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CONNECTING MOBILITY SERVICES AND SPATIAL TERRITORY TYPOLOGY: AN APPLICATION TO A FORMER COAL MINING AREA IN FRANCE

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CONNECTING MOBILITY SERVICES AND SPATIAL TERRITORY TYPOLOGY: AN APPLICATION TO A FORMER COAL MINING AREA IN FRANCE

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ABSTRACT

The French National Institute for Statistics and Economic Studies (INSEE) qualifies as "urban unities" every town inside urban agglomerations. But in these urban organizations, centres, suburban and/or rural areas can exist and we suspect they require differentiated and/or specific transport services.
Based on an economic approach, the distinction between urban and suburban or rural areas depends on the percentage of active residents working in an urban centre. In a geographic approach, this distinction is based upon physical considerations such as land which has been built on and distances between buildings. Our research field is organised in a wide Urban Transport Authority, the "Syndicat Mixte des Transports (SMT) Artois-Gohelle" and includes 115 towns overall. These towns are globally qualified as urban but they do not share the same degree of transport accessibility. Moreover, they present very different densities of inhabitants.
The aim of this paper is to build a typology of towns based on a combination of these factors and to imagine related services that could provide a better choice between car use and Public Transport (PT) use, improving the whole mobility in a context of sustainable development, and Transport Oriented Development (TOD).
The developed methodology allows us to establish such a classification for the SMT Artois-Gohelle towns. Based on the Household Travel Inquiries realized in this area in 2005 and 2006, it can be classified by travel behaviour such as commuting for work or travelling for leisure purposes in order to know the different transport modes (TM) used for these journeys.
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Keywords: Mobility services; Land-use; Transport policy; Household Travel Surveys; Whole mobility; Sustainable mobility.

INTRODUCTION

A controversy has existed concerning the opposition between urban and rural territories (Bonerandi et al., 2003) since the evolution of a third category of territory such as peri-urban (Roux and Vanier, 2008). The distinction between different spaces is useful to apply public policies available to fit each context. It is also important in transport economics to study the mobility behaviours (Lambert et al., 1988, Paul-Dubois-Taine, 2010) in these different territories in order to find relevant solutions promoting personal mobility.

The aim of this paper is to understand if the use of different transport modes (TM) or innovative services is linked to these differentiated of urban, peri-urban or rural territories. To answer this question it is necessary to determine a specific typology.

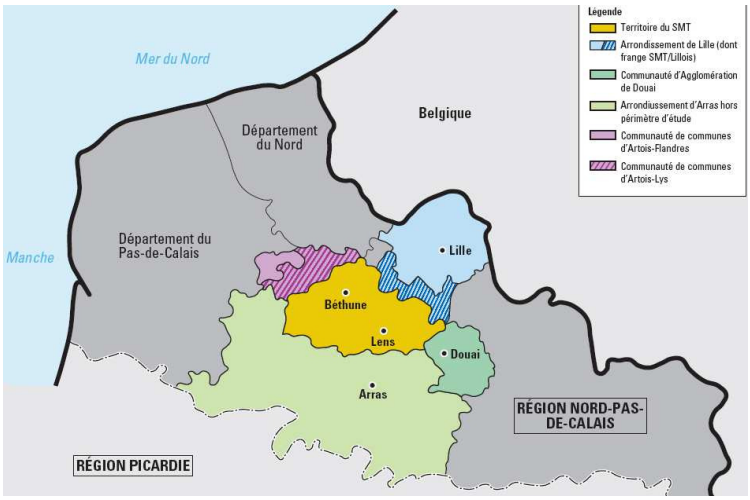
Another question is to know if some transport services corresponding to these territories exist and if their use is specific to these territories or can be adapted.

By a quantitative approach and analysis of the Household Travel Surveys (HTS) on a the field territory, we try to demonstrate if some differentiated mobility behaviours exist according to our territorial typology.

ABOUT THE STUDY AREA

Our study area is the « Syndicat Mixte des Transports (SMT) Artois-Gohelle » in yellow on the following map. It is the local authority in charge of transport and mobility policies for 115 towns belonging to its territory. This zone is a former coal-mining area, located in the Nord-Pas-de-Calais Region, in northern France. It had a total of 594,017 inhabitants in 2011 and a surface area of 76,115 hectares that denotes the urban transport perimeter.

Few studies exist concerning this area. One study shows a very low household motorization in Lens (Lambert et al., 1988). However, this territory presents special features. It is a polycentric territory with two main centres: Lens (36,120 inhabitants in 2008) and Béthune (25,697 inhabitants in 2008). It also presents suburban, peri-urban and rural belts.



Source : *Etude pour l'élaboration du PDU du SMT*, SMT, Transétude, 2009.

Figure 1 – The "SMT Artois Gohelle" area within Nord-Pas-de-Calais Region

Notably, the coal mining industry finished its activity in 1990. During the mining era, services were concentrated around the mine shaft. Miners and their families could access all

the services and jobs on foot (Froger et al., 2010). This explained short distances between their homes and workplaces. But now, it is more difficult because jobs, services and shopping centres are more scattered around the territory. So, it creates many trips, mostly carried out by private car (63% around Lens, 71% around Béthune against 60% for the French average).
Nowadays, it is a redeveloping territory. This redevelopment is carried out by a lot of urban planning projects such as the Louvre-Lens (Bodéré, 2010), a museum that will be linked with the famous Louvre in Paris to present permanent collections. This aims to improve a new image of this territory.
This territory has two important tramway projects, the first from Lens-Liévin-Hénin-Carvin and the second from Béthune-Bruay-la-Buissière. They are scheduled on the most frequent bus routes named "BuLLe" with the highest number of passengers.
The public transport network covers all the studied territory with different type of bus services: classical bus for the main cities and demand responsive transport for the more rural towns. In the center of the "SMT Artois-Gohelle", we can imagine there is a high market share for the public transport (because of a high existing supply contrary to the rural zones) and for walking. We can also think it exists a wide mutual assistance among populations as a legacy of the mining history of this studied zone. A further analysis of the two Household Travel Surveys, available for the territory, allows us to verify or to contradict our assumptions.

DEFINITION OF SPATIAL TERRITORIES

This studied area is mainly considered as an urban area but the following paragraph will show that it is possible to classify territories belonging to urban centres, suburban, peri-urban or rural categories.

Urban territories

Urban territories have been studied by numerous authors (CERTU, 2004, Paquot et al., 2000, Brun, 2001). The definition of urban territories is well-known.
From an economic point of view, urban territories or towns are spaces where economic activities and population are agglomerated. For the economic geography, urban territories represent the space where households and firms are concentrated. For INSEE, an urban territory is characterized by a high level of employment or commuting.
From a sociological point of view (Thomsin, 2001), urban territories have a common culture that will spread based on value systems which are recognised and shared by everybody and where social relationships can be established.
So, it is a very diverse area. Nevertheless, this indicator is no longer the exclusive criterion of urban spaces because of population migrations and economic activities which increase and diversify housing, economics and leisure areas (Schmitt and Gofette-Nagot, 2000).

