

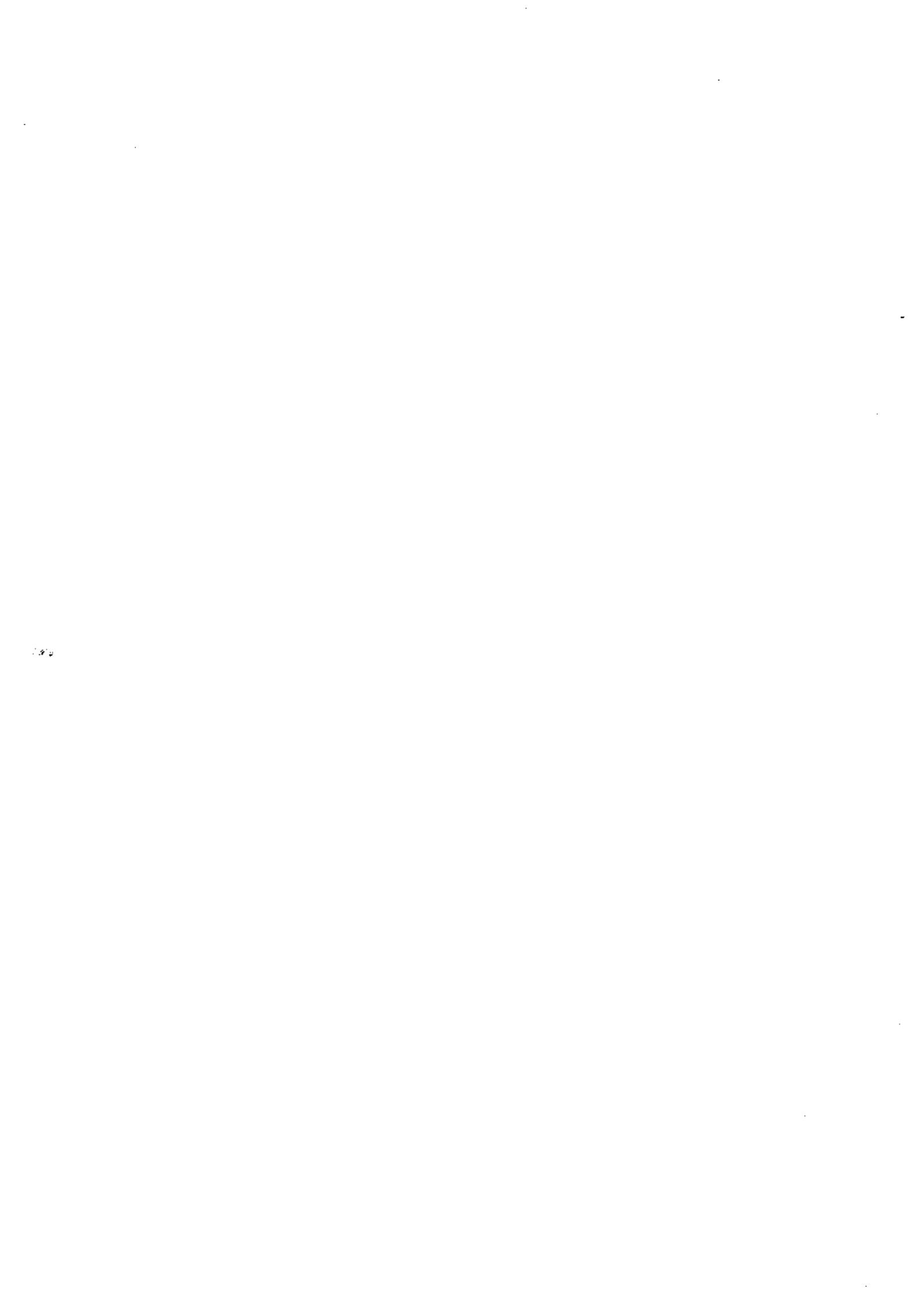
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003**SERIE RESEARCHMEMORANDA**MOBILITY AS A SOCIETAL VALUE :
PROBLEMS AND PARADOXES

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MOBILITY AS A SOCIETAL VALUE :

PROBLEMS AND PARADOXES

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1. Introduction

Mobility in a modern society has two faces: increased access to many facilities due to the advanced transportation technology (reflected inter alia in the Concorde, the Hoovercraft and the Shinkansen) and increased decay in quality of life due to congestion, pollution and noise annoyance. These contrasting (and sometimes paradoxical) developments have placed the mobility of man and society in the centre of scientific and political interest.

The control of this mobility process is also fraught with many limitations: it seems as though mobility acts as an avalanche which cannot be stopped anymore. The 'homo mobilis' is apparently a spatial actor whose spatial behaviour is hard to influence. Market solutions and/or institutional solutions (regulations, e.g.) may be helpful to bring about a marginal change in the mobility pattern, but mobility itself appears to have a very firm position in the hierarchy of needs of individuals, households or groups.

The integral rise in mobility in the past decades is marked by various characteristics:

- The mobility is an integrated process in which multiple actors with multiple motives (consumers, entrepreneurs and government agencies) play a joint role: residential mobility, job mobility, recreation, commuting, shopping, entrepreneurial relocation and geographical decentralization reflect the same tendency.
- The mobility is - according to Say's law - a derivative of the supply of physical communication infrastructure (such as road and railway infrastructure): the 'hardware' determines the rise in 'software'.
- The mobility pattern reflects structural changes in modern societies: increased interaction patterns, increased leisure time, simultaneous occurrence of geographical concentration and deconcentration, increased labour force participation by women, and differential dynamics (fast dynamics versus slow dynamics, or different adjustment speeds) between the components of an interwoven spatial system (cf. Johansson and Nijkamp, 1984).

In conclusion, mobility has become the medium through which a modern society generates and enjoys its welfare, so that it is no surprise that mobility trends are hard to influence.

