

As regards reasons travelling and transport mode used, two conclusions can be drawn: first, for inter-municipal journeys figures for personal motives are higher than for those for intra-municipal journeys, and, second, the latter are mainly made on foot or by bicycle, while a privately-owned vehicle is clearly the majority choice for inter-county journeys. The only other noteworthy comment here concerns the degree of public transport use for journeys with Alt Camp as the point of origin / destination.

3.3. Analysis by municipality

Before beginning my analysis of patterns at a municipal level, it should be noted that the limitations of the sample do not allow for a breakdown of the determining factors at a municipal level, so by necessity the data given below have had to be added at a regional scale.

As might be expected, general figures for municipal self-containment are lower than those for regional self-containment, following, and sometimes highlighting the territorial patterns explained earlier. Accordingly, for Camp de Tarragona as a whole, figures for municipal self-containment are 71.3% on weekdays and 61.1% on weekends.

At a regional level, Tarragonès is the area with the highest level of municipal self-containment, influenced by the capital city, Tarragona, even higher than the most rural regions (Conca de Barberà or Priorat) which tend to be quite dependent on their respective capitals as they are the focal points for a significant number of jobs and cultural / leisure activities.

4. Conclusion

As stated at the outset, this study is intended to be descriptive, determined by the fact that this is the first time data about habitual mobility patterns for Camp de Tarragona has been available.

Nevertheless, this analysis has made it possible to identify certain tendencies, behaviour, characteristics and territorial distribution related to mobility. In turn, these have major implications for planning, drawing up and managing mobility policies as well as for new communication infrastructures. I would like to underline the two which, in my view, prove to be the most relevant.

First, regarding the daily mobility of the resident population of Camp de Tarragona, one can observe a clear and manifest dependence on privately-owned vehicles, which from the perspective of sustainability is excessive, and to the detriment of the meagre availability of public transport. The lack of public transport services and infrastructure would appear to be the key factor, since citizens claim that the main reasons for using their own vehicle are the shortcomings of

public transport alternatives. If we also add the low averages for numbers of people travelling in privately-owned vehicles, the consequences for the environment, society and the economy are easy to see. Therefore, the implementation of certain awaited measures, such as creating a network of trains-trams taking advantage of existing rail infrastructures and complementing them with new services, integrated management of urban and inter-urban busses networks, and integrating fares for all these services, can only improve the present poor state of public transport.

Second, the distribution of mobility, combined with the analysis of the underlying reasons, allows us to see the territorial associations of Camp de Tarragona from a functional perspective. In effect, according to the patterns and tendencies that have been identified here, we could say that Camp de Tarragona demonstrates characteristics very similar to those of a consolidated metropolitan region. One of the main characteristics of mobility is proximity, and could not be otherwise if one takes into account that travel time has to be short for it to be feasible on a daily basis. However, one can see certain territorial dynamics which clearly show the territorial associations around the central city (Tarragona) and an inter-urban polycentric network (in essence, Reus and Valls).

But, this metropolitan phenomenon cannot be said for the entire Camp de Tarragona territory, and so in the strictest sense the "hard core" would only comprise the Tarragonès, Baix Camp and Alt Camp regions. By comparison, we first have the rural characteristics of Priorat and Conca de Barberà: in addition to being further away and less accessible to regarding the capital city means that they are more self-contained and autonomous. By way of further contrast, the unique features of the Baix Penedès appear to make it a kind of "frontier region" between the metropolitan areas of Barcelona and Tarragona. Clearly the existing provision of a connecting local train services with the Metropolitan Area is one of the key determining factors for its ambivalent role: for example, closer to that of Garraf than Conca de Barberà.

It is clear that the SDM is an invaluable source of information which will contribute to proper adequate territorial management and planning for Camp de Tarragona and the rest of Catalonia.

- 4 Mobility Territorial Councils.
- 5 Mobility Bill, passed by the Catalan Parliament.
- 6 Catalan Autonomous Government.
- 7 Precisely not being able to consider here whether journeys have their origin in the municipality where the traveller lives, means that we cannot call this municipal self-containment, as the coincidence between the municipality where a person's journey begins and the municipality where they live is a precondition.

