

## **For a better understanding of the demand for mobility: elements of consideration about the concept of access**

STRC 1<sup>st</sup> Swiss Transport Research Conference  
Monte Verita, Ascona – March 1-3. 2001

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### **Introduction**

Paper presents part of the results of research «*Indicateurs d'accès pour une mobilité durable*» carried out within the framework of the PNR 41 (A11 project, 3<sup>d</sup> series) between January 1999 and July 2000. The presentation will be carried out from the critical point of view on the bases for measurement of spatial mobility and for the making of public policies (measurements and strategies), from the point of view of the sustainable development of mobility.

The following points will be developed :

- Spatial mobility and sustainable development
- Access and accessibility : two faces of a system
- Elements influencing access and policies for sustainable development of the mobility
- The modal choice : places to reach and expected qualities of the system of transport.

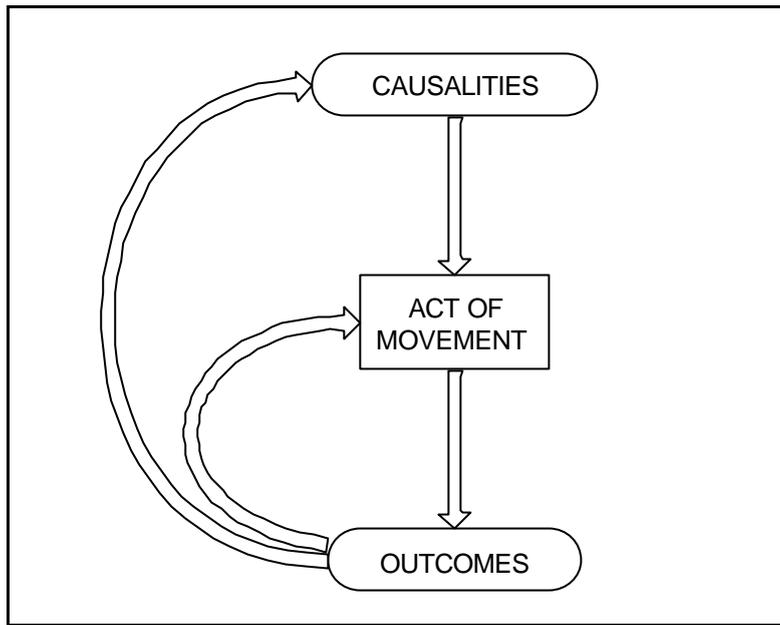
### **1. Mobility and sustainable development**

In the field of transport, the public authorities are subjected to contradictory demands. On one hand, to allow and ensure the individuals and firms an optimal degree of mobility and, on the other hand, to limit the negative impacts of these space interactions, in particular in terms of environment and quality of life. The measures often taken by these authorities to increase or reduce mobility appear to be inadequate measures. They use either physical (widening or contracting of the roadway system, suppression of parking spaces, congestion, etc.), fiscal (taxes on the vehicles, etc.) or financial means (price of the fuels, tolls, taxes, etc.), without really influencing the basis of mobility, notably the great increase of mobility.

To prevent short-term answers, a better understanding of the determinants of mobility is needed, in order to influence the causes of movements rather than only their consequences (Durand-Raucher 1997). Indeed, spatial mobility indicates at the same time the propensity and the facility of a person to move and the realisation of this propensity in the form of movement. Propensity to move depends on opportunities which each individual has the knowledge for the satisfaction of his needs (e.g., to buy goods and services, to learn, to work, to relax, etc.).

Thus, we consider spatial mobility from the broader point of view than that for displacement, by the fact that it considers the causalities and the consequences related to movements (Reichman 1983), as represented on figure 1 below.

*Figure 1 Components of spatial mobility*



source : authors, inspired of Reichman, 1983

By considering in this way, spatial mobility can be linked with the factors explaining the diversity of social, symbolic or factual exchanges (Matalon 1975), which thus adds a human dimension to the field of transport and allows not to separate the act of movement from the complete movement behaviour.

The human dimension of the phenomena of mobility leads to the concept of right to mobility, regarded as one of individual's fundamental freedoms. In our societies, this consideration implies the guarantee of mobility for all, on the same time preserving the environment from externalities too significant and remaining within the limits of the financial resources available for the collectivities and the individuals.

