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«Committed Geography» – From Theory to Application

A case study in mobility research and urban planning

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1 Introduction

«Committed Geography» (Boesch 1989) is designed to taking clear scientifically based positions on current issues concerning spatial structures and regional development. We intentionally take measure at Economics due to its dominance and impact on society. For this approach, orientation knowledge of «what to do and why» is decisively more important than handling knowledge of «how to do it», even though the latter should not be neglected (Boesch 1991), because in practice, it can often be seen that many obstacles stand in the way of the realisation of well meant intentions. On the other hand, the opposite is also true: handling knowledge as a purpose in itself is at the mercy of utilisation interests in any given discipline.

Whether or not a discipline requires a common normative platform (as presently in Economics with its neo-liberal market doctrine; cp. Boesch 1999 with references) may be disputed controversially. One can assume that the discourse between differing schools of thought is at least as productive and has as much public appeal (cp. the relevance criteria in Boesch 1989) as a monolithic position. Personally, we consider the concept of sustainability (Daly 1992) to be ethically convincing and scientifically challenging as well as fertile ground for a committed geography (Boesch 1989).

However, this workshop report wants to demonstrate the approach, methods, and achievements of our projects rather than to pursue theoretical reasoning about the requirements and modalities of «Committed Geography».

2 Background: regional development and mobility

The various needs for mobility of our multi-faceted society are steadily increasing. Depending on the settlement structure, these requirements can be met in several ways. Whereas in compact settlement structures many journeys can be covered by foot, bicycle or bus, in dispersed settlement structures the use of motorised individual transport (MIT) is necessary. These differences generate, apart from various external factors, a range of development costs for network operators and users. The more dispersed the settlement structures are, the wider the area the transportation networks will have to cover and thus the longer and less frequent the journeys will become. This leads to a shift in transport systems from the «environmental network» (pedestrian and bicycle traffic) towards MIT and on the whole to higher mobility costs.

Therefore, the hypothesis that lies at the basis of this case study is as follows: «The mobility costs in dispersed settlement structures are considerably higher than those in compact settlements». The adjoining question, which in this study shall be answered by means of estimation, is «What are the mobility costs in compact settlements versus those in dispersed settlement structures?» The correlation between the settlement structure and the mobility costs will be shown and quantitatively measured and reported.

The normative framework for this case study is the concept of «sustainable development». Society is interested in satisfying it's needs for mobility in the environmentally most compatible and least expensive form possible. Therefore, in order to realise this objective, the true cost of mobility must be determined. This case study seeks to help close the gap of understanding in the costs of mobility as a function of settlement structures. In regional development, densification has been promoted for years, but without any significant progress. On the contrary, settlements are spreading out across almost the whole of the Swiss Midlands, and without a turnaround of this tendency in sight. By means of exposing the mobility costs of this settlement structure, we want to support the requirement of regional development moving decisively towards densification.

The continuous sub- and de-urbanisation process in Switzerland is resulting in unchanged growth of agglomerations. The individual activity spaces are more and more dispersed, and the travel distances between them are getting larger. The well-known model of the basic living functions places the function of «dwelling/accommodation» at the centre and the other basic functions of «working, relaxation, provision, and education» are arranged around it. The functions of communication and transport connect and combine them (see figure 1) (Akademie für Raumforschung und Landesplanung-ARL 1970: 430).

Since World War II, we have witnessed a kind of

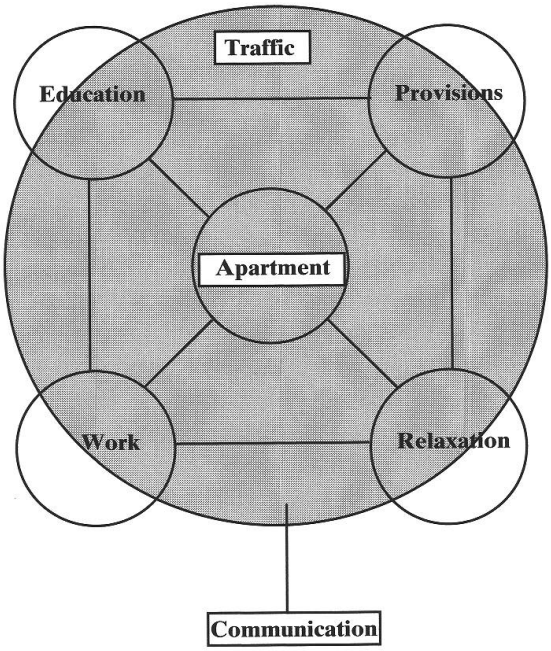

Fig. 1: The basic living functions
Die Daseinsgrundfunktionen
Les fonctions existentielles de base
Source: Akademie für Raumforschung und Landesplanung – ARL 1970: 430

