European Transport Policy and Sustainable Mobility

David Banister, Dominic Stead, Peter Steen, Jonas Åkerman, Karl Dreborg, Peter Nijkamp and Ruggero Schleicher-Tappeser



Transport, Development and Sustainability

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The inspiration for this research arose from Task 13 in the DGVII's 4th Framework Strategic Research programme in 1995. On a cold spring day, a group assembled in the Tinbergen Institute in central Amsterdam to discuss the possibility of putting forward a collaborative bid. Even at that early stage, it was realized that something special was being created, in terms of the different perspectives of the researchers and the potential for innovative thinking on policy scenario building. From that starting point, the Consortium emerged, and in true EU fashion decided on the POSSUM acronym – POlicy Scenarios for SUstainable Mobility.

Over the next two and a half years, a tremendous amount of work was carried out on the conceptual framework, the modified backcasting methodology, the setting of the policy targets, and the building of the Images of the Future, together with the lengthy process of discussion with the expert groups. The development of the Policy Packages and the Paths took quite sometime (longer than expected), and provided an unexpected challenge to the Consortium, as this was the crucial link between the theoretical framework developed and the actual policy process. The project has provided the most interesting experience in international collaborative work in which many of the members have participated.

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'Rail travel at high speed is not possible, because passengers, unable to breathe, would die of asphyxia' Dr Dionysys Lardner (1793-1859) – Professor of Natural Philosophy and Astronomy, University College London.

Lardner also contended that no large steamship would ever be able to cross the Atlantic, since it would require more coal than it could carry. Two years later, in 1837, the *Great Western* crossed the Atlantic.

Introduction

1.1 Challenging conventional wisdom

One of the great challenges facing policy-makers at the start of the 21st century is to reconcile the different priorities between economic development and environment, whilst at the same time recognizing the different social priorities and the distributional consequences of decisions. Transport offers us the best example of the complexity of these choices. In the past, a high-quality transport system has been seen as an essential prerequisite for economic development and many major investments in transport have been justified on non-transport criteria. This established wisdom has now been questioned, particularly where high-quality well-connected networks already exist (Banister and Berechman, 2000).

Additional links in these networks will result in changes in accessibility, and bring some transport benefits, at least in the short term, through travel time savings. But the additional benefits of inward investment and new employment are not proven. As the transport benefits make up a smaller part of the total economic benefits, it becomes increasingly important to examine the non-transport factors. However, even where there are well-connected established networks, there may still be substantial transport benefits in particular situations, where, for example, missing links are opened or where substantial bottlenecks are eased. But analysis must address more than just the physical aspects of the network. The real value added is reflected in making the existing transport systems and the complementary communications networks compatible, through common organizational and operating systems, and through high-quality monitoring and information systems. It is the integration of networks in this wider sense that true value added is obtained.

In addition to the debate over the economic impacts of new transport investments, policy is equally concerned with the environmental and social costs of transport. It is now widely recognized and accepted that transport in Europe is unsustainable, and that the trend-based path of continuous and continuing growth is unacceptable. This understanding is crucial to the development of transport policy at both the national and European levels. Although there is common agreement on the nature and scale of the problem, little is being done to change the direction of policy in a fundamental way. It is argued (CEC, 1998*a*) that the economic growth objectives of policy are crucial to the competitiveness of Europe and that an explicit realignment of policy objectives towards environmental and social measures will weaken this position – so little real change has taken place.

The view taken in this book fundamentally differs from this conventional wisdom. It is strongly argued here that longer term economic objectives of transport policy are compatible with the wider environmental and social objectives. A sustainable transport policy for Europe is achievable. More important, it is not a costly policy, nor will it result in a major reorganization of lifestyles and businesses, as it can be achieved through a mixture of technologically oriented policies, complemented by actions to reduce the transport intensity of people's and firms' activity patterns. However, it is not easy to achieve change in the transport sector as it will require people to accept that change is necessary. It requires the involvement of all actors and the process and the acceptance of responsibility for change. More important at this stage is the necessity for leadership and the implementation of measures to bring about change. We suggest such leadership can either come from the European Union (top-down) or from the people as a whole (bottom-up) or through a combination of actions at both levels.