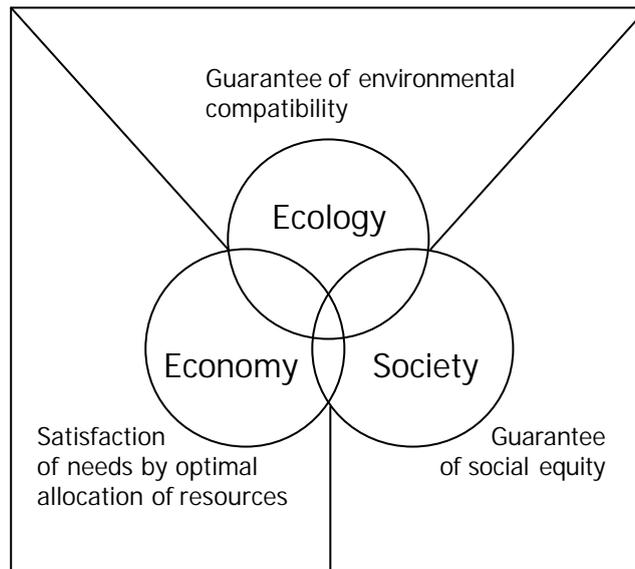
The systemic approach of transportation policy aiming at durability takes into account the interrelationship of three subsystems (cf. Figure 2) :

- the socio-economic subsystem in which satisfaction of needs is guided by the criteria of optimal allowance of the resources ;
- the territorial subsystem aiming distributive equity ;
- the environmental subsystem of which environmental compatibility is ensured by means of externalities reduction.

The aims of a sustainable mobility policy should be to guarantee simultaneously the satisfaction of the largest variety of economic and social needs while ensuring a less use of the resources available and by guaranteeing a kind of social equity (Himanen and alii. 1993; Sadler-Jacobs, 1990 ; Monhaim, 1997).

The implementation of transport policies based on sustainability implies the definition of indicators allowing the appreciation of their effectiveness and their efficiency. The literature on this subject (see Martinelli, Pini, Torricelli, Widmer, 2000) shows lack of consideration on the demand side and therefore on the individual choice towards their motivations.

**Figure 2 : Components of systemic approach of sustainable mobility policy**



Source : authors, inspired of Basler E. + Partner AG 1998

From this point of view, the accessibility indicators, which are considered as essential for the appraisals of transportation system, can no longer be content to measure the relationship between the organisation of the territory and the system of transport, the utility of the individuals or the performances of the transportation system (cf. Handy & Niemeier 1997 among the rare contributions on the subject), while there is plenty supply's indicators.

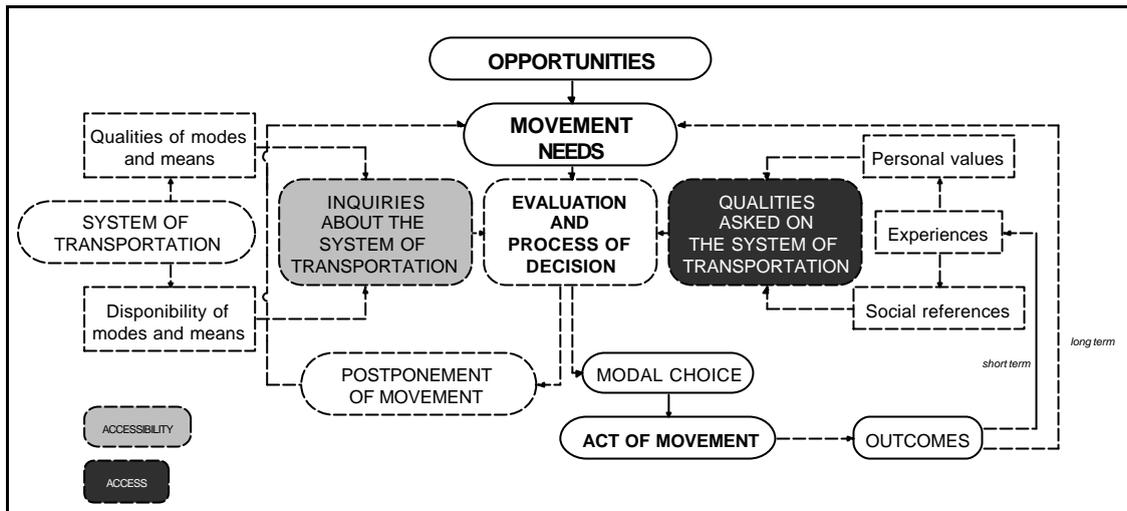
## **2. Access and accessibility: two components of a same system**

To be interested in mobility, from such a point of view, means thus to wonder about the request and the offer of transport, the needs of the persons, their waiting in terms of quality of movement, and also their motivations and their choices upstream of the act of movement. That implies to consider the qualities offered by the system of transport and the user's perception of the movement. We claim that each individual, consciously or unconsciously, sets qualitative and quantitative levels of satisfaction for the movement to be made according to the needs to which it must answer (Figure 1).