Clearly, the mobility processes in the past decades have also had a significant impact on the subject matter of such disciplines as geography and regional science. In the period before the sixties much attention has been focused on location analysis, while in more recent decades the analyses of spatial interactions and processes has come to the fore (cf. Masser and Brown, 1977). Especially in the seventies the 'geography of movement' has opened a rich field of scientific research (cf. Lowe and Moryades, 1975). So far, two new trends can be observed in the eighties, viz. the analysis of individual spatial choice processes (cf. Nijkamp et al., 1984a) and the analysis of structural spatial changes (cf. Nijkamp et al., 1984b). In the present paper, particular attention will be focused on these two issues and their consequences for assessing the societal relevance of geographical mobility.

2. A Typology of Locational Mobility

In the past century, human settlement patterns have exhibited significant changes. Approximately, a century ago only one percent of the total world population was living in cities with more than one million inhabitants, while nowadays more than ten percent is living in such metropolises (cf. Button, 1976). To take another example: Sao Paolo had in the year 1900 approx. 250.000 inhabitants, while according to United Nations forecasts this city will have more than 25 million inhabitants by the year 2000 : an increase with a factor 100 in 100 years!

This tendency toward a higher spatial concentration has led to many diseconomies: congestion, criminality, segregation, pollution, and decline in residential quality. These agglomeration disadvantages have acted as a new stimulus for spatial mobility, as many people have made an attempt to avoid these diseconomies by moving to suburban and rural areas, thus causing again environmental deterioration and energy consumption. Thus we see here again one of the most striking paradoxical aspects of mobility: mobility causes negative externalities, which evoke new mobility in order to avoid such external effects; this new mobility causes again social costs, etc. Altogether the spatial mobility pattern exhibits a cyclical pattern.

Such a cyclical pattern has been identified in many European countries (see Van den Berg et al., 1982). The spatial development phases of many cities in Europe can be characterized by the following sequence of spatial-urban processes: urbanization, suburbanization, desurbanization and reurbanization. It should be added however that this is only a superficial representation of complex spatial developments. First of all, many of these processes have been highly selective: high- and medium-income people acted as trendsetters for the spatial dynamics in modern societies; less wealthy people and specific groups (guest workers, ethnic minorities, one- and two-person households) stayed within the city (or moved into the city). Consequently, the spatial distribution of people reflects at the same time a socio-economic segregation.

In the second place, it should be noted that locational mobility may exhibit complex spatial movements. Suppose we make a distinction between the core of a city, a suburban ring, an intermediate area and a rural area (see also Figure 1.). Then a wide variety of spatial

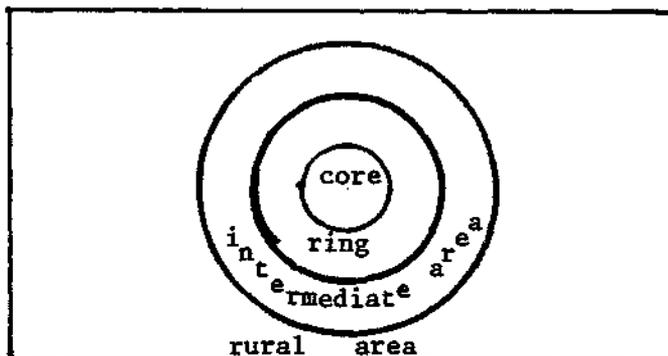


Figure 1. Configuration of a spatial system.

and urban development processes can be distinguished. Table 1 makes an attempt at representing these processes by examining the combinatorial possibilities of the net spatial flows to all 4 areas concerned.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
core	+	+	+	+	-	-	-	-	+	+	+	-	-	-
ring	-	+	+	-	-	-	+	+	-	-	+	+	+	-
intermediate area	-	-	+	+	-	+	+	-	-	+	-	+	-	+
rural area	-	-	-	-	+	+	+	+	+	+	+	-	-	-

Table 1. Combinations of locational movements in a spatial system.

Legend: + net increase of population share
 - net decrease of population share.

For instance, case 1 is a situation where the core of a city is growing in the detriment of its ring, its surrounding intermediate area and the rural areas, so that this is the most pure form of urbanization. Analogously, case 2 is a pure form of a combined urbanization-suburbanization, while case 13 is a pure form of suburbanization. All kinds of

pure, intermediate and mixed configurations can be distinguished by means of Table 1.

Several cities in western countries (for instance, Berlin, Amsterdam) exhibit a decline in the population share of the whole agglomeration, while intermediate areas are growing; this situation corresponds to case 6 or 14. On the other hand, a policy of urban renewal and of compact city design which aims at revitalising the whole urban agglomeration can be represented by means of case 2 or case 11.

It should be noted that a similar Table can be designed for entrepreneurial mobility. Cities have lost many industrial activities due to entrepreneurial movements to suburban (or sometimes intermediate) industrial areas. On the other hand, nowadays there is also an increased tendency for small-scale business activities to flourish again in the cities. For instance, Naisbitt (1983) claims that approx. 70 percent of current economic activities is related to the information sector, which does not necessarily require a location in urban centres. In addition to this 'high tech' however there is also a trend toward a 'high touch' (small-scale activities based on face-to-face contacts, e.g.), which needs the city as a breeding place. Altogether, the present mobility patterns of entrepreneurs are highly complex and exhibit mutually contrasting developments.

It is clear that a superimposed pattern of household and entrepreneurial mobility processes based on Tables 1 and 2 would provide an adequate picture of the actual locational movements in a dynamic spatial system. A research agenda for analysing in a more detailed way these mobility processes would have to include at least the following two important items:

- a more adequate analysis of the individual behavioural backgrounds and driving forces of mobility;
- a more appropriate impact analysis of public policy instruments upon mobility patterns.

Both issues will be discussed subsequently.

3. Spatial Choice Analysis: A Concise Overview

Spatial choice and interaction analysis has already a long history. This issue made up essentially the heart of economic geography and regional economics, in so far as these disciplines focused attention on the location of firms or the settlement patterns of families or groups in a country (see also Fischer and Nijkamp, 1984).