The European Union (EU) is in a unique position, as it is the largest population centre in the developed world and as it has one of the highest GDP per capita figures. It is a powerful global player and it can take the lead in promoting sustainable transport policies. In addition, it has the advantage of relatively high densities, strong city centres, and a tradition of using public transport and other green modes of travel. There is an opportunity for Europe to develop a truly sustainable transport system, to demonstrate the 'art of the possible', and as a consequence to take a leadership role within the world (Figure 1.1).

The rhetoric here may all seem wishful thinking to the true sceptics. Some may say let Europe take the lead. We all watch, wait and see. If a serious attempt is to be made to achieve sustainable transport, then a group of nations has to take the lead and demonstrate the art of the impossible. This is the challenge that has been taken up by the EU, and by the end of this book, we hope that considerable reassurance will have been given to the sceptics, and that a strong push will have been given towards policies to promote sustainable mobility at the EU level. The consequences of not taking positive actions are well known, as the environmental and social costs of transport increase. Even within Europe, there are tremendous variations between nations, as some countries have much higher levels of mobility, of car ownership and of energy intensive lifestyles. Other countries have much lower levels of transport consumption, but are rapidly increasing their use of transport. The same patterns are reflected at the sub-national and the local levels within each country (SACTRA, 1999).



Figure 1.1 Physical map of Europe with distances

Our intention is not be prescriptive, but to describe what is happening in Europe at the international level, and to explore through a scenario building exercise the options for change. The approach adopted is a discursive one, based on the development of policy scenarios, through a visioning process, the setting of targets, and the imaginative packaging of policy measures to achieve the scale of change required. At all stages in the process, expert groups have been used to sound out the visions of the future, the targets, and the policy measures and packages. This essential feedback has helped clarify all stages of the research, and it has also helped to highlight cultural differences, omissions, and some of the difficulties in the implementation of effective action. It has also helped to emphasize the need for action and the general support for new approaches to achieve sustainable mobility.

In this book we have taken a necessarily precise definition of sustainable mobility, set within the broader concept of sustainable development. Sustainable development is a global concept and it requires all sectors in society to stay within the total global sustainability levels. Transport and sustainable mobility is one important sector. We have argued that in our future year (taken as 2020), there should be a substantial reduction of nonrenewable energy used in transport from the levels in our base year (1995). In this calculation, we have not included the energy costs tied up in the construction of the infrastructure (and its maintenance), nor in the production (recycling and maintenance) of vehicles using the system. We have only included the energy costs in the use of the transport system. This in itself is a challenging target, as there is a strong expectation that travel will increase by at least 63 per cent over this 25-year period (1995-2020), if current trends and economic growth expectations are continued (Table 1.1). It can be argued that this trend figure is rather modest as the growth over the previous 25 years (1970-1995) was much higher (107 per cent) than the expected increase (63 per cent) over the next two and a half decades.

| | Mode | Volume (billion passenger-km/ billion tonne- km) 1995 | Reference case 1995-2020 | Expected percentage increase reference case 1995-2020 | Actual percentage increase 1970-1995 |
|-----------|--------------|---|--------------------------------|---|---|
| Passenger | Car | 3590 | 5380 | 50 | 125 |
| | Aeroplane | 400 | 1200 | 200 | 250 |
| | Bus | 370 | 480 | 30 | 50 |
| | Train | 290 | 350 | 20 | 40 |
| Freight | Lorry | 1130 | 2260 | 100 | 160 |
| | Train | 240 | 240 | 0 | -5 |
| | Inland water | 120 | 130 | 10 | 10 |
| Total | | 6140 | 10040 | 63 | 107 |

Table 1.1 Expected transport volume development between 1995 and 2020 in EU15 and Norway, Switzerland and Turkey

Note: The reference case is built upon fairly conservative assumptions that growth rates will decrease over time.