Rural territories

Rural territories are less studied. Nevertheless, they have a shared representation. According to geographers (Poulot, 2008), the rural space is a specific territory with scattered discontinuous housing and relatively low population densities. From an economic point of view as indicated by INSEE in 1999, all spaces that do not belong to the urban category will

be grouped into a rural category. This is in contrast to the town with low population density, with few artificialised soils and a developed agricultural activity.
For economic geography, rural territories present low densities of population and/or of jobs and the agricultural activity is dominant. It is also possible to find other social categories (such as workmen, craftsmen, shopkeepers…) who commute for work every day towards urban centres.
According to other authors (Schmitt and Gofette-Nagot, 2000), a distinction may be made between "rural spaces at the urban periphery" representing a built-up rural area such as an extension of the town with a certain continuity, and "rural spaces that are not under urban influence" even of the nearest town.
From a sociological point of view (Thomsin, 2001), it is better to use the term "rurbain" when considering rural spaces. The term "rurbain" is used to describe rural transformation spaces where rural structures and individual urban culture coexist. Nevertheless, these authors agree that agricultural and farm activity is no longer their economic driving force because of the migration of the population and the dispersion of economic activities during recent years, enhancing the heterogeneity of these territories. Rural territories are now being driven by new dynamics that oblige us to consider new definitions.

Peri-urban territories

The current difficulty is to define peri-urban spaces. They include small towns hosting inhabitants who work in urban poles. Another difficulty is to adapt transport services to these different territories in order to promote a more sustainable mobility.
According to an economic perspective, peri-urban territories are dispersed towns and evoke the transformation of the areas located between the rural and the urban territories (Roux and Vanier, 2008).
From a geographical point of view, peri-urban territories represent a third category of spatial planning. They are neither urban nor rural areas. They have both rural and urban characteristics. They are not isolated regarding commercial activities, procurement, commuting or services. According to other authors (Bonerandi et al., 2004), defining peri-urban territories is very difficult because these areas are constantly evolving. They are qualified as "intermediate spaces". They are subject to a morphological (artificialization of land), social and functional integration to the city (Rouget, 2008).
From a sociological perspective (Thomsin, 2001), a peri-urban territory means a "functionally urban area" on the outskirts of an urban agglomeration.

DIFFERENT TYPOLOGIES TO IDENTIFY DIFFERENT SPATIAL TERRITORIES

Our studied area is mainly considered as a dense urban zone. Nevertheless, it is important to obtain different categories of territory to adapt mobility services according to the specificities of each type of territory.
In this part, we choose to use different typologies to classify our studied territory.
Four typologies were testified. The first one based on urban unities from INSEE (2010) does not sufficiently distinguish between centre, suburb, isolated and rural towns. Too many towns are in the suburb category. The second typology according to urban areas from INSEE (2010) does not reflect the rural nature of some territories. The third one is a typology according to the population densities. It is not sufficiently discriminating too. Effectively, it only takes into

account the habitat without indicating its surface. The last one, described in the below paragraph, is a typology according to the land-use. The aim of this one is to distinguish between the different category of territories and their classification into the previous definitions explained above.
The best typology appears to be in accordance with the land-use. So, on the following part only this typology is presented.

Typology according to land-use

This typology is based on the research of a public land agency in the Nord-Pas-de-Calais Region, called EPF. EPF wants to create a typology to distinguish different territories within a large urban area1. EPF uses the notion of habitat area, developed by INSEE, to establish this typology. If we add other variables like the share of economic and agricultural activities, we obtain eight categories (see Figure 5):

- "Centre": corresponds to the two biggest towns of our study area: Lens and Béthune. Habitat and economic activities represent more than 75% of the surface of the towns.
- "Urban pole": presents the same level of population as centre, but economic activities are less prevalent than in the centre (between 23 and 32% against 41% in the centre).
- "Secondary pole": the level of population is significant compared with our study area, about one third of the surface of the town is devoted to the habitat and the share of economic activities is usually inferior to that of the urban pole.
- "Industrial suburb": the level of population is inferior to that of the secondary pole but this category counts only a few thousand inhabitants. As the map shows, these towns are located in the former coal-mining area also recognizable by miners'houses due to the former mining activity.
- "Mixed suburb": the level of population is equal to that of the industrial suburb. The share of agriculture represents more than 50% (between 52 and 71%). The share of habitats is on average around 25% and the economic activities are still present while agriculture clearly dominates. The mixed suburb towns are mostly located around the centre.
- "Peri-urban": these towns are located on the edge of our study territory. The level of population is inferior to that of the industrial and the mixed suburbs. The greatest feature is the dominance of agriculture (between 67 and 99%). Economic activities are almost nonexistent (4% for one town, between 0 and 1% for the others).
- "Mixed peri-urban": this category presents the same characteristics as peri-urban. The agriculture still represents more than the half of the town's surface. Economic activities have a stronger weight than that of the peri-urban.

[1] We use the same classification and our work is based on several meetings with Philippe Heroguer, Responsible of the observation pole and geomatics at the EPF Nord-Pas-de-Calais specially with the land methodological workshops results.

- "Rural": these towns are located in the south of the study area. The level of population is very low (between 200 and 700 inhabitants, mostly around 300). Agriculture is predominant on these zone's surfaces (between 88 and 94%).

We use this typology because it describes the diversity of the territories into a large urban area. It could be applied to identify specific mobility behaviours, by place of residence, in our study area.

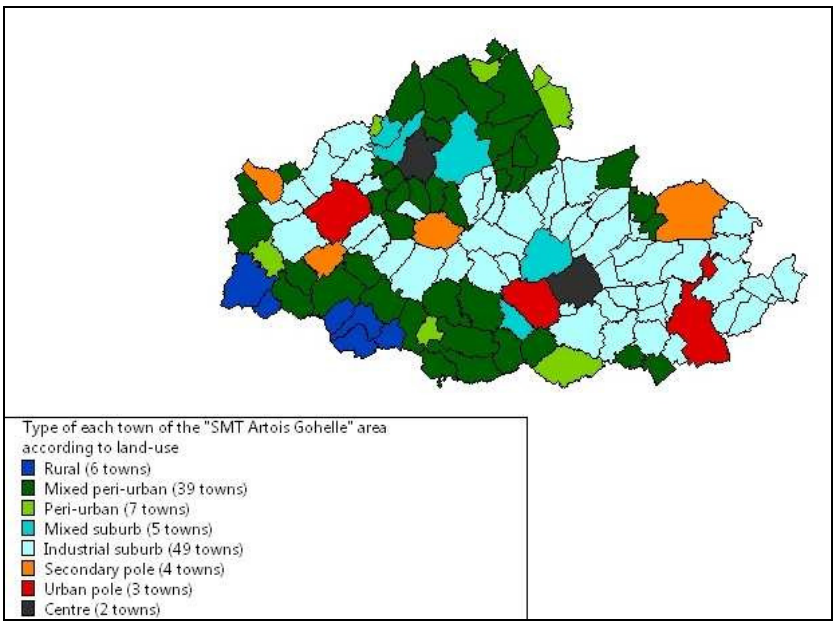


Figure 2 – Representation of our study area accord to land-use

DIFFERENT TRANSPORT MODES OR NEW MOBILITY SERVICES

Every TM presents advantages and drawbacks. In this part, we make a description of different TMs and some new mobility services. Then, we classify them according to the territories where they can be implemented.