The first formal contributions to spatiotemporal aspects of choice behaviour can be found in traditional space-time geography (see, for instance, Hägerstrand, 1970). In a modelling framework, location-allocation models based on programming theory have played an important role in aggregate spatial choice and interaction analysis. In the seventies, categorical spatial choice models focusing on distinct alternative choices have come to fore. Categorical spatial choice models aim at describing, explaining and forecasting disaggregate choice behaviour in a spatial context (for instance, in housing market, transportation and labour market analysis). In a later stage, also panel studies and longitudinal data analysis have drawn a great deal of attention in spatial choice research, while simultaneously also the spatial activity-based approach came into existence. Very recently, also event-history analysis has demonstrated its potential in discrete spatial choice analysis.

Spatial choice models may be classified on the basis of criteria such as:

- the level of aggregation,
- the nature of the choice process,
- the element of time,
- the attributes of alternative choice items,
- the impacts of choice decisions,
- the planning aspects of spatial choice models.

On the basis of these criteria, the following main classes of spatial choice models may be distinguished:

- programming models
- gravity and entropy models
- catastrophe and bifurcation models
- micro simulation models

- deterministic utility-based models
- conventional random utility-based models
- generalized random utility-based models
- psychometric behavioural models
- activity-based choice models
- search models.

Random utility models aim to provide an operational framework for spatial choice problems by regarding choices as events with a certain probability distribution, so that the probability of a certain event is co-determined by the observable attributes of the choice alternatives.

According to Van Lierop and Nijkamp (1984) such random utility models have the following advantages compared with deterministic approaches:

- more adequate treatment of behavioural aspects
- more precise description of actual spatial interactions
- more satisfactory analysis of the process nature of choices
- greater flexibility in specifying choice models
- better possibility to include categorical data
- more adequate tests of the statistical validity
- better possibility to include policy variables
- better possibility to include inter-actor interactions.

Especially the class of random utility-based spatial choice models has become an important analytical tool in analysing the backgrounds of spatial mobility patterns. Several versions of such utility-based models may be distinguished, such as:

- conventional random utility models (logit analysis, e.g.)
- general extreme value models
- multinomial probit models
- elimination-by-aspects models
- multilevel logit models
- dogit and tobit models
- negative exponential distribution models, etc.

Clearly, the choice in favour of one of the abovementioned spatial choice models is not unambiguous, as this depends on the nature of the data and the specific research aims. In general, however, the multinomial probit model has many advantages compared to other model candidates, such as: flexibility, introduction of taste variations, statistical robustness, introduction of structural state dependence, possibility of consistent aggregation, and avoidance of the 'independence of irrelevant alternatives' axiom (see for more details Van Lierop and Nijkamp, 1984).

In conclusion, a wide spectrum of analytical instruments for describing, explaining and forecasting spatial choice behaviour and spatial mobility patterns is available (see also Jansen et al., 1984). Two aspects are still underdeveloped, however, viz dynamic aspects and policy aspects; they will be further discussed in the sequel of this paper.

4. Impact Analysis of Public Policies

It has already been mentioned that people tend to have a hate-love relationship with respect to mobility. Mobility opens the way to a wide variety of personal and professional contacts, to a participation in various amenities, and to an increase in the stock of knowledge. Mobility leads to an increase in the efficiency of production factors and to a rise in the utility of goods. Beside these positive aspects also a wide variety of negative externalities have to be mentioned: congestion, decrease in safety, environmental degradation, exhaustion of energy, noise annoyance, land use, destruction of valuable monuments, etc. A city like Athens has become a glaring example of the negative impacts of spatial mobility.

It is conceivable that several policy measures have been proposed and implemented in order to keep the mobility processes under control. In several cases, fairly unrealistic policy goals have been advocated, such as the reduction in mobility. Even apart from the fact that mobility is closely connected with the economic performance of a country and is thus hardly controllable, it has to be mentioned that the mobility does not exist.

Mobility is made up by a wide spectrum of possibilities, such as professional mobility, entrepreneurial mobility, residential mobility, recreational mobility, social mobility, shopping mobility, etc., each of these options having its own specific driving forces. Crude measures which do not discriminate between these various mobility modes may then do more harm than good. Moreover, spatial mobility may have a multiple purpose character and also a selective socio-economic distributional character. These considerations lead to the conclusion that mobility policy is necessarily multidimensional in nature and needs a fine tuning of all measures to be taken.

An impact analysis of policy measures on spatial mobility is hampered by many limitations:

- the aims of a mobility policy may be in conflict with other aims of a socioeconomic policy;
- various elements of a mobility policy (infrastructure policy, compact city design, e.g.) may require a very long time, while mobility patterns themselves may exhibit rapid changes and

- adjustments to new circumstances;
- the constraints within which a mobility policy has to be implemented are often fuzzy or uncertain in nature (cf. the uncertainty regarding the stock of oil reserves);
- mobility policy is in general a meso- or macro-policy which is unable to discriminate between the individual motives of the 'homo mobilis' (cf. also our discussion of behavioural issues in section 3).

Consequently, the assessment of integral - rather than partial - effects of a mobility policy is very problematic, especially because also various counter-intuitive results may emerge. For instance, a reduction in private transport might lead to a reduction in daily mobility, but might consequently on the other hand also lead to a greater interest in the residential quality, which might in turn cause a higher priority to a more spacious living environment. Such substitution processes are hard to trace, although it is necessary to make an attempt at assessing all direct and indirect impacts of policy measures regarding mobility behaviour.

In this regard, an integrated systems approach based on a qualitative impact assessment may be extremely meaningful. This qualitative impact analysis is based on a 'qualitative model' of a complex system (made up of edges, nodes and dynamics) represented by means of an arrow scheme (cf. Nijkamp and Van Pelt, 1984). The arrow is constructed such that all linkages that do exist between variables are represented (see Figure 2).