DAILY MOBILITY IN TERRES DE L'EBRE

Daniel Polo

The following text is a brief draft of the mobility in Terres de l'Ebre nowadays, that is, the amount of trips made for any reason and with any mean of transport, on the basis of the information offered, for the first time, by the Survey of Daily Mobility 2006.

Thus, this text not only describes the Survey of Daily Mobility's main results, but it also notes some practical conclusions on the transportation planning of this region, which is our final aim when talking about mobility. It can happen that, by providing different readings from the ones traditionally used, thanks to the Survey of Daily Mobility, we will also have a different point of view. In the last section, these last suggestions will be noted in accordance to the objectives stipulated in Act 9/2003 on mobility, an instrument that shares with the Survey of Daily Mobility the fact of being relatively new and also pioneer in some of its approaches.

1. Basic characteristics of mobility in Terres de l'Ebre

Residents inhabiting in the municipalities of Terres de l'Ebre travel an average of 581,128 trips on a working day and 411,687 on a bank holiday or weekend. Taking into account that the number of inhabitants in the region was 171,248 the year the survey was made, these data gives an average result of 3.39 and 2.40 journeys per person and day, respectively.

With the aforementioned data, two comparative questions may arise and they will help structure the analysis of all the data that the Survey of Daily Mobility provides. Firstly, how can the significant difference between the amount of trips made on a working day and on a weekend/bank holiday be explained? And secondly, referring specifically to mobility in Terres de l'Ebre, is it very different from the mobility in the rest of Catalonia?

Taking the first issue into account, it can be observed that mobility on a weekend/bank holiday is nearly 30% less than on a working day. However, this decrease is not homogeneous, it flows in relation to the mean of transport used (depending on the

1 General Town and Country Planning Project for Catalonia.

2 Although this study focuses on Camp de Tarragona, in order to provide a comparison and broader context, I have made some short references to mobility models for Catalonia as a whole. For this purpose statistical data has been used which are available from the following web page: http://www10.gencat.net/ptop/AppJava/cat/arees/mobilitat/observatorimobilitat/emq2006/emq_2006.jsp.

3 Transport Consortium for Camp de Tarragona.

reason and type of vehicle), as shown in tables 1 and 2, that can be summarised in two main characteristics:

- a. Resasons: on weekends, occupational mobility nearly disappears, that is, the one linked to paid jobs and official studies.
- b. Means of transport: on weekends, the number of trips made walking decreases.

According to the reasons, during weekends, there is a net increase of 28,000 trips of a personal matter, that is, a 20% more than during a working day. However, this growth is due to the significant increase in leisure activities (+46,000 trips, +124%), as in weekends/bank holidays there is also a fall of some of the complementary reasons that take place mostly in working days: daily shopping, accompanying people (includes taking kids to school), doctor/hospital appointments and non-official studies. As it can be seen, the growth of leisure compensates the reduction of these other reasons.

Regarding the use of the means of transport shown in table 2, it is worth mentioning that there are means that are not present in Terres de l'Ebre, but that could be used by the residents of this region who, during the days that the survey took place, travelled to the metropolitan region of Barcelona. However, this is a very small fraction and does not alter the analysis studied here. Comparing the data to a working day, on the weekends the use of all transports is reduced, but the biggest fall is with the non-motorised vehicles (-94,000 trips, -37%). In fact, there are only two means of transport that do not suffer a decrease in the number of users during the week: the car as a passenger and the coach (discretionary service). These are the two ways of travelling closely linked to leisure activities that, as it has just been mentioned in the previous paragraph, is the reason that shows an outstanding growth during weekends. The use of the car on working days is almost unipersonal and strongly linked to travelling due to work, with an average of 1.27 persons/car. On the other hand, on weekends, these trips are mainly substituted by other ones linked to leisure and prone to be done in group, as the average of 1.56 persons/car shows.

There are still two more issues that can be discussed to illustrate the differences between working days and weekends which are also linked to the reasons and means of transport. The first one indicates the type of destination of the trips, according to whether or not they take place within the same town. On a working day, leaving the town of origin happens less than on weekends. As it can be seen in table 3, the fraction of intramunicipal trips is of 77.3% on a working day and this number is reduced up to 69.4% on weekends and bank

holidays. This happens, of course, due to the non-occupational reasons: many of the personal travels on a working day (daily shopping, accompanying people, doctor appointments, etc.), that normally take place in a close area (same neighbourhood or town), are substituted by another sort of trips, closely linked to leisure and with a higher predisposition to travel further (table 1).