Walking

Walking is the oldest TM. It allows enjoying the town facilities, its environment and gives the occasion to practice a sport activity. Walking distances are limited by each individual physical capacity (Mérenne, 2008). Walking can be improved by specific technologies such as moving walkway or escalators. Intermodality is possible for high travel distances. People go on foot for short proximity travels in inner town centres (less than 1 kilometre). Walking is a good complement to public transports (PT). It avoids parking and circulation problems. This TM uses indeed few public spaces. Moreover, it is accessible to all kinds of education level.
Some services give a new use of this TM. The "walking school bus" or "pedibus" can represent an educational way towards sustainable mobility. It consists in an accompanying walking service for children going to school (Depeau, 2008). "This is a group of children who walk to school along a set route, collecting other children along the way at 'bus stops', escorted by several adult volunteers, one of whom is at the front ('the driver') and one is at the back ('the conductor')" (Mackett et al., 2003). It has specific itinerary, stops and timetable and is cheap, healthy and environment-friendly.

The innovation is more in the way to organise this service. One of its goals is to show that to be accompanied by their own parents (and more often by car) is not a unique way to go to school. Another advantage is to teach and develop mobility capacities for children, to give autonomy for school travels and to develop new habits and a more sustainable behaviour. However, this service demands an actual citizen involvement, mostly on a volunteer basis. It also gives the occasion to replace children in the city under the watchful supervision of young or elderly adults.

New bicycle uses

For the past few years, big cities are offering self-service bikes also called bike-sharing system in order to renew the bicycle use. People who travel by bike are often doing short distances (less than 5 kilometres) nevertheless there is a huge sustainable stake at this level because this mode only uses human energy. This TM is safe if cycle lanes are constructed.
Its market share difference between several countries can be explained by the topography of the area, the climate, physical capacities of people, the infrastructures and facilities for non-motorised TMs and the convenience of the other competing transport modes (Héran, 2001). Some personal characteristics such as the age, income and activity can also explain it. Cultural tradition of the country, for instance the Netherlands must be taken into account (Rietveld and Daniel, 2004).

Bike-sharing systems are more located in urban areas. To be truly effective, they must be coupled with planning policies improving the use of bicycles (Paul-Dubois-Taine, 2010). It is an economical TM because the registration price may be low for users even if the operating costs of this service (repair, maintenance, theft) can be high. Moreover, the price of cycling infrastructures is less expensive than road infrastructures. It is a reliable, ecological and healthy TM even if it can be unsuitable in case of inclement weather.

Electric assistance bikes are also a new device in the bike universe. The electric bike allows longer travels up to 8 kilometres (Paul-Dubois-Taine, 2010). Its main advantage is saving time and avoiding parking problems if some specific facilities (secured and watched-over parking) are created to encourage its use.

Electric scooters

Electric scooters can also be an alternative to bicycles for longer trips out of urban territories. They allow travels between 10 and 20 kilometres (Paul-Dubois-Taine, 2010). No specific equipment is required to accompany a passenger.
It is difficult to couple electric scooters with the other TMs because of the need of vehicle storage at charging stations. Moreover, they do not solve the problem of congestion into road traffic and the risk of accident can increase.

New car uses

Two sorts of services can change attitude towards the car: individual use of the car: electric urban cars, low-cost cars, self-service car, short-term car rental, or services which promote a more collective practice of the car: car-pooling, car-sharing.

Electric urban cars or low-cost cars do not solve the problem of congestion and space consumption. They have up to 150 kilometres autonomy. This TM raises the question of the

access to charging stations and the length of the recharge. The purchase cost is important. Low-cost cars are based on low-cost construction. They mark the transition between the car seen as a way of freedom or social attribute and the car seen as a commodity (Paul-Dubois-Taine, 2010).

Self-service cars allow people to rent a car for short periods, at any time. It means less private car use in support of alternative TMs such as cycling, walking or PT. A self-service car could substitute around fifteen private cars (Marzloff, 2005). So, it can free up public space and avoid traffic jam. This service is suited to the user's specific needs, but it is not an actual ecological service because no effort is made about their occupancy rate. Short-term car rental presents the same benefits as the self-service car.

Car-sharing fulfils the specific mobility needs when using car is almost indispensable (Huwer, 2004). It means a successive use of the same vehicle by different consumers, often for short periods (Paul-Dubois-Taine, 2010). It has an environmental impact: distances covered are shorter, fuel consumption is reduced as well as the generated pollution (Feitler, 2003). Parking space is thereby also reduced. Nevertheless, this type of service does not solve the problem of the rental and the return of the vehicle, since a major constraint is to return the car at the same place. Connecting stations can moreover promote the attractivity and interest of the service (Entreprises Territoires et Développement, 2009). The cost of the car-sharing service gives information to the user about the financial cost of each travel. This service also meets a social function because people who cannot own or use a private car (for financial reasons for example) can cheaply share one for their personal or professional occasional use.

Car-pooling refers to several people who make the same travel together indiscriminately for personal or professional purpose (Paul-Dubois-Taine, 2010). Effectively, this mobility service provides a higher vehicle occupancy rate through the sharing of travel requests for similar journeys. It responds to a triple need: offering the access to private car to people, avoiding traffic congestion and preserving the environment (Vincent, 2009). Car-pooling may be a complement to PT modes (Entreprises Territoires et Développement, 2009). Usually, a web site is required to match supply and demand for car-pooling. The information and communication technologies play an important role here.

By reducing the numbers of vehicles circulating, car-sharing and car-pooling generally help to solve the problem of traffic congestion. All these types of services offer to consumers a larger diversity in terms of available TMs. They also help to change attitudes towards private cars that tend to become more a commodity than a personal and individual property.

Demand responsive transport (DRT)

DRT is restricted to low-density areas or territories which are poorly or not served by conventional PTs. This service was born because of the phenomenon of peri-urbanization (Paul-Dubois-Taine, 2010). It presents a large diversity of supply and operation. DRT is part of the solutions proposed to help mobility of people in peri-urban and rural areas. In theory, it can be applied to all segments of the population, including PT captives (Dejeammes, 2004).

DRT is a field of technological innovation (Faudry and Chanaron, 2005). They are often criticized because of their cost and lack of flexibility including their routes and their inability to meet high demands (Mulley and Nelson, 2009). Nevertheless they allow inhabitants of low-density zones to have a minimum access to PT and therefore a better quality of life, well-being, and an easier social integration.

In our study area, 14 DRT bus routes are used. DRT can be seen as a complex service: making a reservation, having a registration within the transport network. It can be a substitute for PT regular lines with few passengers or a way to serve specific equipments, events

(markets) or inaccessible areas. Recent studies based on inquiries have showed that DRT is more used by elderly and female or retired people (Nelson and Phonphitakchai, 2012).

Bus with a High Level of Service (BHLS)

New bus schemes known as BHLS are being implemented in different European countries more particularly in France. They are not necessarily "new solutions" or some innovative form of transport looking for a market. These bus schemes often tend to restore the efficiency that buses had before they get stuck into the car congestion. These are the result of poor urban structure and form, and greatly exacerbated by urban sprawl. This has contributed to the degradation of economic and financial conditions of most of PTs in the last four decades of the 20th century, with great loss from public to private forms of transport. Very large public expenditures are then required to try to regain fractions of the lost business. BHLS can help to change part of this context, and it is now important to understand the key factors for the bus revival. Its concept can therefore be explained by the necessity to fill the gap between the regular bus and the tramway in terms of performance, cost and capacity (Heddebaut et al., 2010).