Source: ECMT (1997), EUROSTAT (1997).

The imperative to achieve more difficult targets has been set by two landmark global agreements – the Rio Stabilization targets for carbon dioxide (CO_2) emissions (1992) and the Kyoto Protocol (1997), where allowable greenhouse gas emission¹ levels have been assigned for 2008-2012. The total commitment is for the industrialized countries to reduce their greenhouse gas

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emissions by 5.2 per cent on the 1990 levels. Within the EU there is an overall target of an 8 per cent reduction and this has been redistributed according to the internal 'bubble' agreement (Table 1.2). Demonstrable progress in achieving the overall target should be clear by 2005. All the EU15 countries have now ratified the Kyoto Protocol and have the responsibility to achieve their individual mandatory targets. Even though the agreements reached at Rio (1992) and Kyoto (1997) mark a significant change in global policy on the environment and are a considerable achievement in their own right, the real actions need to be taken so that the substantial reductions in CO_2 emissions are realized. This is the new challenge and one that this book directly addresses through the scenario building process within the EU15 context.

| Country | Internal Commitment (% change from 1990 levels) | |
|----------------|--|--|
| Austria | -13 | |
| Belgium | -7.5 | |
| Denmark | -21.0 | |
| Finland | 0 | |
| France | 0 | |
| Germany | -21.0 | |
| Greece | +25.0 | |
| Ireland | +13.0 | |
| Italy | -6.5 | |
| Luxembourg | -28.0 | |
| Netherlands | -6.0 | |
| Portugal | +27.0 | |
| Spain | +15.0 | |
| Sweden | +4.0 | |
| United Kingdom | -12.5 | |

Table 1.2 The internal distribution of the EU15 'bubble'

Source: Grubb, Vrolijk and Brack (1999)

1.2 Rationale and structure of the book

The basic thinking behind the book is that we need to have a fundamental rethink about EU transport policies and priorities so that real progress can be made towards sustainable mobility. Trend-based analysis does not lead in the appropriate direction as it is predicated on trying to mitigate the steady and relentless increase in travel, rather than attempting to stand back and take a longer (and wider) perspective on the problem. Scenario building approaches permit the perspective to be more holistic, trend breaking, and to view transport within its wider economic and social development context. It is the first time that such an exercise has been undertaken, with a range and depth of ideas and experiences, that none of the participants² in the research could have anticipated. This is the rationale for the book. It is intended to present both the scenario building methodologies and the substantive research results. We feel that both the method and the empirical findings offer new perspectives on the understanding of and investigation of transport problems at the EU level.

The book is split into three main parts. In Part 1, the context is set as the recent changes in European transport policy are presented. First, the more general forces of change in the transport sector are outlined, covering the globalization trends in the economy, the new service and knowledge-based growth sectors, the changing demographic structure of the population, the decentralization of cities, the growth in affluence and leisure activities, and the fundamental institutional and organizational changes taking place in transport (caused by technology, privatization and deregulation, for example). Economies (and societies more generally) are in a state of transition and rapid change. In one sense, this may give rise to even greater pressures on the transport system, but in another it suggests there are new opportunities to change the way in which many transactions take place.

In the following two Chapters, Chapters 3 and 4, the more specific trends in European transport are covered, together with the policy responses. It is here that unsustainable growth patterns are described and it is shown that many of the indicators of travel are increasing rapidly (such as the number of vehicles, the volume of traffic, trip lengths), together with the growth in congestion and transport intensity (defined here as a measure of the economic activity – or of the energy consumption – as a ratio of passenger movements or freight movements or a combination of both).