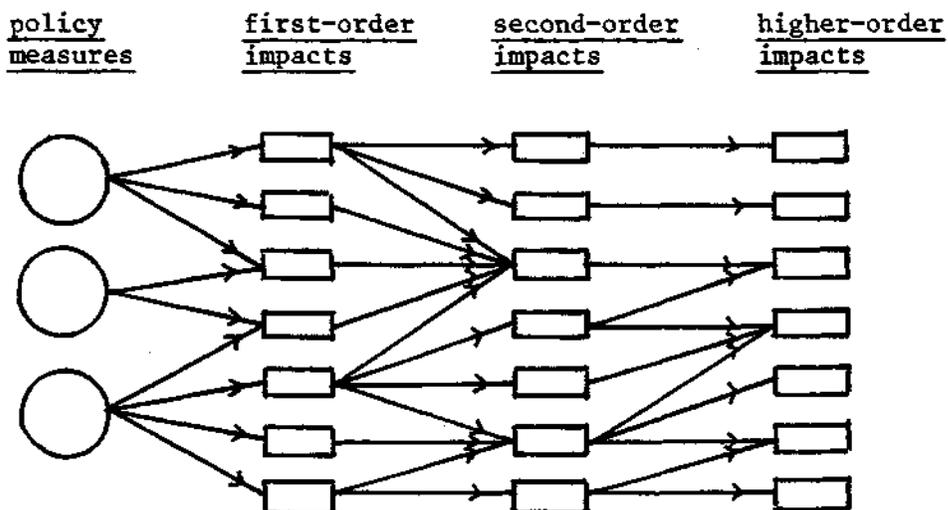


Figure 2. A qualitative systems representation for impact analysis.

The logic of this approach is very simple: given the intuitive qualitative model, the direct impacts of policy measures upon certain variables have to be assessed as accurately as possible. If no formal model does exist, ad hoc procedures and heuristics have to be used. Then the second-order impacts related to the first-order impacts can be assessed along similar lines; if no quantitative information is available, qualitative information (rankings, binary codings) can be used as well. The procedures will be continued through all stages of the qualitative model until the reliability of the sequence of impacts becomes almost zero. Several applications have demonstrated the feasibility of this approach (see also Nijkamp, 1982). The results can be included in a qualitative impact table (see Table 2), which represents all direct and indirect effects of policy measures.

It has to be added that the evaluation of various policy strategies is a next step of the analysis. In this respect, two types of evalua-

<u>policy measures</u>	<u>effects</u>		
	<u>first-order effects</u>	<u>second-order effects</u>	<u>higher-order effects</u>
price policy supply policy regulations etc.			

Table 2. An impact table of policy measures.

tions for alternative strategies can be carried out:

- a monetary evaluation based on a social cost-benefit analysis
- an integral evaluation based on multiple criteria analysis.

A monetary evaluation of pros and cons of effects of alternative mobility policies is an almost impossible task, as it requires a proper transformation of all relevant impacts into a common monetary denominator. So far, integrated monetary assessments on a national basis have never been made; only partial attempts have been made, for instance, the net benefits of spatial concentration versus deconcentration, or the net benefits of private transport versus public transport.

A multiple criteria evaluation of alternative policy strategies is also fraught with many difficulties due to lack of insight into political priorities, though it has to be added that on a partial basis (for instance, a regional or urban scale) several attempts have been made to evaluate the effects of mobility policies.

5. Selective Mobility

It has already been indicated that mobility is always a selective process: it discriminates according to age, income, race, and many other attributes. In migration analyses these attributes are even often included as explanatory variables. In this respect, locational mobility appears to be a mirror of the age, socioeconomic and ethnic composition of society.

In recent years, also the issue of selective transportation mobility has come to the fore (see, for instance, Maggied, 1982). In an earlier article, Koutsopoulos and Schmidt (1976) have tried to make a systematic listing of all constraints that hamper the individual mobility. They made a distinction between trip-making constraints (physical constraints, psychological and informational constraints, and socioeconomic constraints) and environmental constraints (locational constraints, administrative constraints and demand-response constraints). The specific weight exerted by each constraint will then determine the transportation mobility pattern of people (both car-owners and carless people).

Alternative studies in the area of selective transportation mobility have been carried out by Passwell and Recker (1978) and Webber (1973). The common conclusion in many empirical case studies is that mobility (for instance, total travel time of daily activities or number of migration movements per year per individual) is an increasing function of income (see Figure 3), though this curve has evidently a saturation level.

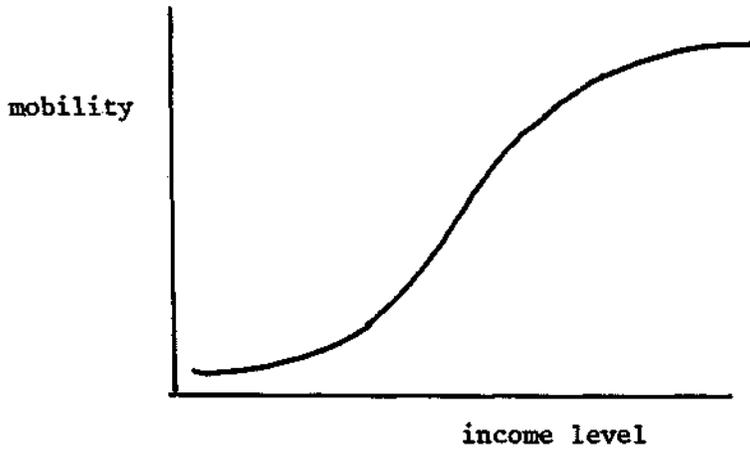


Figure 3. Mobility as a function of income.

The relationship between location, sex and travel mode choice for journey-to-work decisions exhibit also a high degree of selectivity, as is also reflected by Figure 4.