Bus lines have different functions within the network itself. They are then operated in different urban contexts, with different capacity requirements and then different operational requirements. They can have urban or inner centre bus routes operating within the core urban area. BHLS can also be local or distributor routes operating locally in the inner or outer suburbs, including feeder roads. BHLS can represent collector or radial roads connecting one suburban area or the hinterland with the centre of the urban area. BHLS can also be cross-city roads connecting different parts of the urban and suburban areas via the main city centre. Finally, BHLS can represent peripheral or tangential roads connecting suburban areas without entering the centre (Finn et al., 2011). This category of bus is more adapted in urban or peri-urban territories than at a rural level.

Some other new mobility services

Besides new ways to use former TMs, some new services are created. They promote a new mobility for more categories of people or develop a more suitable one.

An information platform provides real-time information and other mobility services across a given territory (Entreprises Territoires et Développement, 2009). It can be a physical home, a hotline or a website. The transport authority can place access points to the information platform in places considered relevant to encourage intermodality. Get regular and updated information is very important for users. Partnerships between different transport authorities and different territorial levels are essential.

Private transport for social purposes is dedicated to the most vulnerable populations (Entreprises Territoires et Développement, 2009). In order to have access to this service, users must be in a physical, material or financial assistance to move to places for their social or professional insertion, or medical places. Organizers have considerable liberty to implement the service.

Financial mechanisms to support mobility meet the needs of access to transport devices. They seek to restore equal access to PT (Entreprises Territoires et Développement, 2009).

Other new mobility services can be regrouped under the term “e-substitution”. It is not necessarily the dematerialization of a service, but may be the substitution of a long trip by a shorter one or by a motionless activity (Kaplan and Marzloff, 2009). Currently, homeshoring

is developed mainly in urban areas. But the real interest is located in the low-density zones like peri-urban or rural territories as it would reduce the number of commuters to work between home and work places (Berget and Chevalier, 2001).

The last new mobility services meet the principles of sustainable development. Raising public awareness and education for a more suitable mobility aims to promote the long-term use of alternative TMs to private car. The main benefit is to facilitate behaviour changes through education and the postponement to other more suitable mobility practices (Depeau, 2008, Mackett et al., 2003).

Crossing transport services with differentiated spatial areas

Every TM can be applied to urban territories. Nowadays, several discussions are conducted on the pernicious effects of urban transportation in a context of sustainable development (Bonnafous et al., 1998, Chanei and Faburel, 2010). The mobility services in rural territories are booming and concrete solutions emerge to facilitate the mobility for people living in these areas (Entreprises Territoires et Développement, 2009).
The real issue is to determine which type of mobility services should be implemented in peri-urban areas. As described previously, their definitions are not so clear. Furthermore, a distinction of different types of peri-urban territories should be useful.

Table I – Differentiated spatial territories for differentiated mobility services

Urban territories	Peri-urban territories	Rural territories	Not specified territories
Walking Mérenne (2008) Walking school bus Dupeau (2008) Mackett et al. (2003) Bike Héran (2001) Electric bike Bike-sharing system Electric scooters Electric urban cars Short-term car rental Car-sharing Car-pooling Paul-Dubois-Taine (2010) Self-service car Paul-Dubois-Taine (2010) Marzloff (2005) BHLS Heddebaut et al. (2010) Finn et al. (2011) Demand responsive transport Paul-Dubois-Taine (2010) CERTU (2004) Information platform Paul-Dubois-Taine (2010) E-substitution Kaplan and Marzloff (2009)	Walking Mérenne (2008) Car-sharing Entreprises Territoires et Développement (2009) Car-pooling Entreprises Territoires et Développement (2009) BHLS Heddebaut et al. (2010) Finn et al. (2011) Demand responsive transport Paul-Dubois-Taine (2010) Mulley and Nelson (2009) CERTU (2004) Information platform Paul-Dubois-Taine (2010) E-substitution Kaplan and Marzloff (2009) Berget and Chevalier (2001)	Walking Mérenne (2008) Electric scooters Paul-Dubois-Taine (2010) Car-sharing Entreprises Territoires et Développement (2009) Car-pooling Entreprises Territoires et Développement (2009) Demand responsive transport Paul-Dubois-Taine (2010) Mulley and Nelson (2009) CERTU (2004) Information platform Paul-Dubois-Taine (2010) E-substitution Kaplan and Marzloff (2009) Berget and Chevalier (2001)	Bike Rietveld and Daniel (2004) Low-cost car Paul-Dubois-Taine (2010) Car-sharing Huwer (2004) Feitler (2003) Car-pooling Vincent (2009) Demand responsive transport Dejeammes (2004) Faudry and Chanaron (2005) Nelson and Phonphitakchai (2012) Private transport for social purposes Entreprises Territoires et Développement (2009) Financial mechanisms to support mobility Entreprises Territoires et Développement (2009)

Table I describes what kind of TM could be implemented into the different spatial territories as suggested by different authors that present the territorial use of these TM. The literature also shows what kind of TM fit different distances categories: less than 1 kilometre: walking, 1 to 4 kilometres: bike, 4 to 7 kilometres: two-wheeled motorized, 7 to 10 kilometres: urban PT, more than 10 kilometres: car/ urban PT.

CONNECTING THE TYPOLOGY BASED ON LAND-USE AND TRANSPORT BEHAVIOURS

Two Household Travel Surveys (HTS) have been conducted on our study area: one for the Lens-Liévin-Hénin Beaumont (LLHB) zone in 2006 and the other for the Béthune-Bruay-la-Buissière-Nœux-les-Mines (BBN) zone in 2005.

We have combined these two HTS to sort out the eight different categories of territories described previously. They correspond to the place of residence of people interviewed in the HTS.

In table II, these territorial categories have been crossed with the distances made by each person and per day and it shows that distances are less important when coming from centre territory (8,8 kilometres).

This can be explained by the proximity between dwellings, jobs or services and their concentration in this kind of territory. They increase up to 12,5 kilometres when travelling from mixed peri-urban territories where agricultural activity is present but where still remains industrial activity. Surprisingly, distances are shorter in peri-urban and rural territories where agricultural activity is predominant.

Table II – Travel-distance budget per person and per day considering the place of residence

Place of residence	**Travel-distance budget per person and per day (in metres)**
CENTRE	8,848
URBAN POLE	10,036
SECONDARY POLE	10,217
INDUSTRIAL SUBURB	11,058
MIXED SUBURB	11,281
MIXED PERI-URBAN	12,511
PERI-URBAN	9,438
RURAL	9,979

Source: HTS LLHB (2006) and HTS BBN (2005)

The results in table III show mainly that travel time budget per person and per day is more important where density of urbanization is very low.

The high level of travel time budget in centre territories can be explained probably by traffic congestion effects or, as shown in the next table, by the higher number of trips. In peri-urban and rural areas, travel time is less important due to this low level of urbanization avoiding congestion effects and also a lower number of trips.

Table III – Travel-time budget per person and per day considering the place of residence

Place of residence	Travel-time budget per person and per day (in minutes)
CENTRE	56.2
URBAN POLE	53.6
SECONDARY POLE	53.0
INDUSTRIAL SUBURB	56.3
MIXED SUBURB	60.5
MIXED PERI-URBAN	59.1
PERI-URBAN	43.0
RURAL	47.2

Source: HTS LLHB (2006) and HTS BBN (2005)

In table IV, the number of trips per person and per day is different between centre territories that count up to 3,9 trips, where urbanization degree is high and where jobs and services are provided, and the peri-urban and rural territories with low dwelling densities that count no more than 2,4 trips. The same number of trip is observed for these categories: urban pole, industrial suburb and mixed suburb. It can be explained by a greater number of shorter trips in these territories where the degree of amenities is relatively high.