explosion of the basic living functions. The distances between the individual basic living functions have increased manifold. Several investigations in the frame of the NRP 41 (National Research Program of the Swiss Science Foundation) have shown, that as a result of increasing long-distance travel opportunities, the shorter connections have come under pressure (Güller & Breu 1996: 11). Pedestrians and cyclists are on the losing side; demand for slow transportation is waning. A result of this development can be seen in the Swiss settlement developments over the last 20 years: the growth of the agglomeration areas continues unchecked, a strong shift from the core cities to the surrounding areas can be observed. Frey (1996: 47) has portrayed the resulting problems in his representation of the four vicious circles (see figure 2).

In Frey's diagram, the sub- and de-urbanisation process is at the centre. It is the driving force which moves people and businesses from the agglomeration core to the agglomeration belt and into the countryside. Without any countermeasures, this shift will lead to the decline of cities. The four problem cycles (traffic / environment & land use / living & working / public finances) lead to the «starvation» and fall of the cities. Switzerland as a «garden-city» (Boesch 1996: 73ff; Baccini & Oswald 1998), extending over a large area from Lake Geneva to Lake Constance, cannot offer the urban advantages that arise from the proximity of many people and services. Environmentally compatible and thus sustainable transportation requires a certain proximity; slow transportation can only function in small-scale structures. Therefore, solutions must be found which result in settlement structures where the basic living functions are closer to one another (see figure 3: Kagermeier 1997: cover picture) or corresponding with public transport interchanges (which is the so called «environmental network», combining public transport and «slow transport», i.e. pedestrian and bicycle traffic). The process of suburbanisation must be abated and reversed. Re-urbanisation, as portrayed by Frey (1996: 50) (see figure 4), accomplishes a contribution towards sustainable development.

Frey's re-urbanisation strategy focuses on the true costs of transportation as an instrument or measure of improvement; this case study shall make a contribution towards this purpose: A balanced mixture of the different basic living functions is one of the fundamental principles of the «city of short distances». The reduction of distances can be brought about by increasing spatial resistance (i.e. a rise in the price of transportation), in combination with the corresponding spatial structures (see figure 5; Gertz 1998: 101). Mixed and compact settlement structures permit a large amount of slow transport.

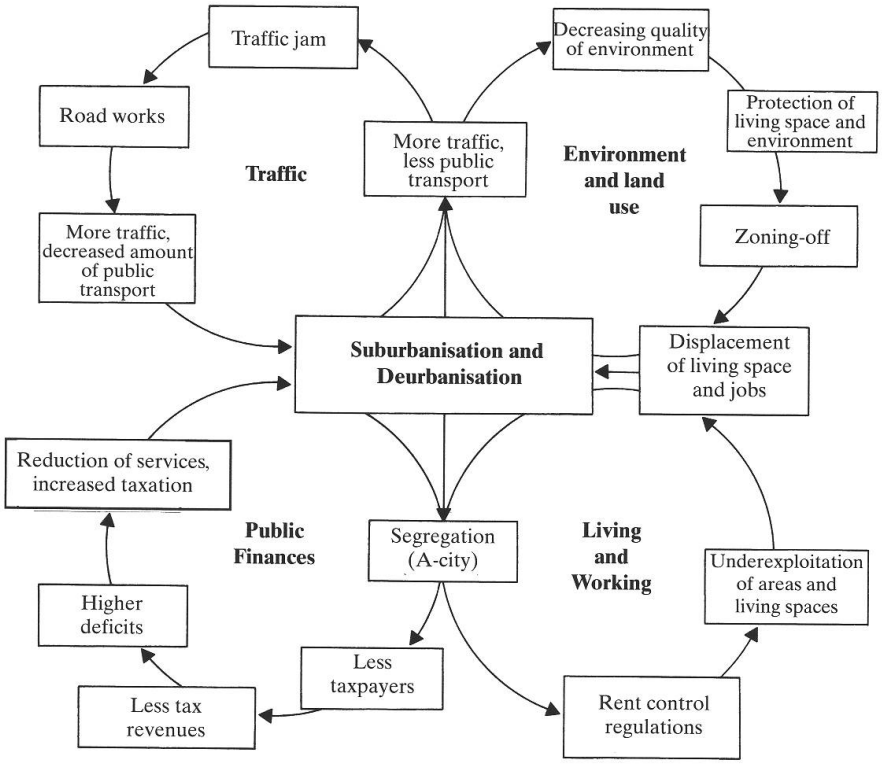

Fig. 2: The vicious circles of suburbanisation and deurbanisation
Teufelskreise der Sub- und Desurbanisation
Les cercles vicieux de la suburbanisation et de la désurbanisation
Source: FREY 1996: 47