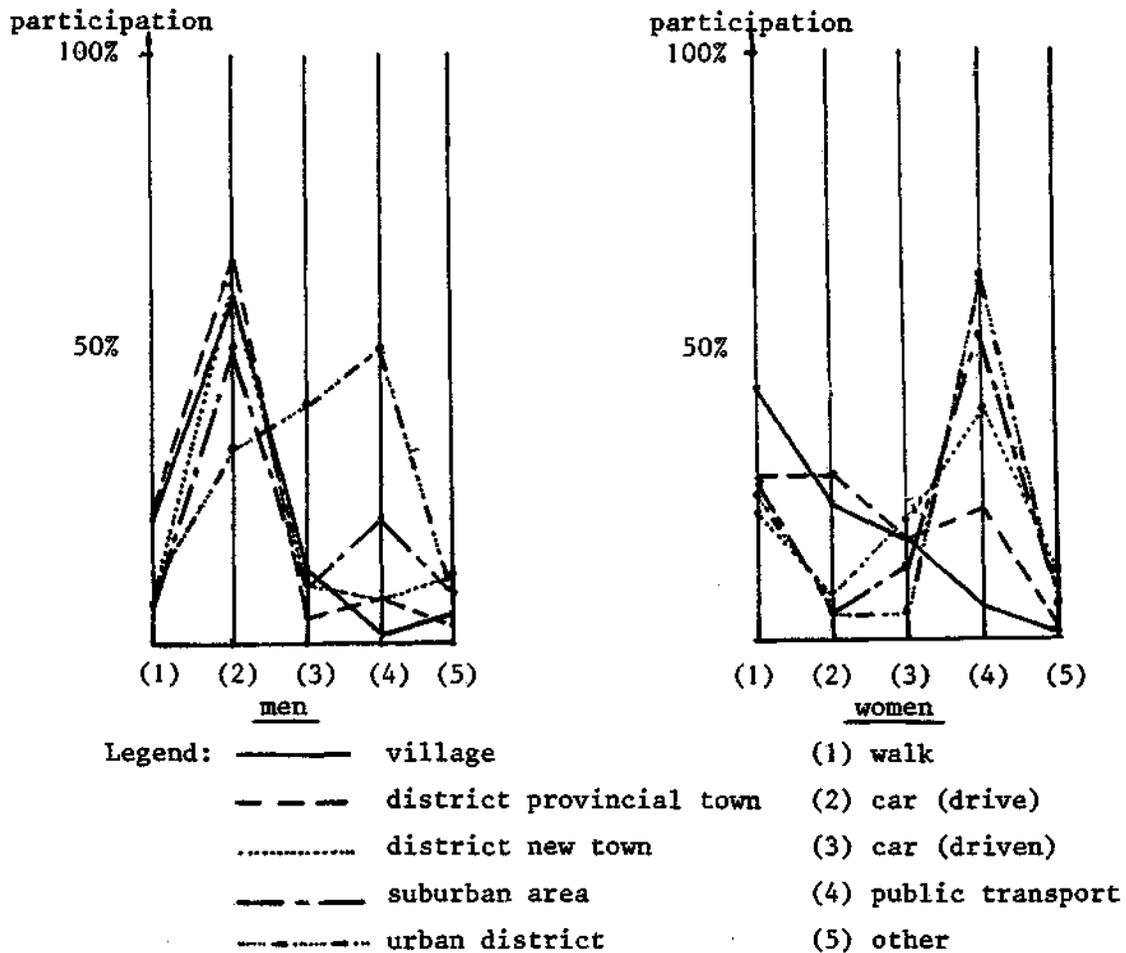


Figure 4. Travel-to-work, by sex and by area (adjusted from Hillman et al., quoted in De Boer, 1980).

In a recent paper, Kutter (1984) questions the trends in physical planning to design a selective spatial lay-out that support the current status quo: settlement and town planning fulfills the needs of an 'automotive' society, based on a segregation of functions (working, shopping, living, recreation, etc.) and the transportation sector has gained an important societal power. He states that in the recession period of our post-industrial society a critical re-evaluation of current planning modes is necessary, with a particular emphasis on the assessment criteria which favour to-day the car in an extreme fashion. Instead of 'planning for transport' he makes a plea for 'planning to enable societal activities'.

The obvious conclusion can be drawn from this section that, if (i) mobility is so closely connected with income, age and location and (ii) structural changes in our society continue to affect the socioeconomic, demographic and locational pattern, profound changes in mobility patterns are to be expected (see also section 7), while it will also become increasingly difficult to pursue a mobility policy that will have a structural balancing effect on selective mobility.

6. Mobility and Recession

How much mobility do we need in order to maintain a growing economy?
And how much is mobility affected by the economic recession?

Many countries have exhibited a fairly sharp rise in oil prices after the first and second energy crisis in the seventies. Altogether however, the net average increase of oil prices over the last decade has been fairly modest: it has on average in most countries kept pace with the general rise in consumer prices. Yet, psychologically the oil crises have had a deep impact on technology and mobility, which is also reflected in increased attempts at constructing more energy-efficient equipments, designing more fuel-saving cars and building more energy-efficient compact cities.

At the same time, due to the economic recession the locational mobility in many countries has drastically decreased (cf. Jansen et al., 1984). Especially two factors favoured this reduction in mobility: the poor perspectives on the labour market, so that people tend to become more risk-averse regarding the choice of a new job and a new residence, and the collapse of the housing market, so that house owners can only sell their property against a considerable loss. Though reliable figures for most countries are still lacking, there is some empirical evidence that the locational mobility trend from the sixties and the seventies does not continue in the eighties.

More empirical research has already been done in the area of transport mobility. It appears that in many countries car ownership and use is stagnating. Whether or not these new circumstances herald a change in the direction of transport planning, however, is difficult, as the answer to this question requires a deep going analysis of the features of the car market, of transport mobility and of household expenditure patterns (see also Allanson, 1982, Bates et al., 1981, Button et al., 1982, and Ferguson and Mogridge, 1984).

Bly (1984) has reviewed the available evidence showing how travel has been affected by the fuel rise prices and recurrent economic difficulties which have followed from the initial oil crisis in 1973-1974. Clear empirical results are hard to achieve, as the most severe effects of the recession have been felt only fairly recently. It turns out that thus far rising fuel prices have caused a measurable fall in road traffic, but the short-term elasticity is small and in the longer term the effect may even be smaller, as people shift to more fuel-efficient vehicles and continue to cover much the same distance by private car while still spending much the same portion of their budget as they did previously. Car ownership has continued to increase in most countries, although at a much slower rate than before. Some countries, however, show a reversal of this abovementioned trend. For instance, Denmark has exhibited a reduction of 4 percent in the number of cars registered since 1979, while there is also a slight decline in household car availability in the Netherlands since 1980.