Table IV – Number of trips per person and per day considering the place of residence

Place of residence	Number of trips per person and per day
CENTRE	3.905
URBAN POLE	3.801
SECONDARY POLE	3.752
INDUSTRIAL SUBURB	3.829
MIXED SUBURB	3.804
MIXED PERI-URBAN	3.565
PERI-URBAN	2.105
RURAL	2.485

Source: HTS LLHB (2006) and HTS BBN (2005)

In table V, the main TM used for travelling has been connected within these eight categories of territories.

Trips by car increase when the urbanization degree decreases: for instance, in centre territories, we observe 41% of car use against 73% in rural areas. Secondary pole and industrial suburb present the same figures: they have the same share of car driver (respectively 44-45%), of car passenger (20-21%) and of walking trips (respectively 28-26%). The explanation can be a same proportion of dwellings and economic activities in these territories. The difference is only the number of their inhabitants.
In the same way, the share of walking trips decreases with the urbanization degree. A high level of walking in centre and urban pole (respectively 35-31%) is observed where the city attractiveness and amenities are more significant, although this level remains high in secondary pole and industrial suburb (respectively 28-26%). Walking trips decline when agricultural activity appears supposing a low level of housings density and greatest walking distances such as in mixed suburb and mixed peri-urban territories (respectively 18-14 %).

The predominance of car use in rural territories (73%) can be highlighted, probably for the same reasons. Moreover, walking practice is pretty nonexistent in these peri-urban and rural areas. The share of bike is quite the same (around 2%) in high density zones.

The share of urban PT is very low (2%) compared to other French agglomerations such as the nearby city of Lille Metropolis (9%).

Surprisingly, this share of urban PTs (2%) remains constant whatever the place and characteristics of residence territories. This suggests either inefficiency in the use of PT in high density territories or DRT use in the other territories, but our results are in agreement with the number of passengers given by the transport authority for the transport network.

Furthermore, the low number of passengers of the PT network is compensated by other TMs. This is mainly by car when the distances are not achievable by walking or cycling. The high level of car passenger, particularly in industrial and mixed suburbs (21-22%) compensates also the weak performance of the PT network. It can probably be explained by the mining history and its traditional solidarity.

Table V – Main transport mode used considering the place of residence

Place of residence	Main transport mode								Total
	Car driver	Car passenger	Urban public transport	Other public transport	Bike	two-wheeled motorized vehicle	Walking	Other	
CENTRE	0.41	0.17	0.02	0.01	0.02	0.01	0.35	0.01	1.00
URBAN POLE	0.43	0.19	0.02	0.01	0.02	0.01	0.31	0.01	1.00
SECONDARY POLE	0.45	0.20	0.02	0.02	0.02	0.01	0.28	0.01	1.00
INDUSTRIAL SUBURB	0.44	0.21	0.02	0.02	0.02	0.02	0.26	0.01	1.00
MIXED SUBURB	0.51	0.22	0.02	0.02	0.03	0.01	0.18	0.01	1.00
MIXED PERI-URBAN	0.54	0.22	0.02	0.04	0.02	0.01	0.14	0.02	1.00
PERI-URBAN	0.60	0.22	0.02	0.03	0.01	0.02	0.10	0.00	1.00
RURAL	0.73	0.14	0.01	0.01	0.00	0.00	0.05	0.06	1.00

Source: HTS LLHB (2006) and HTS BBN (2005)

In table VI, we consider the eight categories of territories and the main TM used combined with the travel purpose. Car driver has an important market share for commuting to work for these eight territories (from 72 to 82%) and for home-accompanying reason (57% in urban pole, 72% in mixed peri-urban). Car passenger is very low for commuting to work trips (9% in peri-urban, 5% in centre).

Car passenger is higher in centre and urban pole territories for visiting family and friends (25-27%). This motif can effectively be done by several member of a family. In low-density areas, car passenger rate is higher for home to school in peri-urban and rural zones (respectively 42-35%) supposing that walking distances are too high to reach the school or university.

On the contrary, the motif home to school or university involves walking in the highest density zones. More than half of these trips are made on foot (56% in centre and 59% in urban pole). The motifs are equally represented in industrial and mixed suburbs.

Walking is also involved in leisure activities: in centre (55%) where leisure supply is important and in secondary pole (37%). Walking for leisure activities is very high in rural zone (60%) where the environmental and nature amenities favour promenades.

Nevertheless, in this table, we can not conclude that origin and destination for a same trip are located in the same place of residence. Moreover, for the secondary travels our analysis does not tell us the origins and destinations of each trip. More than half of these trips are made by car whatever the place of residence.

Table VI – Main transport mode used considering the place of residence and the travel reason