3 The methodical approach

To demonstrate the dependency of mobility costs on settlement structures, two settlements with varying density are taken as samples and compared with one another. All expenditures, which cover a location's transfer networks, are added into the mobility costs. On one hand all expenditures for construction / operation / maintenance / renovation are included, on the other hand the costs, which accrue by the utilisation of the networks. Mobility costs are thus subdivided into network costs (infrastructure, development costs) and utilisation costs.

In the pilot project presented below, we have assumed some restrictions:

1. For the time being, we are limiting the research to the mobility of people. The transfer of goods (including water, energy, sewage and waste products, etc.) and services, as well as information, is not taken into consideration.
2. For the time being, we are focusing on the basic living function of «working», i.e. we are taking into consideration only commuter traffic.
3. We are only investigating the question of «inner development», independent of the macro settlement structure. The extensive structural effects of the network of cities in Switzerland (e.g. the varying commuter distances dependent on the attractiveness of a centre) are not taken into consideration.
4. Regarding the settlement typology, we are limiting the project design to a comparison between a city district of medium density in a medium-sized city (the district of Lachen in St. Gall) and a small suburban municipality at the edge of the settlement cluster of St. Gall.

4 Model calculation

4.1 Network costs

Network costs cover the expenditures of construction, operation, maintenance and renovation of the infra-