This trend to travel a longer distance on weekends is, precisely, the second issue to be taken into account. Even though the Survey of Daily Mobility, due to its methodology, cannot provide direct information about the distance of the trips, this can be deduced through the time that a journey takes. Table 4 shows how the average time of trips increases in 6 minutes on weekends, that is, grows a 46% more. Thus, it can be established that the distances travelled also increase in a proportional manner or even more, if we take into account that on weekends, non-motorised vehicles, which are the slowest, also have a more remarkable decrease than the rest of the means (table 2).

To answer the first question, a synthesis needs to be made. The visible difference between the amount of trips on a working day and on a weekend is due to the change of activities, as it can be deduced from the distribution of the reasons that mobility originates. When changing the reasons, during the weekend, this is what occurs:

- a. A global reduction on mobility, due to a balance of the reasons that decrease (occupational) and the ones that increase (personal, specially those linked to leisure)
- b. A change in the destination of the trips, since the type of activities described tend to happen further or closer to home.
- c. A change in the quota of use of the means of transport, linked to the type of activity that causes the trip and the distance required for each activity.
- d. An increase in the travelled distances, already described in table 3 with inter/intracity trips and the average time that they take.

An opposite reading can also be done, that is, suggesting that a change in the availability of the means of transport could be the actual reason for the differences according to the day of the week and, consequently, also part of the change in the reasons. At the same time, this hypothesis can only be supported because on weekends there tends to be a decrease in the trip frequency. However, there is no reason why the availability of private vehicles and walking would also be minor. But when checking the nearly non-existent quota of use of public transport in the trips within the Ebre region (2.8% on a working day and 1.7% on a weekend/bank holiday),

it can be quickly stated that mobility trends are explained through the reasons and not the means of transport.

This first issue that has been developed so far will be very useful to give an understandable explanation of the second question posed at the beginning of this section: how is the mobility in Terres de l'Ebre in relation to the mobility in Catalonia? It has already been stated that the residents in the Ebre region make 581,128 trips on a working day and 411,687 on a weekend or bank holiday. Comparing it to the 23.1 millions on a working day and 16.2 on a weekend that amount the whole of the Catalans, Terres de l'Ebre represent a 2.5% of the mobility in Catalonia. In fact, the average of trips per person and day in the Ebre region (3.39 on a working day and 2.40 on a weekend day) is almost identical to the average in Catalonia (3.38 and 2.39 respectively) and, in fact, also to any region, even the metropolitan area of Barcelona (3.41 and 2.39 respectively). The conclusion is that all over Catalonia, people travels in similar standards. And why is that? If we compare the distribution of the reasons that move the trips of the residents in Terres de l'Ebre with that in other regions, it can be observed that they are almost the same.

It has already been stressed that the reasons are the key element to explain the mobility trends and, in such a small geographical area as it is Catalonia, the cultural, social and economic factors that determine people's activities are very homogeneous from a territorial point of view.

On the contrary, noticeable differences between Terres de l'Ebre and the whole of Catalonia, or to be more precise, between the metropolitan area of Barcelona and the other Catalan regions, may be observed in one particular issue: the use of means of transport. In the six non-metropolitan areas we find very similar quotas of use amongst these means (public, private and non-motorised), but in the metropolitan area, the use of public transport increases up to 18.6% of quota on a working day and 11.1% on a weekend day (on the Ebre region this represents 2.8% and 1.7% respectively). This fact stems from the uneven distribution of public transport that still exists in Catalonia and that allows a classification in two groups: the metropolitan distribution and the one in the rest of Catalonia. In this context, Terres de l'Ebre stands out for not having an urban transport (apart from the city of Tortosa, that offers three bus lines running every thirty minutes) and for an intercity transport that depends exclusively on the bus, because the train, available only in two districts (Baix Ebre and Ribera d'Ebre) does not meet the needs of internal mobility in Terres de l'Ebre, but plays an economic role for the metropolitan areas of Barcelona and Tarragona.

However, it should also be stated that despite having a major amount of public transport services, the volume of mobility

of the inhabitants of the metropolitan region is exactly the same as that of the rest of Catalonia. This is a trend that calls for special attention for its implication in the planning of transportation and it will be further discussed on the last section of this text.