This analysis of trends is complemented by a presentation of the European Common Transport Policy (CTP) since its genesis as part of the Treaty of Rome (1957), which set up the EU, to the latest priorities outlined in the Communication to the Commission on the CTP - Sustainable Mobility: Perspectives for the Future (CEC, 1998a). The final two Chapters in Part 1 of the book present the means by which we can measure sustainable mobility through indicators and targets, together with an assessment of the potential for actually achieving the targets set. One underlying common element is the realization that policy measures have to be carefully packaged together for effective action. Individual policy measures can help, but it is only when individual measures are put together in combination that real progress can be made. This makes the measurement and the monitoring of change important in assessing the effectiveness of the policy packages, and single indicators are likely to be replaced by more sophisticated composite measures. It also means that there must be a continuous process of monitoring so that policy adjustments can be made as and when needed. The process of policy implementation is a continuous and flexible one.

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In Part 2 of the book, we outline the scenario building methodology. This central group of four Chapters brings together the major methodological contributions that this book makes to the analysis of sustainable mobility. First, in Chapter 7, the scenario building process is outlined in terms of its structure, organization and purpose. Included here are a review of past applications, the background literature review, and the use of the backcasting methodology. This Chapter is followed by the two major components of the scenario building process.

Firstly, in Chapter 8, targets for sustainable mobility in 2020 are set. As mentioned earlier, we take as a starting point the assumption that there should be a substantial reduction in the use of non-renewable energy sources in the transport sector (about 20-25 per cent) in our target year (2020) from the level in our base year (1995). From that we calculate the environmental targets that would have to be achieved, and in addition we establish two other sets of targets, one set relating to the economy (cost recovery and subsidy) and the other to the cohesion objectives of the peripheral regions (through accessibility). These targets are central to the estimates of the changes in the amount of travel that can occur in the 25-year period between 1995 and 2020, in both the freight and passenger sectors. As we will see in those Chapters, the actual amount of travel will vary according to the amount of technology push within each of the scenarios.

In Chapter 9, we use these targets for sustainable mobility to help formulate the Images of the Future. These Images are predicated on the assumption of different types of development within the EU, whether there is a cohesive emphasis in policy with strong central direction, or whether decision-making is much more devolved to the regions. In addition to these two fundamental assumptions, we also put a different emphasis on the technological push that will take place and the complementary decoupling policies necessary to reduce transport intensity. It should be noted that these Images of the Future are not prescriptive but indicative of the types of changes that we might expect, and the levels of change that will need to be achieved if the objective of sustainable mobility in transport is to become a reality, given the different policy assumptions. It is not likely that any of these visions will actually be realized: the future is likely to be a compromise between several of these visions.

In the final Chapter of this Part, we put together appropriate policy measures that will help achieve the targets set in the scenario building process. These policy measures must be packaged to promote the interaction between them and to ensure there is complementarity and value added between them. This is where the backcasting procedures are important, because this process allows us to mix packages together, to emphasize the importance of phasing so that new elements can be introduced, and to give some indication of when action needs to be taken by the policy-makers. All these stages of the scenario building process have gone through an extensive validation process with different groups of experts being asked to comment on the targets, the visions and the policy packages. This process is a lengthy one and requires clear objectives to ensure that these three stages of the scenario building process are fully understood, and that the experts can and are contributing fully to the process of modification of targets, visions and policy packages.

The surprising conclusion from this part of the analysis is that there are many ways in which challenging targets for sustainable mobility can be achieved. This achievement can be facilitated through a greater emphasis on the technological improvement on reducing the transport intensity of movement, or through a combination of both. We started out by thinking that our targets for sustainable mobility would be extremely difficult to achieve over this time period (25 years). In practice, we have found that there are several different ways in which these targets for sustainable mobility can be achieved, but in each case strong intervention and action are required beginning in the near future (3-5 years), otherwise the targets will not be achievable by 2020.

Part 3 of the book brings together the policy actions and the conclusions from the scenario building process. In Chapter 11 the different Policy Packages are presented and elaborated. In each case, the policy measures are put together under headings such as the role of the electric vehicle in cities, fair and efficient distribution of mobility (tradable mobility credits), liveable cities, ecological tax reform, promoting dematerialization in the economy, and promoting subsidiarity. We also consider the means by which these packages can be presented to policy-makers and the public. In many cases the basic measures are well known, but the innovative aspect presented here involves the putting together of the measures, so that they are not all seen as being negative, but that there are also strong positive elements within each of the packages.