Place of residence	Combined travel reason	Main transport mode								Total
		Car driver	Car passenger	Urban public transport	Other public transport	Bike	Two-wheeled motorized vehicle	Walking	Other	
CENTRE	Home to work	0,73	0,05	0,01	0,04	0,01	0,02	0,13	0,00	1,00
	Home to school / university	0,07	0,20	0,10	0,04	0,03	0,01	0,56	0,00	1,00
	Home - shopping	0,39	0,20	0,01	0,00	0,03	0,01	0,35	0,00	1,00
	Home - health / procedures	0,42	0,20	0,02	0,01	0,04	0,02	0,26	0,03	1,00
	Home - leisure activities	0,21	0,20	0,02	0,00	0,02	0,00	0,55	0,00	1,00
	Home - visiting family / friends	0,40	0,25	0,01	0,00	0,02	0,01	0,30	0,00	1,00
	Home - accompanying	0,49	0,09	0,00	0,00	0,00	0,00	0,41	0,01	1,00
	Home - other	0,60	0,11	0,00	0,04	0,03	0,03	0,15	0,04	1,00
	Secondary travels	0,48	0,18	0,01	0,01	0,01	0,01	0,30	0,01	1,00
URBAN POLE	Home to work	0,75	0,08	0,01	0,01	0,00	0,02	0,12	0,01	1,00
	Home to school / university	0,03	0,23	0,09	0,04	0,01	0,01	0,59	0,00	1,00
	Home - shopping	0,45	0,21	0,01	0,00	0,03	0,01	0,28	0,00	1,00
	Home - health / procedures	0,43	0,24	0,04	0,00	0,02	0,01	0,23	0,02	1,00
	Home - leisure activities	0,24	0,20	0,00	0,00	0,05	0,01	0,51	0,00	1,00
	Home - visiting family / friends	0,37	0,27	0,01	0,00	0,03	0,02	0,30	0,00	1,00
	Home - accompanying	0,57	0,12	0,01	0,00	0,00	0,00	0,30	0,00	1,00
	Home - other	0,52	0,17	0,01	0,02	0,02	0,02	0,16	0,07	1,00
	Secondary travels	0,52	0,22	0,01	0,01	0,02	0,01	0,20	0,02	1,00
SECONDARY POLE	Home to work	0,72	0,08	0,00	0,03	0,02	0,04	0,10	0,02	1,00
	Home to school / university	0,02	0,35	0,07	0,05	0,02	0,00	0,50	0,00	1,00
	Home - shopping	0,42	0,24	0,01	0,00	0,00	0,01	0,31	0,00	1,00
	Home - health / procedures	0,37	0,27	0,07	0,00	0,00	0,01	0,26	0,02	1,00
	Home - leisure activities	0,38	0,19	0,00	0,00	0,06	0,00	0,37	0,00	1,00
	Home - visiting family / friends	0,42	0,19	0,00	0,00	0,04	0,03	0,31	0,01	1,00
	Home - accompanying	0,59	0,09	0,01	0,00	0,00	0,00	0,30	0,00	1,00
	Home - other	0,59	0,14	0,00	0,01	0,06	0,03	0,16	0,02	1,00
	Secondary travels	0,55	0,23	0,00	0,03	0,00	0,01	0,18	0,01	1,00
INDUSTRIAL SUBURE	Home to work	0,76	0,07	0,01	0,03	0,02	0,03	0,06	0,01	1,00
	Home to school / university	0,04	0,27	0,11	0,10	0,03	0,01	0,45	0,00	1,00
	Home - shopping	0,52	0,21	0,01	0,00	0,02	0,01	0,22	0,00	1,00
	Home - health / procedures	0,47	0,27	0,03	0,00	0,02	0,01	0,19	0,01	1,00
	Home - leisure activities	0,24	0,24	0,01	0,01	0,05	0,02	0,43	0,00	1,00
	Home - visiting family / friends	0,39	0,26	0,01	0,00	0,03	0,03	0,27	0,00	1,00
	Home - accompanying	0,48	0,16	0,00	0,00	0,01	0,01	0,34	0,00	1,00
	Home - other	0,53	0,16	0,02	0,01	0,04	0,03	0,16	0,04	1,00
	Secondary travels	0,51	0,21	0,01	0,02	0,02	0,01	0,19	0,03	1,00
MIXED SUBURB	Home to work	0,74	0,09	0,00	0,01	0,07	0,05	0,02	0,02	1,00
	Home to school / university	0,03	0,28	0,07	0,16	0,06	0,00	0,40	0,00	1,00
	Home - shopping	0,59	0,23	0,01	0,00	0,03	0,01	0,12	0,00	1,00
	Home - health / procedures	0,51	0,34	0,01	0,00	0,01	0,00	0,12	0,01	1,00
	Home - leisure activities	0,41	0,27	0,01	0,00	0,05	0,00	0,26	0,00	1,00
	Home - visiting family / friends	0,54	0,30	0,02	0,00	0,00	0,00	0,12	0,00	1,00
	Home - accompanying	0,67	0,09	0,00	0,00	0,00	0,00	0,24	0,00	1,00
	Home - other	0,58	0,26	0,00	0,03	0,00	0,05	0,03	0,04	1,00
	Secondary travels	0,53	0,26	0,02	0,01	0,01	0,00	0,16	0,02	1,00
MIXED PERI-URBAN	Home to work	0,82	0,05	0,01	0,02	0,01	0,02	0,07	0,01	1,00
	Home to school / university	0,05	0,40	0,13	0,22	0,02	0,00	0,16	0,00	1,00
	Home - shopping	0,59	0,28	0,00	0,00	0,02	0,01	0,08	0,01	1,00
	Home - health / procedures	0,60	0,30	0,01	0,00	0,02	0,00	0,07	0,00	1,00
	Home - leisure activities	0,30	0,30	0,00	0,01	0,04	0,02	0,31	0,01	1,00
	Home - visiting family / friends	0,46	0,28	0,00	0,00	0,03	0,02	0,21	0,00	1,00
	Home - accompanying	0,72	0,13	0,00	0,00	0,00	0,00	0,14	0,01	1,00
	Home - other	0,60	0,16	0,00	0,02	0,02	0,01	0,10	0,09	1,00
	Secondary travels	0,55	0,22	0,00	0,01	0,00	0,00	0,17	0,04	1,00
PERI-URBAN	Home to work	0,77	0,09	0,00	0,02	0,00	0,07	0,05	0,00	1,00
	Home to school / university	0,12	0,42	0,13	0,20	0,00	0,00	0,13	0,00	1,00
	Home - shopping	0,66	0,27	0,00	0,00	0,00	0,02	0,06	0,00	1,00
	Home - health / procedures	0,66	0,19	0,00	0,00	0,00	0,00	0,14	0,00	1,00
	Home - leisure activities	0,51	0,30	0,00	0,00	0,03	0,00	0,15	0,00	1,00
	Home - visiting family / friends	0,58	0,26	0,00	0,00	0,09	0,02	0,06	0,00	1,00
	Home - accompanying	0,75	0,10	0,00	0,00	0,00	0,00	0,14	0,00	1,00
	Home - other	0,60	0,29	0,00	0,00	0,00	0,00	0,11	0,00	1,00
	Secondary travels	0,66	0,20	0,00	0,01	0,01	0,01	0,08	0,03	1,00
RURAL	Home to work	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00
	Home to school / university	0,24	0,35	0,13	0,06	0,00	0,00	0,22	0,00	1,00
	Home - shopping	0,77	0,19	0,00	0,00	0,00	0,00	0,00	0,04	1,00
	Home - health / procedures	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00
	Home - leisure activities	0,40	0,00	0,00	0,00	0,00	0,00	0,60	0,00	1,00
	Home - visiting family / friends	0,81	0,19	0,00	0,00	0,00	0,00	0,00	0,00	1,00
	Home - accompanying	0,95	0,05	0,00	0,00	0,00	0,00	0,00	0,00	1,00
	Home - other	0,62	0,00	0,00	0,00	0,00	0,00	0,00	0,38	1,00
	Secondary travels	0,53	0,29	0,00	0,00	0,00	0,00	0,00	0,19	1,00

Source: HTS LLHB (2006) and HTS BBN (2005)

Urban PT is mostly used for home-school or home-university travels (10% in centre areas, 13% in very low-density territories). It can be explained by the age of users that usually not have a driving licence, by specific services organised by PT for this type of travels and moreover by the fact it is free for scholars.

Walking is used mainly to go shopping in centre (41%). This rate declines with the degree of urbanization from 31% in secondary pole and 22% industrial suburb to 6% in peri-urban. As described above, shopping attractiveness is mainly provided in city centre.

Using the car more collectively for commuting to work could be proposed for our study area. Effectively, we can deduce from this table that there is some room for enhancing a more collectively use of the car for commuting to work if they are well organised for car passengers. In the same idea, organising walking bus could reduce the use of car to accompany scholars.

For each of the eight territories, the table VII identifies the proportion of travels distributed between their distances. They have been categorised from less than 1 kilometre to more than 30 kilometres. Everywhere, a great proportion of travels (from 34,1% in the mixed suburb to 53% in the peri-urban) covers a distance of less than 1 kilometre. In addition, in centre, urban pole, secondary pole and industrial suburb two third of travels are less than 2 kilometres.

Distances travelled between 1 to 4 kilometres represent the second important interval: 42% on average for very high density areas such as centre, urban pole and secondary pole, 37% on average for high density areas such as industrial and mixed suburb and 26% on average for low-density areas such as mixed peri-urban, peri-urban and rural.