2. Territorial relationships

Once reviewed the more general characteristics that define mobility, it would be interesting to describe the territorial relationships created by people's trips. Table 5 shows the flow matrix amongst the districts in Ebre, on a working day as well as on a weekend day. To start with, it should be advised that in this table, as in all this section, the total amount of trips with an origin or a destination in these districts is mentioned, independently of whether or not the traveler resides in the same area¹. The data shows that only 5% on a working day (28,407) and 8% on a weekend day (30,217) of the trips within the area are between different districts, thus obtaining an accurate estimate of the small fraction that represent those journeys that imply a certain distance.

But obviously, from a territorial perspective the most significant data that table 5 offers is the relative dimension of the different combinations of connection between districts: there are more than 20,000 connections between Baix Ebre and Montsià on a working day as well as on a weekend day; and the rest of combinations hardly reach 2,000. This shows a picture of a region built upon three blocks: the pair Baix Ebre + Montsià, Terra Alta and Ribera d'Ebre. This can be explained by the intersection of the following factors:

- e. The demographic weight, mainly located in the axis Tortosa - Amposta - Sant Carles, that is, in the districts of Baix Ebre and Montsià.
- f. Strongly linked to the aforementioned factor, the concentration of economic activity and services around these cities and their spheres of influence.
- g. Orography and the distribution of means of communication, that sharply increase distances between the block formed by the southern district on the one hand and Terra Alta and Ribera d'Ebre on the other.

Following this territorial perspective, the second element of interest that the Survey of Daily Mobility brings are the connections established between Terres de l'Ebre and the neighbouring regions, described in table 6. Apart from stating again the major volume of long-distance journeys on weekends, it must also be pointed out that the total amount of flows with other areas is bigger than the total amount of flows between the districts that form Terres de l'Ebre. It can also be observed, in table 6, two different levels in the dimension of connections with the other regions: on the

one hand, with Camp de Tarragona, the metropolitan area and the areas outside Catalonia, where flows always rise above 10,000 daily trips. On the other hand, with the other areas of Catalonia, where the flow hardly reaches 3,000 daily trips. This means that there is not a direct link between the flow dimension and the geographical proximity and, therefore, other factors will be needed to explain this issue.

The first flow in dimension takes place with Camp de Tarragona, since there are two basic connections: between Ribera d'Ebre and Priorat and between Baix Ebre and Baix Camp. In both cases, there is a motorway (N-420 and N-340) and, moreover they are the two only links of Terres de l'Ebre with a rail connection (always with Camp de Tarragona). But on top of these infrastructures that improve communications, the amount of population and the economical activity that concentrates around the cluster Tarragona – Reus have to be taken into account.

Secondly, there is the flow with the metropolitan area of Barcelona, which shows that on a weekend there is the same amount of trips than the flow with outside Catalonia, but on a working day the amount is clearly bigger. Unlike the above mentioned flow, in this one there is no geographical continuity, that is, where communication between neighbouring towns but in different districts is important, but here, it relies on the commercial and services potential that the capital and its metropolitan surroundings exert.

Closing the flows' block of major importance, we find the connection with the areas outside Catalonia, basically with Comunitat Valenciana and Aragón. Supposedly, the major part of this flow goes to the north of Castelló, since in the first case the two districts that concentrate more people and activities in Terres de l'Ebre (Baix Ebre and Montsià) are closer and better communicated. Moreover, Vinaròs, Benicarló and Peníscola are a very important focus of attraction. The contrary happens with areas neighbouring Teruel and Saragossa, that do not concentrate that many inhabitants nor have similar communication means.

Finally, amongst the flows with the rest of Catalonia, stands out the low dimension of the connection with Terres de Ponent, despite the physical neighbouring from Ribera d'Ebre with Segrià and les Garrigues and also the fact that there is an important communication facility (C-12 or *Eix de l'Ebre*). In this case, it can be clearly noticed the scarce population in both sides of the division that the Survey of Daily Mobility establishes between Terres de Ponent and Terres de l'Ebre.

3. Notes on transportation planning

This approach on mobility in Terres de l'Ebre cannot be ended without taking

advantage of the potential that the Survey of Daily Mobility offers for the future. The study of the means of transportation and the territorial relationships existing currently are an excellent basis to plan new services and infrastructures of transport and also, to assess the policies that have been developed lately.