In the final Chapter we return to the broader issue related to the limits of technology and decoupling. Our conclusions here are that there must be a strong push on both dimensions, if sustainable mobility is to be achieved. In addition, we discuss the important role that the different actors have to play in the process, and the means by which strong support can be obtained both from politicians and business, but more importantly from the general public. It is here that the implementation issues must be debated and discussed in an open forum. Unless there is support for the types of changes discussed in this book, together with the implementation of policy packages, there is little chance that sustainable mobility will be achieved over the next 25 years.

However, as with all such analysis there are still many questions that need to be addressed. In particular, we have concerns over the huge growth in longdistance travel, particularly by air and for leisure activities. This potentially large growth market has not been extensively examined within this research, but should be given far greater emphasis in future.

Within the freight sector, there are many potentially useful measures and packages that could be introduced to increase both the dematerialization of distribution processes, which is already taking place in many sectors, and in the regionalization of distribution networks so that the transport components of many products can be minimized (glocalization). There are many possibilities for reducing the transport intensity of distribution and production processes in the freight sector. The question here is whether this is something that the market can accommodate itself, or should there be strong intervention from the EU and other levels of government. In the passenger sector, it is much harder to achieve the objective of sustainable mobility, critically in the leisure market.

We started out by thinking that it would be extremely difficult to achieve sustainable mobility in the EU through strong policy action, directed either from the centre or through more devolved decision-making. In retrospect, we have come to the conclusion that sustainable mobility in the transport sector is achievable within Europe, provided that strong action is taken at various levels of government and provided that it has the support of the many actors within the process. Furthermore, it may be possible to have strong action on both the technological and the decoupling dimensions of policy. We have found that the necessary policy actions are perhaps not as costly as we first anticipated. So, rather than trading the higher levels of technology with lower levels of decoupling, or higher levels of decoupling with lower levels of technology, it could be possible to push hard on both the dimensions to achieve large reductions in the use of non-renewable energy in transport and the transport sector over the next two or three decades.

Notes

- 1 Greenhouse gases there are six greenhouse gases that are included in the Kyoto Protocol. The most important in the context of this book is carbon dioxide which accounts for 80 per cent of all greenhouse gas emissions from the industrialized world. Transport is a major contributor to CO_2 emissions, accounting for 25 per cent of the total. Emissions of methane (CH₄) and nitrous oxide (N₂O) have declined in the 1990s, but the other three are also important chlorofluorocarbons (CFCs), Tropospheric Ozone (O₃) and Stratospheric Water (H₂O).
- 2 The POSSUM Consortium has members from University College London; Free University of Amsterdam; National Technical University of Athens; the Environmental Strategies Research Group in Stockholm; EURES – Institute for Regional Studies in Europe in Freiburg; VTT – Technical Research Centre of Finland in Helsinki; Warsaw University of Technology; and the Ministry of Transportation of the Russian Federation in Moscow.

Part One

The background context to European transport policy

Forces of change in transport

2.1 Introduction – the drive for mobility

Spatial mobility is at the heart of human activity. It is reflected in nomadic behaviour in historic times, and as long distance commuting in modern times. The Greek philosopher Heraclitus once summarized his view on the world concisely in two words, panta rei, meaning 'everything is in motion'. This statement seems to fit our modern world very well, where mobility, interaction and communication have become a leading characteristic: motion is the driving force of progress. The increasing mobility of persons and goods is also a worldwide source of concern. Clearly mobility is a 'normal' and even positive phenomenon in a growing economy. It may increase economic efficiency through gains of trade and labour mobility and it also offers more social opportunities to all members of society through better access to a wide variety of amenities. But there is a growing awareness that the positive effects of mobility are offset by negative externalities such as environmental pollution, congestion or lack of accessibility, and high accident rates. There have been numerous studies on the impacts of transport on the development of regions and cities (Banister and Berechman, 2000; Bruinsma and Rietveld, 1998) and the social costs of mobility (Verhoef, 1996).