Road traffic in Denmark has fallen even more sharply than car ownership, by approx. 10 percent between 1978 and 1981, while also several other countries have shown reduction in traffic recently. In some countries there has also been a moderate shift from car to public transport. The author concludes that it seems likely that, unless the future holds a long-lived and sizeable reduction of real disposable incomes, the general tendency will continue toward increased dependency on private cars and dispersing land use patronage which are difficult to serve by public transport.

The foregoing notions clarify once more that the relationships between spatial mobility, car ownership and use, expenditure patterns and economic recession are fairly complex. This is also reflected by a small sample of 79 respondents in the Netherlands. These respondents were classified according to car owners and non car owners and were asked which adjustments in expenditure patterns had become necessary in order to cope with the present recession. The results of this survey are included in Table 3.

	car-owners	non car-owners		Total
		never owned car	previously owned car	
I. Persons not economizing at all	9	3	2	14
II. Persons economizing, but not on transport	18	6	1	25
III. Persons economizing on transport and other things	17	3	7	27
IV. Persons economizing only on transport	4	0	1	5
V. Persons who claim not to be economizing on transport, but who are doing so	3	2	3	8
Total	51	14	14	79

Table 3. Results of a survey on effects of economic recession on expenditure patterns (Source, Baanders et al., 1984).

One more problem has to be mentioned. If the economic recession leads to a reduction in car use, a shift toward public transportation is a plausible consequence. However, in many countries (if not all) public transportation is confronted with deficits. The tendency to shift to public transportation would then lead to more passenger kilometers by means of public transportation and hence to higher deficits. As a consequence, public transportation might have to reduce its service level or to increase its fares in order to stay within its tight budget. This would imply that transportation mobility based on private transportation would lead to higher societal benefits.

Holtgreffe (1984) has shown that such a pessimistic picture is not realistic. After an analysis of the cost structure of different transport modes, he concludes that the flexibility in changing supply of public transportation facilities is high enough to restrict the rise in costs. Thus a careful planning of public transportation may avoid the negative effects of the economic stagnation.

7. Analyses of Structural Change

At present the spatial configuration of many countries is in a period of rapid transition. Especially in the developed countries, a shift from a phase of growth to a phase which can be characterized by stagnation and decay of economic functions of the city can be observed. These transitions affect urban systems in a structural way. Not only are some key factors within the system exhibiting drastic changes, but also the interaction pattern between components of complex dynamics. Such structural changes may cause these systems to move to a new equilibrium state or a sequence of bifurcations.

Spatial interaction patterns in a complex system are not an isolated phenomenon per se. Their developments can only be understood as the result of changes in key components governing that system (such as housing, employment, retailing, e.g.). In order to explain, predict and evaluate these developments, a dynamic systems approach focusing attention on dynamic trajectories of a spatial system is necessary.

If we restrict ourselves to urban agglomerations, the question may be asked whether an scientific box of tools is adequate to analyse the pattern of structural changes. This would require a review of dynamic urban models and theories. A closer look at the literature in this field reveals a great diversity of approaches, while there is only a limited number of models or theories that is actually capable to take into account structural changes in urban systems (see also Nijkamp et al., 1984b). From this set, only a smaller subset can be identified that is also focusing attention on spatial mobility in the context of structural change (see for a short overview Table 4).

Various models or theories take for granted that urban fluctuations inevitably must occur in a dynamic urban system. Possible causes for such cyclical endogenous patterns in a spatial system are:

<u>Model</u>	<u>Purpose*</u>	<u>Scale of Analysis**</u>	<u>Time</u>	<u>Spatial Mobility</u>	<u>Methodological Model/Theory Analytical/Empirical***</u>	<u>Definition of the System System Elements</u>	<u>Internal/ External Factors</u>	<u>Incorporating Structural Change</u>
1. Allen (1981)	D/P/P	B-C	fast + slow	commuting and migrations between zones; accessibility	model AN	industrial, commercial, residential actors	both	+
2. Anson (1974)	D	C	slow	spatial distribution of accessibility	formal AN	population density, rent, opulence	internal	-
3. Van de Berg et al. (1982)	D	B-C	medium fast + slow	migration between core, ring, periphery; changes in transport system	theory EM	population, employment, government	internal	+
4. Forrester (1969)	F/P	B-C	slow	immigration from urban environment	model AN	industry, housing, labour	internal	+
5. Jacobs (1961)	E	B-C	fast + slow	accessibility of urban functions; transport infrastructure	theory EM	physical structures, accessibility, population, 'urbanism'	internal	+
6. Haag et al. (1983)	D/P	A-C	slow	2 zones migration system	model AN	population, housing suppliers	internal	-
7. Norton (1981)	E	B-C-D	slow	migration between core, ring, periphery; accessibility changes	theory EM	population, employment	both	-
8. Nijkamp et al. (1983)	E	C	medium fast + slow	transport infrastructure	model AN	urban production, capital, R&D-capital, employment, infrastructure	both	+
9. Fred (1977)	E	B-C-D	medium fast + slow	information fields based on distance	theory EM	local/multilocal organizational organizations	both	-
10. Robson (1973)	E	C-D	slow	information fields through communication infrastructure	model EM	innovation, urban population	both	-
11. Thomas (1979)	E	C-D	slow	migration flows between competing regions	theory EM	migration, population, capital accumulation, building activities	external	-
12. Wilson et al. (1981)	D/E/P	B-C	fast + slow	commuting and migration between zones; accessibility	model AN	retailing, employment, housing	internal	+

Table 4. A short overview of selected models and theories.

Legend:

- * : D = descriptive ; F = forecasting ; E = explanatory ; P = policy evaluation.
- ** : A = micro level ; B = meso level ; C = macro level ; D = super macro level.
- *** : AN = analytical ; EM = empirical.