The sample of the Survey of Daily Mobility in Terres de l'Ebre (8,020 interviews on a working day) is big enough to allow a more in-depth hypothesis than this study, however, we will draft some interesting ideas.

From the analysis undertaken in the first section, we can extract a very relevant assumption: in a relatively homogeneous socioeconomic context, differences in the distribution of the means of transport has a feeble impact on the type of activity that people do throughout the day, that is, on our daily life and the social and economic functions that we develop. However, they are decisive when it comes to the way we choose to travel and carry out the necessary or desired activities. It shows that a same amount of inversion oriented, for example, to motorways or rails alternatively does not vary the amount and type of social and economic activities carried out. It is obvious that influence can indeed be exerted in the dynamics of territorial relationships, as long as it implies a relative increase of the capacity of some links of communication against others.

If we take into account the aforementioned explanation and the fact that Catalonia has a legislation like Act 9/2003 on mobility, that explicitly aims the planning of transport towards an improvement of accessibility and the reduction of its negative impacts, it seems fairly obvious that the investment in the coming years will need to be focused on the improvement and enlargement of public transport. This assumption seems to be clearly rooted when talking about the metropolitan area of Barcelona, but it vanishes when applied to Terres de l'Ebre, implying that there is not enough demand to economically sustain the services of public transport. About this issue, the Survey of Daily Mobility also gives an important information: the reasons stated by the people that do not use the public transport that already exists in these districts. Thus, the major reason why travelling by private vehicle is the lack of alternatives in the public transport (table 7), above other reasons such as comfort or travel time, shows the existence of a latent demand of more services of public transport.

It stands out that the most mentioned reason for people to use public transport is the low cost that this option implies (table 8), a fact that stresses the function of inclusion and social redistribution that this mean of transport offers.

This socially oriented element has been stressed, together with the

forementioned issues of accessibility and sustainability that inspired Act 9/2003, because it is surprising that the Transport Infrastructure Plan of Catalonia concentrates its funds from these districts basically in the addition of a carriageway to the C-12 (*Eix de l'Ebre*, from Tortosa to Lleida through Móra, Flix and Maials) and to the N-340 (Barcelona-València). These will turn into the free alternative to the Mediterranean highway, which will run in parallel. In other words, two infrastructures: the first one (C-12) will be totally overvalued (as it will be explained in the next paragraph) and the second one does not answer to the will of structuring the territorial relationships in Terres de l'Ebre. Also, both would make the use of a private vehicle more attractive against the existing public transport.

The case of C-12 deserves special attention as, thanks to the characteristics of the Survey of Daily Mobility, a very interesting study can be done. Mobility surveys are known to bring a very complete description of the studied phenomenon as long as there is not an excessive territorial segmentation of the results. That is, they are very precise when explaining globally a country, a region or even a district; however, they cannot provide feasible information between two small towns or what concerns a specific infrastructure, since the sample becomes insufficient and the error linked to the results unacceptable. Except when coincidences like the following occur: C-12 is practically the only way of communication between Terres de Ponent and Terres de l'Ebre², which are, in fact, two regions for which the Survey of Daily Mobility quantifies the flow that relates them on the basis of the sample obtained in the whole of Catalonia (more than 100,000 interviews with a margin of error of $\pm 0,31\%$). Thus, the traffic flow³ on the crossing between C-12 and the border of the two regions can be deduced with high precision, which is a very central spot of this highway (located between Flix and Maials).

It has been a long while since the Ebre river ceased to be the most important route of communications for these districts, the ones that Jesús Moncada describes so well in *Camí de sirga*. Table 6 shows how the highest flow between Terres de l'Ebre and Terres de Ponent on a weekend day is of 3,299 daily trips (both ways), very inferior to those that take place with other areas of Ebre. Letting the bus aside and assuming that all these trips are done by car through the C-12 (thus, adding the traffic flow of C-233), and adding the average occupation of 1.56 person/car,⁴ a traffic flow of 43.1 vehicles/hour, each way, at the C-12 crossing point (between Maials and Flix) can be obtained. In other words, nearly one vehicle every minute and a half, which does not announce an imminent threat of traffic congestion and, therefore, makes the plan of adding a carriageway to the highway unnecessary.