To consider at the same time causalities, the realisation and the consequences of a movement appears very complex for the transport planners and, so the latter more privileged the study of only one item, the transport supply. From this point of view, the facility of a place (where an opportunity is localised) to be joined by an actor, a customer, an information or a service and the transport supply were often regarded as the only indicators, gathered under the various concepts of accessibility. However, according to our observations, these indicators do not consider sufficiently the request for transport and postulate a very strong sensitivity of the individuals to the modifications of the system of transport. Thus, to improve these indicators and to integrate the demand, we formulated a concept of access, defined as the whole of the qualities requested from the system of transport by an actor or a user to join an opportunity – i.e. workplaces or services and leisure places, etc. – which satisfy its needs.

Access and accessibility are the two sides of the same medal : access expresses a request – derived from the request for transport - while accessibility expresses the supply's level of the system of the transport (or communication), which allows the realisation of a need for the common life.

**Figure 3 Process of modal choice from the individual's point of view**



Whatever if we look at access or accessibility, the process of modal choice constitutes a central point of the realisation of each displacement.

### 3. Considerations about factors influencing access

Nowadays, people feel free to move and claim to move the way they want. When government tries to rule circulation in a territory by physical (reduction of capacity, closure of a street, etc.), or fiscal (fuel prices, road taxes, toll roads, etc.) measures, many people claim to choose their type of mobility, their right to mobility.

However, this feeling is losing its power when we analyse the ins and outs of this “freedom”. Our mobility behaviour are subject to constraints : working hours, opening hours, weekly schedule, public transport network, public transport schedule, etc.). Each individual adopts mobility behaviour planned by one or more social groups. Being part of this familiar context, the individual do not see anymore the constraints of mobility. This shows theories of dissonance cognitive, understand as the behaviour construction on an *a posteriori* rationalisation of *a priori* choices (Derenne 1992).

According to these theories, an individual justify his modal choice on a distorted basis. For example, a person who needs his car will easily accept his drawback and even justify it or he will pick up only the information he wants without considering the others (consumer myopia).

The process of modal choice is influenced by a multitude of objective and subjective reasons governing modal choice between motorised individual transport and ecological transport, among which we can distinguish eight types of reasons (Brög & Erl 1996) :

- objective constraints<sup>1</sup> ;
- lack of alternative choices ;
- lack of information ;
- reserves ;
- time ;
- comfort ;
- the itinerary ;
- the cost ;
- the free choice.

<sup>1</sup> To carry luggage, the health and age reasons, the weather conditions, the professional car use, etc.

But, in their study in Germany, if the time was more quoted by private car users as reason for not choosing ecological transport, the cost was rarely quoted, even if more for not choosing private car as driver or passenger.

In our study on *Canton de Vaud* (Martinelli, Pini, Torricelli, Widmer 2000) , we have taken some of these results and tried to determine the more important modal choice factors in the context of work and leisure mobility.

#### 4. The modal choice

As individuals express their needs, these contain intrinsically a share of subjectivity. The same need can be evaluated in different ways while being realised in an identical way. The quality of access required in order to satisfy a need will differ according to each individual considered. The modal choice (the manner in which it is realised) reveals the quality required by the individuals to reach principal opportunities (work, shopping, leisure, friends or parents, etc.) causing the majority of daily movements within a regional space. Modal choice is for example about age, income, environmental sensitivity, but also about the supply of transportation system.

Our methodology consisted in clarifying the role of the modal choice criteria according to the spatial localization, the socio-economic characteristics and the type of activities to be realised, in order to allow the development of a specific policy of mobility according to spatial and socio-economic contexts. We thus highlighted the importance attached to the modal choice criteria and the hierarchy of these criteria that everyone carries out before moving in order to reach an opportunity. Our research leads to the knowledge of the latter, which is of primary importance, because it will give the essential indications in the setting up of a mobility policy, whose goal is the management of mobility (regional, urban or metropolitan) in a sustainable policy.