- (1) A functional substitution from residential to other land uses, which are, in themselves, less attractive for the city. This substitution can take place as a result of:
 - excessive demand for transportation facilities within the city
 - the rise in land prices, due to an overattractiveness of the city. In this competition for available space, only a limited number of land uses can survive.
- (2) The selective nature of suburbanization, due to constraints (e.g. political, economic) for certain population groups to move away from the city. In this view, suburbanization is considered as the outcome of changing housing and environmental preferences of people and is for a large part autonomous.
- (3) Ageing and obsolescence of physical stocks in the city. During a period of rapid growth, new construction activities outrun ageing processes. If the city becomes congested, and land becomes unavailable, the city ages, and cannot adjust itself to new situations. A possible effect of this is a slow-down of growth, which may eventually turn into a decline.

Clearly, predicting spatial mobility effects of structural changes in a dynamic system is a complex matter and deserves much more attention in our research efforts. The societal value of mobility - from a long-term point of view - can only be assessed if adequate insight is obtained into the endogenous and exogenous dynamics of complex spatial systems and into the differential dynamics of various systems components. This issue will be taken up further in the final section of this paper.

8. Prospects

In a challenging paper, Peter Hall (1984) discusses various paradoxes for the eighties in regard to spatial mobility. From the sixties onward, urban transportation planners almost everywhere foresook the ideal of individual motorized mobility for all and they substituted a mix of urban traffic restraint and the promotion of good public transport. This change in policy was fortified in the seventies after the Limits to Growth discussion, the first and second energy crisis, and the ecological awareness. Public transport infrastructure however, required also heavy investment and reinforced the traditional urban-suburban mobility patterns: outward deconcentration of population coupled with preservation of service employment in the urban core. In addition, city centres were made more attractive for shopping (pedestrian malls, etc.). The author argues that there is virtually no evidence that such systems could actually generate activity; such systems serve at best a minority of all journeys made within the urban system.

Given the decreased importance of energy scarcity and given the deconcentrated spatial configuration generated inter alia by public transport, it is - according to Hall - foreseeable that in the long run the use of the car will increase and that the position of public transport will decrease, at least if the economic growth will resume its course. On the other hand, the current recession challenges the subsidies for public transport because of the general pressure on public spending. Thus while in the seventies a policy of spatial deconcentration has taken place, public transport is left with the job of providing a fixed minimal level of service for a diminishing number of people; disproportionately, these people also happen in general to be the least affluent. These are the transportation-poor, who in many cases coincide with the money-poor. Altogether public transport service is almost bound to be inferior.

Hall's view however underestimates some new developments which may have a major impact mobility pattern (see also Brotchie et al., 1984). In the first place, many countries have started a policy of urban revita-

lization and urban renewal in order to stimulate the breeding place function of the city for residential, entrepreneurial and recreational activities. Several cities demonstrate that this policy is going to be successful. The trend toward deconcentration or concentrated deconcentration is not inevitable: many cities start also showing the first signs of a rejuvenation. This (selective) shift in locational mobility patterns caused by more compact city designs will also exert a significant impact on transport mobility (especially car use).

Secondly, the microelectronics revolution may have a profound impact. Especially American experiences demonstrate that medium-sized cities appear to provide eminent breeding grounds for innovation and new activities: the traditional centres of innovation (New York, Washington, Chicago) have lost power, while new (smaller) centres are flourishing (Seattle, Houston, Boston). Thus, the spatial pattern which is most likely to emerge is not much concentrated versus deconcentrated configuration, but a large cities versus medium-size cities configuration. A further spatial deconcentration is likely to be hampered by the 'high touch' social contact need that is a consequence of the 'high tech' development.

Undoubtedly, spatial development processes and spatial mobility processes will exhibit wave-like cyclical or fluctuating patterns in the future. Upswings and downswings of cities in a spatial system are almost inevitable (see also Nijkamp and Schubert, 1983). This can also be illustrated by using the 'depression trigger' hypothesis, which has recently become very popular in innovation research. Suppose a city as part of a system of cities has a fairly low socioeconomic performance relative to the other cities (low value added, high unemployment, high criminality rates etc.).

Then the city will try to enhance its relative performance by increasing its investments in social overhead capital (communication infrastructure, educational facilities, R&D centres). Of course, it will take some time before a critical threshold level of urban improvement has been reached, but then a rapid rise in the urban performance may emerge. However, the city cannot afford to keep its social overhead instruments at a very high level, so that after some time the social overhead investments are

declining. Due to inertia of a spatial system, it will take some time before the inevitable decrease of the performance of the city takes place, but beyond a critical threshold value a certain drop in performance may occur. This cyclical development is illustrated in Figure 5.

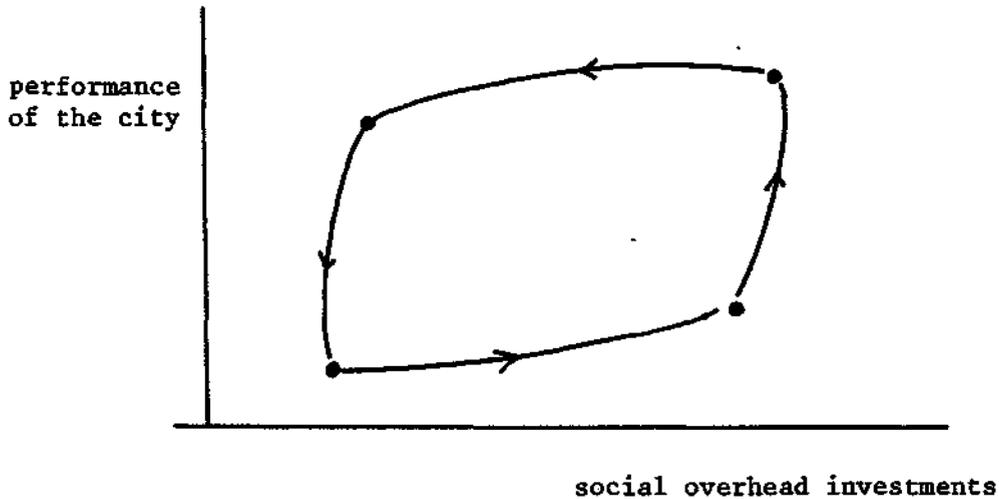


Figure 5. Cyclical urban developments.