This sort of calculation can be done in other locations according to the results of the Survey of Daily Mobility and satisfactory results will also be obtained. In order to prove this, this study can be compared to the C-12: the daily average according to working/weekend day that has been taken from the Survey of Daily Mobility is of 1,999 vehicles/day, almost identical to the average daily flow of 1,807 vehicles/day from 2001, obtained through the traffic directly registered on the road⁵.

What proposals can be made on new infrastructures on the basis of Survey of Daily Mobility and according to the aims of the Act on mobility? Firstly, the differential existent in the use of public transport in the area of Barcelona and in the rest of Catalonia indicates that citizens would be willing to use more services, should they exist. Therefore, regarding long distance journeys, improvements should be studied in the services offered by trains connecting the regions of Tarragona and Barcelona, which are the ones that nowadays show a major volume of trips. Secondly, time may have come to propose a railway service connecting Tortosa-Amposta-Sant Carles, which are the cities that gather the population of Baix Ebre and Montsià, two districts with a connection above 20,000 trips on a working day as well as on a weekend day (table 5).

Along these lines, it should also be analysed the possibility of extending this new railway service to the towns north of Castelló, which is still non-existent despite having a good part of the infrastructures (Mediterranean rail corridor) and showing a trips' flow equivalent to the one that connects it with the metropolitan region of Barcelona.

Finally, it also has to be stated that the Survey of Daily Mobility provides a very useful information to diagnose intercity mobility which is typically 77.3% of all trips on a working day and 69.4% on a weekend. Even though with the results used here concise data about these trips has not been shown, together with the Survey of Daily Mobility, it could illustrate some of the pending duties and could offer corresponding proposals.

1 But they have to reside in Catalonia, which is the area of study of the Survey of Daily Mobility. This factor of residence explains the imbalance between the number of trips in table 5 and the number in tables 1, 2 and 3.

2 With the exception of C-233 between Flix and les Borges Blanques.

3 Obtained in the sample of the Survey of Daily Mobility and therefore it includes inhabitants of every town in Catalonia.

4 Average number of travelers by car amongst the residents in Terres de l'Ebre on a weekend day. This average shows an almost identical number in all the regions of Catalonia, on a working day as well as on a weekend day.

5 DEPARTAMENT DE POLÍTICA TERRITORIAL I OBRES PÚBLIQUES. *Anuari DPTOP 2005. Carreteres (trànsit)* [on-line]. Generalitat de Catalunya <http://www10.gencat.net/ptop/binaris/52_tcm32-35968.pdf>.

DAILY MOBILITY IN THE COMARQUES CENTRALS

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Introduction

Mobility studies play a fundamental role in knowledge of regional structures. Firstly, they make it possible to identify existing areas of relationships and the role of towns and cities in the organisation of the region and, on the other, they highlight the social mobility structures and the role of the different types of transport used by citizens. Despite this importance, the difficulty of obtaining this information is well enough known, and, beyond census data, there are hardly any studies offering sufficient data about territorial and social areas and structures. The Survey of Daily Mobility for Catalonia (2006) is, in this sense, a unique source of information as, for the first time, we have a large quantity of mobility data for the whole of Catalonia, allowing us a reasonably in-depth analysis of regional structures.

The Comarques Centrals region shows features determining the structures that generate mobility. On one hand, the towns and cities in this area are places with strong, diversified economic activity largely, but not exclusively, located in their immediate surroundings, configuring complex urban systems with consolidated social structures —one of the keys to the country's regional structures. On the other hand, although each of these towns and cities clearly articulates an area around it, communications between them are difficult. The lack of transversal infrastructures linking them together has been one of the outstanding challenges for the country, which is beginning to be resolved based on the construction of the transversal trunk road. In this area, the main road and rail infrastructures are those linking each of these towns and cities and their surroundings to the Regió Metropolitana de Barcelona. These two features mark and determine mobility structures, both in the sense of predominant areas of relationships and in the type of transport used.

1. Initial approach to mobility in the Comarques Centrals

An analysis of the basic features of the mobility of residents aged over four in the Comarques Centrals shows a dichotomy between mobility on working days and that at weekends and on public holidays, and this will be a constant throughout the different variables making up mobility as a whole. In general terms, mobility on working days is more complex, with a greater volume of people involved, more journeys made, a wider variety of reasons for them and greater appropriation of