Current trends in transport indicate that the system is moving away from sustainability and that major changes are necessary to make the transport system more compatible with environmental sustainability. The industrialized world has the highest transport mobility rates. In particular, the economic heartlands of the developed world have to cope with unprecedented volumes of traffic, and traffic in urban areas is a major problem causing high social costs. Clearly, transport is a necessary part of economic development, but also causes a wide range of negative externalities in the form of congestion, safety, environmental pollution, landscape destruction and solid waste (discussed in more detail in Chapter 3). According to recent estimates, the external costs of transport (excluding congestion) amount to 7.8 per cent of Europe's GDP (International Union of Railways, 2000), and this figure is gradually rising in all countries. In the light of recent policy targets to reduce not only the growth of pollution emissions, but also their absolute levels, it is clear that transport activities contribute to unsustainable development, especially in urban areas (OECD/ECMT, 1995; Stead, 2000).

A wide range of policy measures has recently been proposed to cope with the high social costs of geographical mobility, such as information campaigns, user charges, emission standards, mobility constraints, new forms of land-use and physical planning, and new transport technologies. The main objective in most urban areas is also to stimulate public transport and to reduce car use (Pharoah and Apel, 1996; Banister and Marshall, 2000). Experiences from different countries and cities, however, have shown that there is no single unambiguous and effective remedy. One observation is clear: at both a global and local scale, modern societies appear to be characterized by an unprecedented increase in spatial mobility. The dynamic behaviour of all actors involved (the demand side) and the rapid change in modern transport modes (the supply side) have led to a dramatic rise in the 'mobility radius' of individuals and businesses.

Clearly, transport and communications systems have never been static, but always in a state of flux. In general, transport modes appear to exhibit a product lifecycle marked by phases of take-off, adoption, market penetration, large-scale use, saturation and declining market shares. They then tend to be overtaken by more adequate transport systems. Parallel to transport technologies, transport management styles also exhibit similar lifecycle phenomena. Technical change may intervene here by providing new hardware to facilitate better control or enhance the quality of information, but even if no new technologies or management styles become available in the near future, drastic change in the flows of persons, goods and information might still emerge, notably for two reasons.

In the first place, we increasingly witness a shift in emphasis from isolated transport modes towards integrated systems technology. This implies a more efficient use and management of (sometimes competing) transport infrastructure. It should be noted that an open European market will supposedly generate a high degree of internationalization of all national economies, thus including an increase in international freight transport, commuting and telecommunications. In short then, we notice that transport cannot be conceived of as a self-regulatory system.

Secondly, in the long run, different transport modes may change fundamentally, since various current modes of transport seem to be in the final phase of their lifecycle. In addition, completely different modes of transport may appear. The current revolutionary changes in the field of superconductivity may induce a new generation of rapid, environmentally friendly and energy saving vehicles. In the field of passenger transport, new developments causing changes on the demand side may be distinguished, such as demographic ageing processes, new forms of lifestyle, increased labour force participation, urban sprawl, increased use of telecommunications, flexibility of economic activities, and so on.

In this Chapter, we present a broad perspective of the changes that are taking place globally and in Europe, as they impact upon transport. It is not a deterministic view that all futures are known and that the continued growth in mobility is inevitable. This Chapter recognizes the recent periods of unprecedented change with new driving forces appearing in the economy. The general perspective is one of optimism and opportunity, as technology and new forms of production allow us to be even more efficient and competitive (Sections 2.2 and 2.3). These fundamental economic forces are then set against the new challenges taking place in Europe (Section 2.4), particularly in terms of expansion and integration of the EU and the implications for transport (Section 2.5). The difficulty and scale of the changes required in the transport sector, if we are to develop policies based on sustainable mobility, are also recognized (Section 2.6). This Chapter throws down the challenge which is taken up in the substantive scenario building analysis in Part 2. It sets the scene on the nature and scale of change taking place globally, and as it affects Europe. Indirectly, it also accepts the uncertainty of the future, but it equally accepts the need for new approaches to analysing that uncertainty.