Distances travelled between 4 to 7 kilometres represent on average only 8.2% of trips in the very high density areas, 13.3% in the high density areas (also 13.3% in mixed peri-urban territories), and 4.8% in the low-density areas.

When the urbanization degree decreases the share of long trips increases. People have to make longer travelled distances to access jobs, services…, even if the number of people travelling more than 30 kilometres is pretty nonexistent due to the structure of the HTSs.

Table VII – Travelled distances considering the place of residence

Place of residence	Travelled distances											Total
	Less than 1 km	1 to 2 km	2 to 3 km	3 to 4 km	4 to 5 km	5 to 7 km	7 to 10 km	10 to 15 km	15 to 20 km	20 to 30 km	More than 30 km	
CENTRE	0.438	0.222	0.111	0.070	0.051	0.040	0.032	0.023	0.010	0.002	0.000	1.000
URBAN POLE	0.393	0.244	0.117	0.079	0.033	0.046	0.040	0.035	0.007	0.006	0.000	1.000
SECONDARY POLE	0.412	0.237	0.110	0.059	0.028	0.048	0.038	0.044	0.020	0.003	0.001	1.000
INDUSTRIAL SUBURB	0.432	0.193	0.081	0.056	0.048	0.064	0.064	0.048	0.010	0.005	0.000	1.000
MIXED SUBURB	0.341	0.203	0.122	0.074	0.075	0.079	0.054	0.035	0.009	0.008	0.000	1.000
MIXED PERI-URBAN	0.400	0.168	0.057	0.071	0.055	0.078	0.074	0.070	0.019	0.009	0.000	1.000
PERI-URBAN	0.530	0.096	0.049	0.071	0.012	0.036	0.090	0.080	0.026	0.007	0.004	1.000
RURAL	0.431	0.166	0.105	0.016	0.034	0.013	0.066	0.080	0.051	0.039	0.000	1.000

Source: HTS LLHB (2006) and HTS BBN (2005)

In the table VIII, we use the same distribution than in table VII adding the main TM used for a specific interval of travelled distances.

For distances of less than 1 kilometre, walking is the main TM for centre and urban pole (65-61%). Its share decreases with the urbanization degree from 65% in centre to 13% in peri-urban and rural territories. This confirms what we have seen in the table VI that in high density territories it is easier and pleasant to walk.

For the same short distance, the second TM is the car used as driver or passenger. In contrast to walking, its share raises when the urbanization degree decreases (34% in urban pole, 62% in mixed peri-urban, 76% in rural areas). Car use predominates even over short distances.

Urban PT is mostly used for distances between 10 to 15 kilometres (10% in centre territories, 8% in urban pole and 11% in mixed peri-urban). Despite the existence of PT supply, in centre and urban pole for short distances people rather walk than use the PT possibilities.

The bike is mainly used for distances travelled of less than 4 kilometres (of which 1 to 2 kilometres: 3% in centre and secondary pole, 4% in industrial suburb, 6% in mixed suburb, 2 to 3 kilometres: 3% in centre and urban pole, 4% in mixed peri-urban, 3 to 4 kilometres: 5% in peri-urban).

The two-wheeled motorized vehicles are also mainly used for distances of less than 4 kilometres (from 2 to 3 kilometres: 3% in centre and mixed suburb, 4% in peri-urban and 2% in mixed peri-urban, and from 3 to 4 kilometres: 3% in urban pole and peri-urban and 4% in secondary pole, an exception is made for industrial suburb where these travels are mainly made from 5 (3%) to 10 kilometres (3%)).

This table confirms that for long or short distances trips, they are mainly made by car.

But these results also show that there is possibility to enhance walking practice in mixed suburb and mixed peri-urban by offering facilities.

Car use for short distances could even be lower in centre, urban pole and secondary pole with an increase of walking amenities in these short distances.

Table VIII – Travelled distances considering the place of residence and the main transport mode used