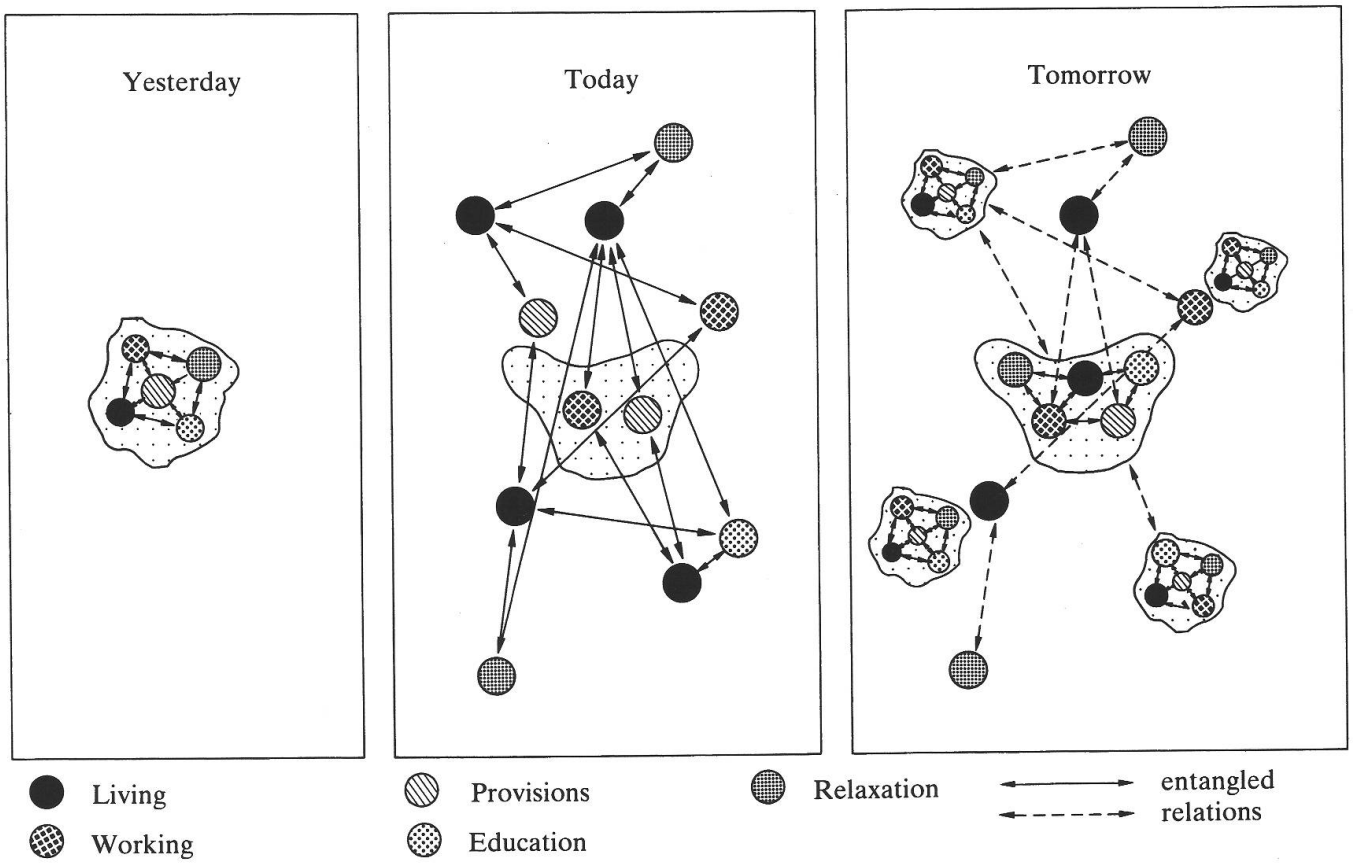

Fig. 3: The new order of the basic living functions
Die Neuordnung der Daseinsgrundfunktionen
Le nouvel ordre des fonctions existentielles de base
Source: KAGERMEIER 1997; Graphics: L. BAUMANN

structure. We will report them on a yearly per capita basis.

The district of Lachen, in the city of St. Gall, is relatively densely populated (2548 inhabitants and a total area of 12.5 ha) with the majority of buildings four to five stories high. Lachen is well connected via bus to the centre of St. Gall and the road network has a length of 4.5 km. The resulting network costs amount to CHF 221.– per inhabitant per annum.

The municipality of Häggenschwil (910 inhabitants, of which 640 non-agricultural and a total area of 897ha) is situated approximately 10 km from the centre of St. Gall. Functionally, it belongs to the outskirts of the agglomeration belt. The settlement area of this municipality is spread out; in the hamlets, traditional (though partially converted) farmhouses are dominant, and most new buildings are detached family houses. The road network is correspondingly large, covering 23.3 km. The network costs per person are therefore roughly 20 times higher than in St. Gall-Lachen, namely CHF 4'451.– per inhabitant and year.

4.2 Utilisation costs

With utilisation costs, we mean the costs of the journeys from residence to work. We used the commuter data of the 1990 national census (BUNDESAMT FÜR STATISTIK 1993a, b, c: Swiss national census 1990) since relevant data from the national census of 2000 have not yet been officially released. 1318 employed individuals live in St. Gall-Lachen; in Häggenschwil 451 people are employed, of which 120 are working in the agricultural sector – thus 331 people are employed in the 2nd and 3rd sectors.

For St. Gall-Lachen we assume an environmentally compatible modal split, as the use of public transport is both possible and reasonable for the persons living there. Employees are divided into 5 different distance categories according to their place of work. It is also assumed that journeys to and from work for the first two categories are undertaken on average 4 times a day. For the category, «up to 30 km» journeys to and from work are undertaken on average 3 times a day, and for the category, «more than 30 km» the journey

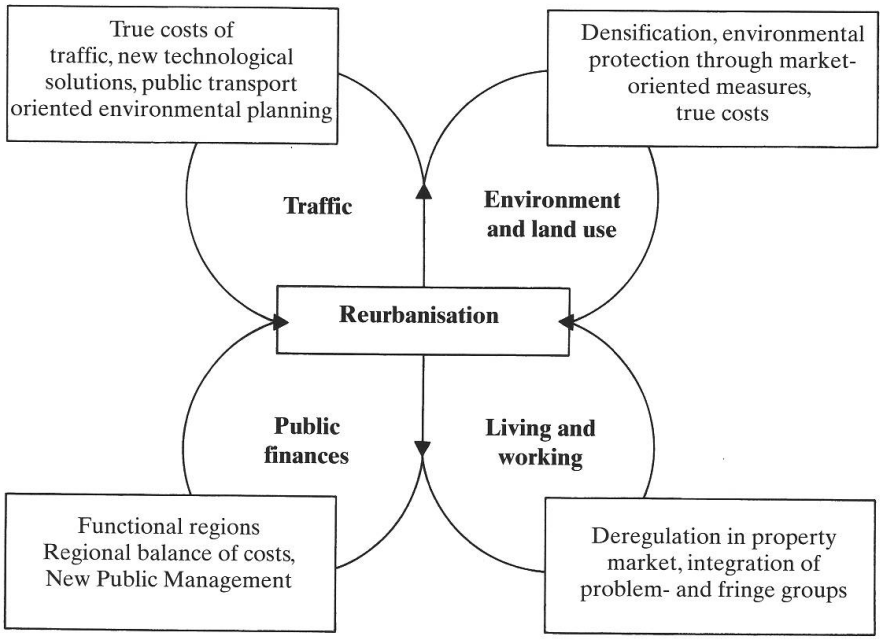

Fig. 4: Reurbanisation
Die Reurbanisation
La réurbanisation
Source: Frey 1996: 50