The upswing and downswing of the city has of course direct influences upon the mobility pattern of this system. Consequently, the mobility pattern cannot be judged as a value in itself, but is contingent upon the complex mechanism of a dynamic spatial system.

References

- Allanson, E.W., Car Ownership Forecasting, Gordon and Breach, New York, 1982.
- Baanders, A., J. Kremer-Nass, and C.J. Ruijgrok, Income Decline and Travel Behaviour, Spatial Mobility in an Era of Transition (G.R.M. Jansen, P. Nijkamp, and C. Ruijgrok, eds.), North-Holland Publ. Co., Amsterdam, 1984 (forthcoming)
- Bates, J.J., M. Roberts, S. Lowe, and P. Richards, The Factors Affecting Household Car Ownership, Gower, Aldershot, U.K., 1981.
- Berg. L. van den, R. Drewett, L.H. Klaassen, A. Rossi, and C.H.T. Vijverberg, Urban Europe, Pergamon, Oxford, 1982.
- Bly, P.H., Effect of the Recession on Travel Expenditure and Travel Pattern, Spatial Mobility in an Era of Transition (G.R.M. Jansen, P. Nijkamp, and C. Ruijgrok, eds.), North-Holland Publ. Co., Amsterdam, 1984 (forthcoming).
- Boer, E. de, Vervoersongelijkheid, Relevantie en Onderzoekbaarheid, Institute for Urban Research, Delft University of Technology, Delft, 1980.
- Brotchie, J., P. Newton, P. Hall, and P. Nijkamp (eds.), Technology and Urban Form, Croom Helm, London, 1984.
- Button, K.J., Urban Economics, MacMillan, London, 1976.
- Button, K.J., A. D. Pearman, and A.S. Fowkes, Car Ownership Modelling and Forecasting, Gower, Aldershot, U.K., 1982.
- Ferguson, G.J.W.A., and H.J.H. Mogridge, Is Car Ownership and Use Stagnating?, Spatial Mobility in an Era of Transition, (G.R.M. Jansen, P. Nijkamp, and C. Ruijgrok, eds.), North-Holland Publ. Co., Amsterdam, 1984 (forthcoming).
- Fischer, M.M., and P. Nijkamp, Categorical Data and Choice Analysis in a Spatial Context, Progress in Urban Modelling (M. Batty, B. Hutchinson, and P. Nijkamp, eds.), 1984 (forthcoming).
- Hägerstrand, T., What about People in Regional Science, Papers of the Regional Science Association, vol. 24, 1970, pp. 7-21.
- Hall, P., Urban Transportation: Paradoxes for the 1980s, Spatial Mobility in an Era of Transition (G.R.M. Jansen, P. Nijkamp, and C. Ruijgrok, eds.), North-Holland Publ. Co., Amsterdam, 1984 (forthcoming).

- Holtgreffe, A.A.I., Stagnation and Public Transport in the Netherlands, Spatial Mobility in an Era of Transition (G.R.M. Jansen, P. Nijkamp, and C. Ruijgrok, eds.), North-Holland Publ. Co., Amsterdam, 1984 (forthcoming).
- Jansen, G.R.M., P. Nijkamp, and C. Ruijgrok (eds.), Spatial Mobility in an Era of Transition, North-Holland Publ. Co., Amsterdam, 1984 (forthcoming).
- Johansson, B., and P. Nijkamp, An Analysis of Episodes of Urban Event Histories, Research Paper, International Institute for Applied Systems Analysis, Laxenburg, 1984.
- Koutsopoulos, K.C., and C.G. Schmidt, Mobility Constraints on the Carless, Traffic Quarterly, January 1976, pp. 67-84.
- Kutter, E., Is the Functionally Divided Automatic Society still the 'Ultima Ratio' in Planning?, Spatial Mobility in an Era of Transition (G.R.M. Jansen, P. Nijkamp, and C. Ruijgrok, eds.), North-Holland Publ. Co., 1984 (forthcoming).
- Lierop, W.F.J. van, and P. Nijkamp, Perspective of Disaggregate Spatial Choice Models, Discrete Spatial Choice Analysis (D.A. Pitchfield, ed.), Pion, London, 1984.
- Lowe, J.C., and S. Moryades, The Geography of Movement, Houghton Mifflin, Boston, 1975.
- Maggied, S., Transportation for the Poor, Martinus Nijhoff, Boston/The Hague, 1982.
- Masser, I., and P. Brown, Spatial Representation and Spatial Interaction, Martinus Nijhoff, The Hague, 1977.
- Naisbitt, J., Megatrends, Warner Books, New York, 1984.
- Nijkamp, P., and M. van Pelt, Urban and Regional Impact Analysis in Development Planning, Urban and Regional Policy Analysis in Developing Countries (L. Chatterjee, and P. Nijkamp, eds.), Gower, Aldershot, U.K., 1984, pp. 171-180.
- Nijkamp, P., Urban Impact Analysis in a Spatial Context, Research Memorandum 1981-5, Dept. of Economics, Free University, Amsterdam, 1981.
- Nijkamp, P., and U. Schubert, Structural Change in Urban Systems, Collaborative Paper CP-83-57, International Institute for Applied Systems Analysis, Laxenburg, 1984.
- Nijkamp, P., H. Leitner, and N. Wrigley (eds.), Measuring the Unmeasurable; Analysis of Qualitative Spatial Data, Martinus Nijhoff, The Hague, 1984.

Nijkamp, P., A. Rima, and L. van Wissen, Structural Change in Urban Dynamic Models, Spatial Mobility in an Era of Transition (G.R.M. Jansen, P. Nijkamp, and C. Ruijgrok, eds.), North-Holland, Publ. Co., Amsterdam, 1984 (forthcoming).

Paaswell, R.E., and W.W. Recker, Problems of the Carless, Praeger, New York, 1978.

Webber, M.M., Societal Contexts of Transportation and Communication, Working Paper no. 220, Institute of Housing and Urban Planning, University of California, Berkeley, 1973.

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