2.2 Recent developments in transport, communications and mobility

At the outset, it should be noted that transport, communications and mobility are rarely (if ever) used or provided for their own sake. They are usually regarded as 'derived demand'. In other words, they are a means to achieving objectives associated with everyday life in our society, such as getting to and from work, and they reflect a basic division which has come to characterize industrial societies - the increasing spatial separation and fragmentation of activities. The demise of the local shop is one such example. The concentration of major public sector investments in, for example, health care or educational facilities in the form of very large all purpose hospitals or schools, is another (see, for example, Stead, 2000). These trends, combined with the increasing tendency for people's homes to be located in suburban and peri-urban areas, create spillovers and consequences for transport policy, not only at a local scale, but also at a national level, while at the same time the importance of the information sector for reinforcing the dynamics of spatial communication is increasing. Some recent developments in this field will briefly be described here in order to sketch a background for this book. The main emphasis in this Section will be on freight transport, passenger transport and information/communication transfer.

2.2.1 Freight

In the area of freight transport we observe the following developments in many European countries:

- 1 The production of more and more high value, low weight commodities. A decreasing amount of material is needed per unit of national product (dematerialization). This is partly due to the growing share of the service sector, such as the information society in the economy. On the other hand, more sophisticated products are made, while at the same time savings in the use of raw materials have been achieved.
- 2 Due to a growing segmentation in lifestyles and in product technologies, a more market oriented approach has come to the fore. More diverse, smaller products play an important role, with direct consequences for the geographical distribution of resources and products. Given this shift in product types, road and air transport carry an increasing share of total transport at the expense of modes that used to be more efficient for bulk products (such as water transport and pipeline transport).
- 3 At the same time, combined transport of previously competitive modes, especially road-rail transport (container traffic) and road-air transport, is becoming more important, in order to increase efficiency and to avoid congestion.
- 4 The development of transport informatics and logistics as key factors for more transport efficiency and integration is also important. The JIT (just-in-time) principle is one such an example. These trends will affect the spatial configuration of European economies substantially (in terms of mobility patterns and location patterns for example). A further shift in the emphasis of activities of large worldwide transport operators from physical exporter to the role of co-ordinator may be expected. Concepts like door-to-door transport and, increasingly, person-to-person transport (for reasons of security), demand a refinement of the distribution pattern and at the same time greater flexibility. However they also imply fewer degrees of freedom due to these integrated transport concepts.
- 5 An important element in a European economic context is the globalization of the economy in general. This global shift goes hand in hand with an economic reorientation. Products are increasingly being made by transnational companies for worldwide markets. Energy, raw materials and intermediate goods are obtained at great distances. Within Europe this trend will result in large flows of products between countries. These dynamics constantly call for adaptation and, more importantly, for anticipation of changing economic conditions. It is also clear that this globalization needs full exploitation of telematics possibilities, although the spatial, organizational and socio-economic effects of telecommunications are in general difficult to predict (see Nijkamp *et al.*, 1996).

2.2.2 Passenger transport

In addition to changes in freight transport, there are also significant changes in passenger transport which are related *inter alia* to demographic, socioeconomic and technological developments. Some important developments in the field are:

- 1 Changing population growth. In most Western European countries, birth rates are decreasing and the number of older people is growing, although migration rates and spatial mobility still cause a considerable degree of spatial dynamics. This demographic trend will have serious impacts on the quantity and composition of the working population in the next century, in terms of labour shortages for example.
- 2 The trend towards smaller and alternative types of households, which affects the need for housing (higher space consumption per head, a disturbed housing market and higher car ownership).
- 3 After the economic crisis in the 1980s, most countries have experienced stable or slowly increasing income levels which have affected mobility. We now see a dramatic increase in the number of first and second private car owners, partly due to an increase in female labour force participation, partly due to an increase in part-time employment, and partly due to the second generation of suburbanized households. In many cases recent European statistics indicate that motorization has resumed its growth after the economic crisis of the 1980s, resulting in an ever increasing private car use at the cost of public transport modes.
- 4 Another geographical development in almost all European countries concerns increased commuting and urban sprawl (suburbanization). Generally speaking, rising incomes have contributed to higher car ownership and an increased separation between home and work. Furthermore, the distance between activities has grown considerably. These changes took place at the expense not only of public transport but also at the expense of the environment, particularly in and around large cities.