Place of residence	Main transport mode	Travelled distances according to the main transport mode										
		Less than 1km	1 to 2 km	2 to 3 km	3 to 4 km	4 to 5 km	5 to 7 km	7 to 10 km	10 to 15 km	15 to 20 km	20 to 30 km	More than 30 km
CENTRE	Car driver	0,23	0,48	0,59	0,55	0,61	0,61	0,67	0,69	0,69	0,65	0,00
	Car passenger	0,07	0,23	0,23	0,27	0,28	0,29	0,25	0,15	0,26	0,16	0,00
	Urban public transport	0,00	0,01	0,07	0,06	0,04	0,03	0,05	0,10	0,03	0,00	0,00
	Other public transport	0,03	0,00	0,01	0,02	0,01	0,01	0,00	0,00	0,00	0,19	0,00
	Bike	0,01	0,03	0,03	0,02	0,01	0,02	0,00	0,00	0,00	0,00	0,00
	Two-wheeled motorized vehicle	0,01	0,01	0,03	0,02	0,02	0,02	0,00	0,02	0,00	0,00	0,00
	Walking	0,65	0,23	0,05	0,06	0,03	0,02	0,01	0,01	0,02	0,00	0,00
	Other	0,01	0,01	0,00	0,01	0,00	0,00	0,01	0,02	0,00	0,00	0,00
TOTAL		*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*0,00*
URBAN POLE	Car driver	0,25	0,47	0,57	0,56	0,67	0,64	0,70	0,62	0,67	0,61	1,00
	Car passenger	0,09	0,25	0,30	0,27	0,24	0,27	0,19	0,20	0,22	0,12	0,00
	Urban public transport	0,01	0,01	0,02	0,04	0,03	0,05	0,03	0,08	0,02	0,11	0,00
	Other public transport	0,01	0,00	0,00	0,02	0,02	0,01	0,00	0,02	0,00	0,05	0,00
	Bike	0,02	0,02	0,03	0,02	0,01	0,00	0,00	0,01	0,00	0,00	0,00
	Two-wheeled motorized vehicle	0,00	0,02	0,02	0,03	0,01	0,01	0,03	0,02	0,05	0,00	0,00
	Walking	0,61	0,21	0,05	0,06	0,02	0,02	0,02	0,02	0,00	0,00	0,00
	Other	0,01	0,01	0,01	0,00	0,00	0,01	0,03	0,04	0,04	0,12	0,00
TOTAL		*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*
SECONDARY POLE	Car driver	0,38	0,60	0,74	0,56	0,60	0,62	0,58	0,63	0,68	0,61	1,00
	Car passenger	0,08	0,23	0,16	0,34	0,24	0,25	0,29	0,27	0,18	0,00	0,00
	Urban public transport	0,00	0,00	0,05	0,03	0,01	0,02	0,01	0,07	0,09	0,39	0,00
	Other public transport	0,01	0,00	0,02	0,02	0,03	0,08	0,02	0,01	0,00	0,00	0,00
	Bike	0,00	0,03	0,01	0,01	0,00	0,00	0,02	0,00	0,00	0,00	0,00
	Two-wheeled motorized vehicle	0,00	0,02	0,01	0,04	0,03	0,01	0,01	0,00	0,00	0,00	0,00
	Walking	0,51	0,11	0,02	0,00	0,08	0,03	0,07	0,01	0,00	0,00	0,00
	Other	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,04	0,00	0,00
TOTAL		*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*
INDUSTRIAL SUBURE	Car driver	0,32	0,49	0,54	0,56	0,57	0,57	0,57	0,57	0,63	0,66	0,00
	Car passenger	0,12	0,27	0,29	0,26	0,27	0,25	0,28	0,29	0,21	0,18	0,00
	Urban public transport	0,00	0,01	0,03	0,06	0,06	0,08	0,06	0,06	0,03	0,04	0,00
	Other public transport	0,02	0,01	0,03	0,02	0,03	0,03	0,04	0,04	0,05	0,02	0,00
	Bike	0,03	0,04	0,02	0,03	0,01	0,01	0,00	0,00	0,01	0,00	0,00
	Two-wheeled motorized vehicle	0,01	0,02	0,02	0,02	0,02	0,03	0,03	0,01	0,01	0,00	0,00
	Walking	0,49	0,16	0,06	0,05	0,02	0,02	0,00	0,01	0,01	0,00	0,00
	Other	0,01	0,01	0,01	0,00	0,01	0,02	0,01	0,02	0,07	0,10	0,00
TOTAL		*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*0,00*
MIXED SUBURB	Car driver	0,45	0,59	0,67	0,74	0,70	0,69	0,71	0,72	0,50	0,70	0,00
	Car passenger	0,10	0,23	0,24	0,18	0,22	0,25	0,19	0,19	0,35	0,08	0,00
	Urban public transport	0,00	0,00	0,01	0,03	0,02	0,04	0,03	0,02	0,00	0,13	0,00
	Other public transport	0,01	0,02	0,02	0,02	0,03	0,02	0,07	0,03	0,07	0,00	0,00
	Bike	0,02	0,06	0,01	0,00	0,00	0,00	0,00	0,04	0,00	0,00	0,00
	Two-wheeled motorized vehicle	0,01	0,00	0,03	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	Walking	0,38	0,10	0,03	0,02	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	Other	0,02	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,07	0,10	0,00
TOTAL		*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*0,00*
MIXED PERI-URBAN	Car driver	0,45	0,58	0,62	0,63	0,59	0,64	0,59	0,52	0,76	0,67	1,00
	Car passenger	0,17	0,29	0,21	0,24	0,27	0,26	0,24	0,29	0,13	0,19	0,00
	Urban public transport	0,00	0,00	0,01	0,01	0,04	0,04	0,06	0,11	0,01	0,00	0,00
	Other public transport	0,02	0,01	0,05	0,05	0,05	0,02	0,07	0,06	0,08	0,08	0,00
	Bike	0,02	0,02	0,04	0,03	0,01	0,00	0,00	0,00	0,00	0,00	0,00
	Two-wheeled motorized vehicle	0,00	0,02	0,02	0,01	0,01	0,02	0,01	0,00	0,00	0,00	0,00
	Walking	0,31	0,07	0,02	0,02	0,01	0,00	0,01	0,00	0,00	0,00	0,00
	Other	0,02	0,00	0,03	0,01	0,01	0,01	0,02	0,01	0,03	0,07	0,00
TOTAL		*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*
PERI-URBAN	Car driver	0,50	0,52	0,45	0,73	0,74	0,85	0,60	0,75	0,86	0,71	1,00
	Car passenger	0,27	0,35	0,43	0,06	0,26	0,10	0,30	0,20	0,00	0,29	0,00
	Urban public transport	0,00	0,00	0,00	0,04	0,00	0,00	0,03	0,00	0,14	0,00	0,00
	Other public transport	0,08	0,00	0,00	0,00	0,00	0,05	0,02	0,00	0,00	0,00	0,00
	Bike	0,00	0,00	0,00	0,05	0,00	0,00	0,04	0,00	0,00	0,00	0,00
	Two-wheeled motorized vehicle	0,00	0,01	0,04	0,03	0,00	0,00	0,00	0,05	0,00	0,00	0,00
	Walking	0,13	0,13	0,08	0,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	Other	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
TOTAL		*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*
RURAL	Car driver	0,68	0,63	0,73	0,39	1,00	1,00	0,81	0,86	0,78	1,00	0,00
	Car passenger	0,08	0,29	0,27	0,61	0,00	0,00	0,00	0,14	0,22	0,00	0,00
	Urban public transport	0,00	0,00	0,00	0,00	0,00	0,00	0,19	0,00	0,00	0,00	0,00
	Other public transport	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	Bike	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	Two-wheeled motorized vehicle	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	Walking	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	Other	0,11	0,07	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
TOTAL		*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*1,00*	*0,00*

Source: HTS LLHB (2006) and HTS BBN (2005)

When sorting out data scattering transport modes by travelled distances, it confirms that for distances of less than 1 kilometre, walking is the dominant TM in the denser zones.

For distances of more than 1 kilometre, car is widely the dominant TM. Distances realised by car drivers mainly represent less than 2 kilometres in almost all of places of residence (50% in centre, 52% in industrial suburb, 55% in peri-urban areas), except for mixed suburb (36%). For the same interval of distance, car passenger has almost the same share, except for peri-urban territories with 71%.

CONCLUSIONS

In this paper, a typology of towns was created to differentiate territories in a zone globally qualified as urban. This method is based on the distribution of habitat, economic activities and agriculture for each town of our study area. In further work, a finer cut will be taken to analyze the composition of each town (the distribution of the towns could be changed according to this new scope of analysis).

We also give technical solutions to improve mobility while being less focused on car use.

The results presented in all tables above are preliminary results but some trends already emerged. Almost two third of travels have less than 2 kilometres and half less than 1 kilometre. Trips are mainly made by car. Trips by car passenger decline with the urbanization degree. The real challenge for introducing new mobility services is to control or manage this category of travels of less than 1 kilometre realised by car because they are the most polluting ones. We also find that walking is the dominant TM in centre, urban pole, secondary pole and industrial suburb for this same distance.

These points are in accordance with our results for the different TM use possibilities related to the typology of areas as described in table I. We could say that distance of less than 1 kilometre can fit walking mode by enhancing the walking facilities and city attractiveness.

For bike use, the results are in line with the recommendations of Héran (2001) for an urban use but we can say that most of the observed travels have less than 4 kilometres for all the territories. It means that bike in self-service could be implemented with free of charge trips for less than half an hour use. Bike has a good market share, around 2%. For example, Lille was approximately 1% in 2006. People who live in low-density areas could join urban PT nodes by bike. In the higher density zones, cycling facilities could make easier the bicycle use.

Two-wheeled motorized vehicles could be effective to connect low-density areas to different poles of the territory (13.3% of trips in the mixed suburb for distances between 4 and 7 kilometres). It exists a market share for the two-wheeled motorized vehicles for all categories of territory for less than 4 kilometres. But also this distance is compatible with the implementation of electric bikes whose potential is seen up to 8 kilometres (Paul-Dubois-Taine, 2010).

Accompaniment is more important in low-density territories. Our study area may have an interest to develop mobility services for this type of trips.

We also found that the study area has a potential for a shared-car supply, particularly for commuting to work and home-school / university motif. Actions from companies could be considered to improve a better occupancy rate of car to go to work or to encourage employees to use PT. Another solution could be the improvement of the “BuLLe” bus routes into BHLS schemes.

This analysis has shown in particular how industrial restructuring as described in our typology can change both journey lengths and modes.

However, this article does not take into account the incentives to implement in order to adopt new patterns of a more suitable mobility for the territory's population.

Later, it could be very interesting to focus on the travel chain and to know the origin and the destination of each trip according to the place of residence.

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