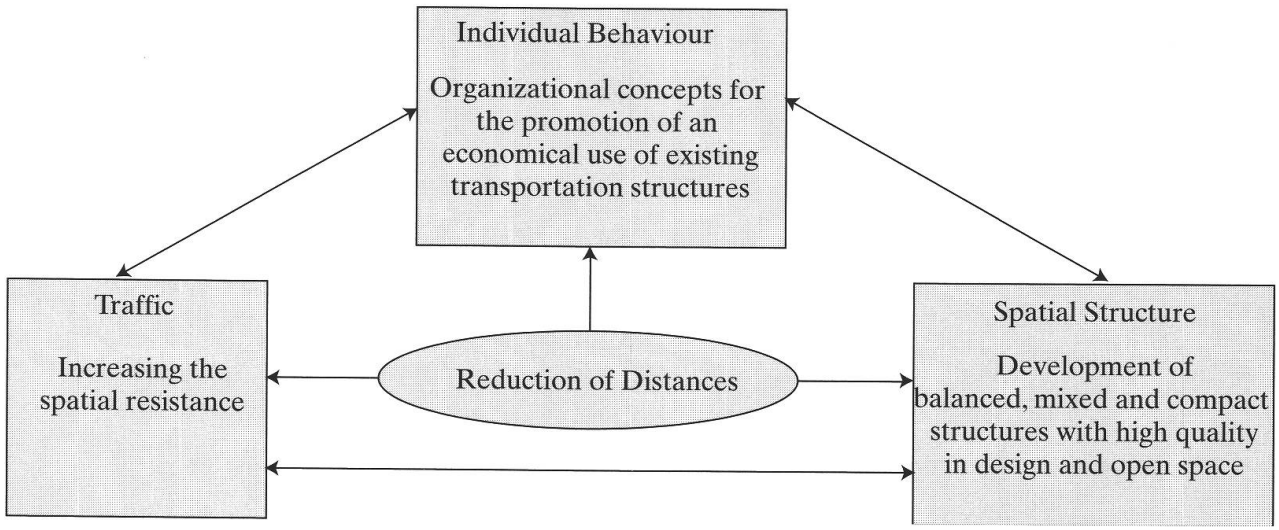

Fig. 5: Approaches of the strategy of short distances
Ansätze der Strategie der kurzen Wege
Approches de la stratégie des courtes distances
Source: Gertz 1998: 101