The purpose of the sample survey was also to highlight the hierarchy of the access factors, in particular, the importance of the modal choice criterion according to the localisation, by comparing two to two the following criteria:

- the general conditions of displacement;
- the time of displacement;
- the cost of displacement;
- the environmental sensitivity.

The comparison between couples of criteria showed that time is the criterion collecting the greatest number of points of importance, whatever the geographical area, except for the inhabitants of the centres communes in the case of leisure displacements, where the conditions of displacement are the most significant.

#### **Importance of the modal choice criteria according to the geographical area**

	Centres		Agglomeration		Non-urban		Total	
	Work	Leisure	Work	Leisure	Work	Leisure	Work	Leisure
Time	18 pts	17 pts	21 pts	20 pts	21 pts	20 pts	21 pts	19 pts
Condition	17 pts	21 pts	14 pts	14 pts	12 pts	16 pts	14 pts	17 pts
Cost	12 pts	13 pts	14 pts	15 pts	15 pts	13 pts	13 pts	15 pts
Sensitivit	13 pts	9 pts	11 pts	11 pts	12 pts	11 pts	12 pts	9 pts

The environmental sensitivity is almost always the criterion to which it is granted the least importance, with however less difference compared to the conditions and the cost within the framework of work displacements. We also note that the cost is only privileged compared to

the conditions by the inhabitants of the nonurban communes within the framework of work displacements and by the residents of the peripherals communes of agglomeration during leisure's displacements.

It should also be noted that towards the question " why this modal choice ? ", relating to the last movement, people questioned stressed in priority the conditions of displacement (38% work, 42% leisure), then the time of displacement (19% and 16%), the environmental sensitivity (11% and 5%) and the cost (3% and 2%).

On the other hand, to the question " compare the selection criteria ", referred to work access, the people clearly privileged time, then quoted the conditions of displacement, followed by the cost and the environmental sensitivity ; this hierarchy of the factors is also found for the access to leisure (with however a stronger preponderance, in the centres, for the environmental sensitivity to the detriment of the cost).

The hierarchy of the criterion of modal choice appears thus different according to the manner of asking the question. This difference is explained by the shift between the needs for the everyday life (to move to work, to slacken, etc.) and personal values of each one. Even if the questions related to last movement to join the leisure and place of work, it is probable that the people questioned integrated a more global dimension during the cross estimations of the criteria. Thus, during the indirect questions, surveyed privilege initially the criterion of the general conditions of displacement and then the time of displacement. The cost of displacement is even often regarded as being less significant than the environmental criterion, which means that the individuals perhaps perceive their daily movement as being more frequent, therefore requiring a greater " comfort " and involving a greater environmental sensitivity within sight of the generated effects. On the other hand, for leisure displacements, the environmental criterion becomes marginal, contrary to the cost of displacement, which takes more importance, while remaining relatively slightly evoked. That means that the individuals always grant much importance to the time and the conditions of displacement, with a glance more marked on the costs of displacement and a relative disinterest of the environmental effects, as if the pleasure of going to practise a leisure took advantage over the environmental protection.

Thus, we find two types of hierarchy of the modal choice criteria :

- the "hierarchy of the needs", where individuals are subject to a concatenation of events and constraints of the daily life ;
- the "hierarchy of the values" which reflects the values and the normative's structure in which individuals identify and which, according to certain cases, can privilege other criteria than those quoted previously.

## **5. Conclusion**

The design and the evaluation of a sustainable mobility policy imply on the one hand the understanding of modal choice process, on the other hand, the implementation of indicators of access and accessibility.

Our study in the framework of PNR41 has highlighted the differences in the modal behaviour towards work and leisure mobility mainly when considering the geographical position of residence (urban, suburban or rural context). Differences concerning the education or the income are not statistically significant when using log linear regression.

Considering these results and the hierarchy of modal criterion, we have built an composite indicator of access (Martinelli, Pini, Torricelli, Widmer, 2000, 58 pp.). According to it, the demand is clearly different between urban, suburban and rural inhabitants. Even if the use of private car is privileged, differences of behaviour are not evident when considering income or

education. This allows us to think that the willingness to pay more for a better mobility, which means respecting time and comfort constraints, is not utopian.

These first results show us the importance of the conditions of modal choice when an individual wants to reach his work (mainly time and comfort) or leisure (mainly comfort and cost) place. This could be a lesson for transportation research : the hierarchy of modal choice factors considering the opportunity to be reached is a fundamental step in the implementation of any indicator of access.

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