2.2.3 Information and communication

In the field of information and communication transfer we have witnessed various important changes. Examples are:

1 Production systems going through a phase of structural transition, in which information plays an important role in improving the effectiveness and efficiency of logistic organizations. These future production systems may be expected to exhibit closely interwoven interactions in which communications and transport play a key role. The just in time (JIT) concept, for example, causes an increase of delivery frequencies, and with it an increase of road haulage.

- 2 Although from a technical viewpoint the modern telecommunications sector can be seen as a substitute for many physical interactions, this modern technology will be necessary in order to compensate for the rapid increase in physical and human interactions in modern society. At the moment there is incomplete evidence in this respect, especially because the developments in the field of transport logistics and telecommunications are experiencing rapid growth.
- 3 High-tech, telecommunications and telematics will have a large impact on the development of new rapid modes such as high-speed trains and larger aeroplanes. Modern electronics and informatics have the potential to provide more environmentally friendly solutions. New transport technology, pre-programmed routing and efficient organizational structures and management will make such developments possible.
- 4 Advanced communications technology may structurally change the demand for passenger and freight transport (telecommuting or teleshopping, for example). On the other hand, the information society may lead to more flexible working arrangements with an increasing number of commuters without a fixed place of work, relying more heavily on the car.

This sketch of important developments in the field of commodities, passengers and information illustrates the importance of the new drive for mobility. Transport provides a clear illustration of the wider changes that are taking place in the global economy. These in turn are resulting in new patterns of mobility and they have strong implications for all aspects of economic life.

2.3 The changing economy

The transformation from stable development to structural dynamics is a marked and noteworthy feature of our modern economy. The external environment of business life has drastically changed in recent years: new markets, new international policy arrangements, new technologies, new tastes of consumers and so on. Business life is faced with a great variety of new challenges and opportunities. In this Section we address four major driving forces impacting on mobility behaviour and their expected consequences for economic activities (see Figure 2.1). These four drivers are: the emergence of global markets, the development of industrial networks reflected in particular in various forms of outsourcing, the rise in flexibility in working arrangements leading to a 24-hour economy, and the trend towards economic and political power concentration in large-scale agglomerations.



Figure 2.1 Driving forces of mobility

2.3.1 The emergence of global markets

Although it is an exaggeration to call the world a global village, it cannot be denied that the action radius of economic activities has increased to an unprecedented degree. The rise of global markets and global players is particularly noteworthy. The globalization trend not only leads to the flow of more goods, services, people and information, but is also accompanied by new foreign investments, not only in the industrialized heartland of the world, but in all regions where new opportunities are likely to emerge. This means that there is a trend towards a Schumpeterian1 economy with a strict competition for new market opportunities.

In the same vein we also observe the development towards globally operating commercial companies. The globalization trend is also reflected in worldwide integrated product markets, access to global knowledge and technology, and the emergence of global capital markets. The improvement in transport technology and the extension of transport networks also causes a geographical spread of commodity markets.

Business enterprises are shifting their operations towards locations with the most favourable cost-efficiency or productivity. New competitive factors seem to become important drivers of location and investment decisions of entrepreneurs. This holds not only for globally operating, multinational companies but also for firms with a local or regional sales market, which are faced with strong competition from outside.

In a competitive global market we observe monopolistic competition elements with distinct market niches, a phenomenon sometimes called the 'hamburger economy'. This type of economic organization is based on rationalized and standardized products (Coca-Cola, McDonalds and so on), which have a worldwide image, and whose marketing activities have a high penetration rate. Thus, it seems that the trend towards global markets will be accompanied by a trend towards worldwide market niches.