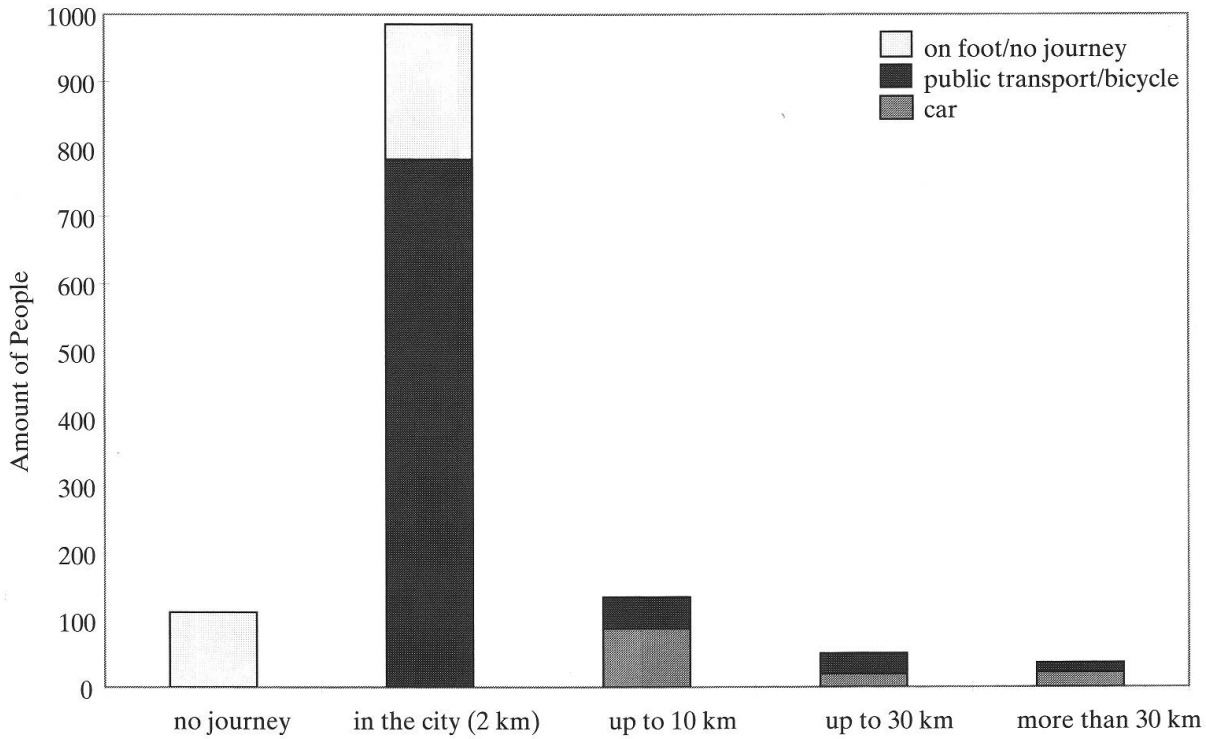

Fig. 6: Lachen: public transport used and distances
Lachen: benutztes Verkehrsmittel und Distanz
Lachen: moyens de transport utilisés et distance

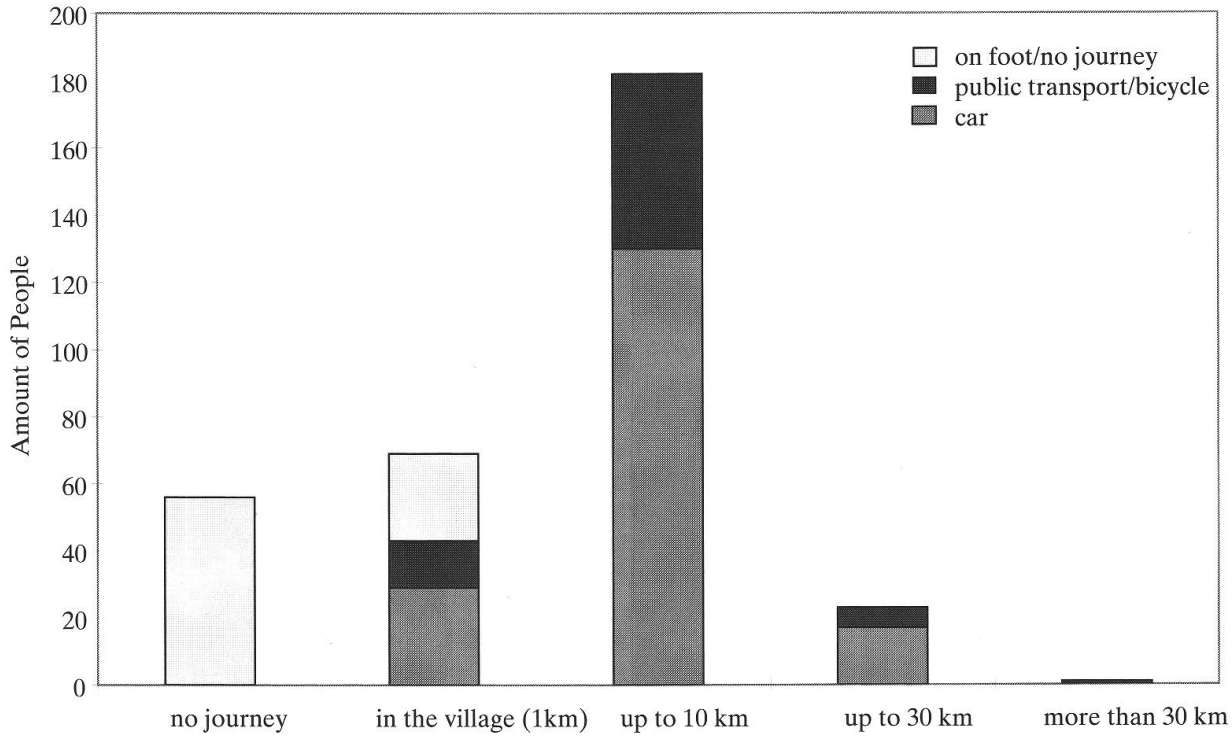

Fig. 7: Häggenschwil: public transport used and distances
Häggenschwil: benutztes Verkehrsmittel und Distanz
Häggenschwil: moyens de tansport utilisés et distance

