important part of transport analysis. In rural and urban areas, each socially distinctive locality generates its own type and pattern of demand for transport, and responds in its own way to the available services and facilities.

Transport and land use therefore influence each other. The development of tram and railway systems, for example, enabled a separation to occur of workplace from place of residence (Kellett, 1969; Ward, 1964). The later developments of motor buses, lorries and above all of mass-produced cheap private motor cars enabled a much greater suburbanization and deconcentration of urban and economic activity to occur. As a consequence it is now increasingly expensive to provide a decentralized urban area with adequate public transport services. City centres have become less accessible due to road congestion and parking difficulties, while bypasses and ring roads have enhanced the accessibility of the suburban fringe. However, where land use and transport planning have been coordinated and the decentralization of urban activity has been tightly