St. Gall-Lachen	Total employed: 1318			total inhabitants: 2548					
	Employed							Utilisation costs CHF/day	
	Total	by car, moped, etc.		Public Transport		on foot, by bicycle		Car, moped,	Environmental
		persons	km/day	persons	km/day	persons	km/day	etc.	network
no journey to work	8.5%	0.0%	0	0.0%	0	0.0%	0	0	0
working in the municipality	74.8%	0.0%	0	55.2%	5815	19.6%	2070	0	1746
up to 10 km journey to work	10.2%	6.6%	3501	3.5%	1870	0.0%	0	2223	154
up to 30 km journey to work	3.8%	1.5%	1735	2.3%	2783	0.0%	0	1101	297
> 30 km journey to work	2.7%	1.7%	2634	1.1%	1699	0.0%	0	1672	77
Total	100.0%	9.8%	7869	62.1%	12167	19.6%	2070	4997	2274
Total utilisation costs for «work» per inhabitant									
CHF/day	2.85 of which 0.47 external costs								
CHF/year	627.83 of which 104.24 external costs								
Häggenschwil	**Total employed: 331**			**total inhabitants: 640**					
	Employed							Utilisation costs CHF/day	
	Total	by car, moped, etc.		Public Transport		on foot, by bicycle		Car, moped,	Environmental
		persons	km/day	persons	km/day	persons	km/day	etc.	network
no journey to work	16.9%	0.0%	0	0.0%	0	0.0%	0	0	0
working in the municipality	20.8%	8.8%	116	0.0%	0	12.1%	160	74	0
up to 10 km journey to work	55.0%	39.3%	5200	15.7%	2040	0.3%	40	3302	168
up to 30 km journey to work	6.9%	5.1%	1530	1.8%	540	0.0%	0	972	20
> 30 km journey to work	0.3%	0.0%	0	0.3%	120	0.0%	0	0	5
Total	100.0%	53.2%	6846	17.8%	2700	12.4%	200	4347	194
Total utilisation costs for «work» per inhabitant									
CHF/day	7.10 of which 1.49 external costs								
CHF/year	1561.10 of which 326.98 external costs								

Table 1: Utilisation costs of the basic living function of «work»
Nutzkosten der Daseinsgrundfunktion «Arbeit»
Coûts d'utilisation de la fonction existentielle «Travail»

is only undertaken twice a day. The category «working within the municipality» amounts to 2 km for the case of Lachen, and 1 km for the case of Häggenschwil (see figures 6 and 7).

For the costs we use a km-price of CHF 0.50 per car, to this we add another CHF 0.135/km for external costs (Ecoplan 1992: 111). For public transport we use a price for the train of CHF 0.29/day and km for the category «up to 10 km»; for the category «up to 30 km» a price of CHF 0.03/day and km; and for the category «more than 30 km», a price of CHF 0.0071/day and km (according to the information given by the Swiss Federal Railways). For the bus within the city of St. Gall, we use a price of CHF 2.29 per workday, independent of the km travelled (according to the information given by St. Gall Public Transport: the yearly ticket costs CHF 504.– and is valid through 220 working-days). External costs are also added to public transport and amount to CHF 0.01/Pkm for the train and CHF 0.014/Pkm for the trolley (Ecoplan 1992: 111).

As already mentioned, the utilisation costs generated by the employed persons are applied to the entire population so that for the future calculations (basic living function of «provision» and «relaxation/leisure» respectively) there is a common data structure. Accordingly, the utilisation costs for the basic living function of «working» in St. Gall-Lachen amount to CHF 2.85/inhabitant and day. In Häggenschwil they are more than double, i.e. CHF 7.10/inhabitant and day. Given 220 working days per year, this results in CHF 628.– per inhabitant p.a. for St. Gall-Lachen; for Häggenschwil the utilisation costs are nearly 2.5 times higher, at CHF 1'561.–/inhabitant per annum (see table 1).

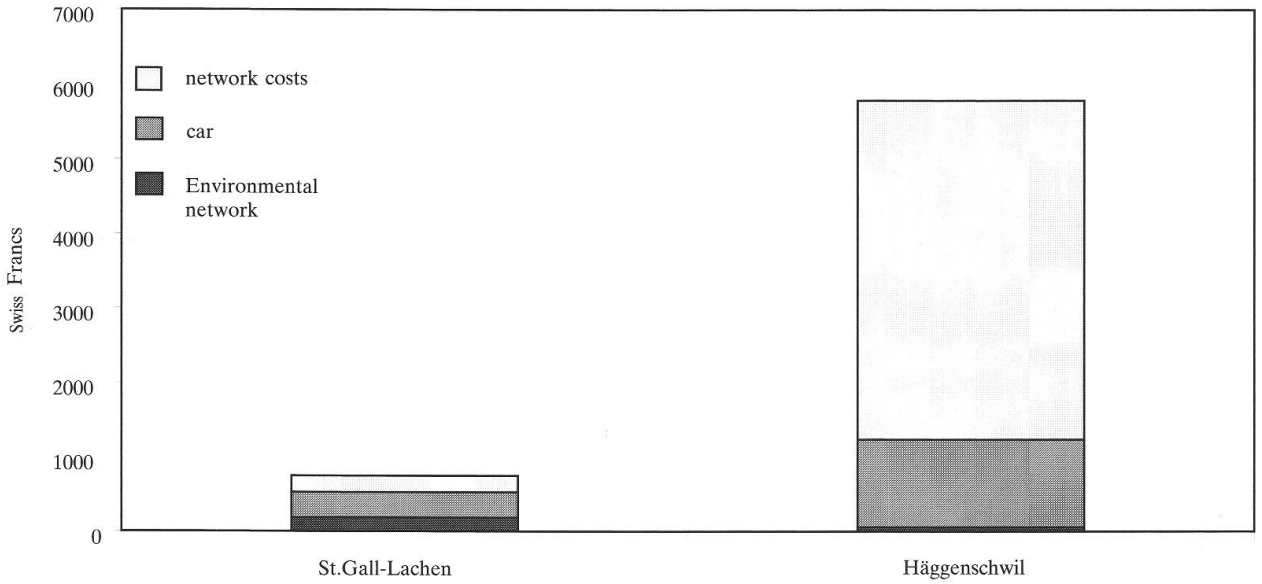

Fig. 8: Total mobility costs for the basic living function of «work» in CHF per inhabitant and year.
Gesamte Mobilitätskosten für die Daseinsgrundfunktion «Arbeit» in Franken pro EinwohnerIn und Jahr.
Total des coûts de mobilité de la fonction existentielle de base «Travail», par habitant et par an.

4.3 Total costs

Total mobility costs for the basic living function «working» consist of the sum of the network costs plus utilisation costs. One should keep in mind that these costs do not accrue completely to the individuals; infrastructure costs are also contained therein, which are paid for by the general public. The comparable mobility costs are CHF 848.– per inhabitant and year in St. Gall-Lachen, and in Häggenschwil the costs are CHF 6'112.– per inhabitant and year (see figure 8). Therefore, a person living in the compactly built-up district of Lachen, which is well serviced by public transport, and is close to the centre of St. Gall, has seven times fewer costs than a person, who lives in the country on the outskirts of the agglomeration in the village of Häggenschwil. Expressed in absolute terms: inhabitants of Häggenschwil generate mobility costs that are approximately CHF 5'000.– per year higher than do the inhabitants of St. Gall-Lachen.

Hereby, the costs of commuter mobility have been reported. The mobility costs of the remaining functions, such as shopping and leisure would most likely exacerbate the differences. Inhabitants of the village have to travel longer distances to go shopping than city dwellers. But by and large, these costs would presumably turn out to be lower than those for work as usually one does not go shopping daily to a shop that is not within walking distance. Leisure traffic has grown to about half of all distances travelled (Dienst für Gesamt-Verkehrsfragen 1996: 20). However, leisure behaviour has not yet been researched well enough in relation to its spatial orientation, so that notwithstanding its obvious significance, it is not possible to make any assumptions.

5 Conclusion

The goal of this pilot study is to prepare the ground for a comprehensive estimation of the mobility costs in relation to settlement structures. The basic living function «working» was analysed first because the supporting statistical data is most comprehensive. Similarly, only two types of settlement structures were investigated. The estimation of the total mobility costs in Switzerland will be based on a differentiated settlement typology (Boesch 1982; Bundesamt für Statistik 1994) and will take into consideration the cost differentials of all spatial structures. At any rate, a provisional projection can be made on the basis of the results at hand. Under the assumption that in Switzerland about 2 million persons live in settlement types that correspond to the case of Häggenschwil, the savings potential of more efficient regional planning solely for mobility of persons would amount to at least 10 billion CHF per year (with a cost differential between Häggenschwil and St. Gall-Lachen amounting to approx. CHF 5'000.–/person/year). The increase in efficiency of 3% of the GDP (Gross Domestic Product) is certainly an interesting economic aspect of regional development, which should be paid for more

attention in the future. Expressed emphatically: our relatively dispersed settlement structures are a luxury, conditioned by affluence, which cannot be considered sustainable – as these structures are inefficient, unjust and incompatible towards the environment.

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