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Firmographic analysis in the previous coal mining area of Lens in the French Nord-Pas-de-Calais Region

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ABSTRACT

It is widely accepted that there are some factors that influence the location patterns of firms over space and over time. The above is especially relevant in the case of deprived regions because an increase of firms' location leads to higher employment opportunities which impacts on the regional economic growth. Moreover, the public transportation system may be efficiently exploited if the correct policy strategies of firms' location are enhanced.

The former reasons explain the usefulness to analyze the location patterns of firms over a certain region. In practice, the main problem of the empirical analysis of spatial and temporal patterns of firm location is related to the complexity to obtain detailed firmographic data due to both the lack of availability of micro data and confidentiality issues. Therefore, very few studies are available on these issues. Herein, we discuss different methodologies to obtain information on the location patterns of firms. As a case study, it is analyzed the region of the "*bassin minier*" of Nord-Pas-de-Calais, at the northern part of France. The Transport Authority is the SMT Artois-Gohelle and it has planned to build in the near future two new tramway lines that will improve the accessibility in the region. In this case, an analysis that understands the mobility patterns of firms in the area would be certainly useful to foster their location when the new tramways start operating.

Keywords: Firm location patterns, Transport policy, long term impacts assessment, tramway, land use and economic benefits.

INTRODUCTION

It is well known that transportation is a key factor for improving the socioeconomic conditions of a region. As commented by Lucas (2006), it influences the conditions of society by means of reducing health inequalities, increasing educational and employment opportunities, along with a renewal of neighborhood conditions and services. However, researchers have concluded that transport infrastructure is a necessary but not sufficient condition for economic development (Button et al., 1995).

Therefore, when a new project of public infrastructure is under discussion for its further construction and implementation, it is important to propose in advance different methodologies in order to work along with the Authorities to record micro-level data over the long term for its further analysis and comparison. Indeed, it is necessary to measure the future impact of a new transport infrastructure using multiple appraisal methods in order to better comprehend the changes that are taking place, even before the construction of it. Therefore in this way, it will be possible to apply the correct policy strategies if changes are either not taking place or are negative for the community. For the sake of the analyses, the wider range of methodologies are used, the better information can be elicited, which means making use of quantitative and qualitative methodologies along with continuous micro-level datasets over a long period.

In general, the analysis carried out over a certain area where a new transport infrastructure is going to be located are related to cross-sectional data, and focused on travel pattern impacts. These analyses do not take into account time factors at the short and long term. Literature affirms that if no temporal effects, such as habits and inertia, are taken into account, there may be overestimation problems. Moreover, it is necessary to evaluate not only the effects related to changes in travel patterns but also the ones related to the built environment (Banister and Berechman, 2001; Banister and Thurstain-Goodwin, 2011; Mejia-Dorantes et al., 2011; Mejia-Dorantes et al., forthcoming).

As it is well known, one of the most important problems related to the assessment of long term impacts of a new transport infrastructure, is related to the lack of availability of detailed datasets to analyze different factors that might be influenced by the transport infrastructure. There are only few studies that have succeeded to carry out a thorough ex-ante/ex-post assessment. Probably the most interesting one is the Jubilee line extension (London) in 1999. It comprised 2 years before operation and 4 years afterwards, where different aspects were evaluated, such as: Transport impacts and accessibility changes; Residential and commercial development; Economic impacts (employment); Residents and travel patterns (Arup Economics and Planning, 1999; Lucas and Jones, 1998; Wofinden, 1998a; Wofinden, 1998b).

In fact, the ideal analysis would be to follow the infrastructure before construction until the settle effects take place (See figure 1).

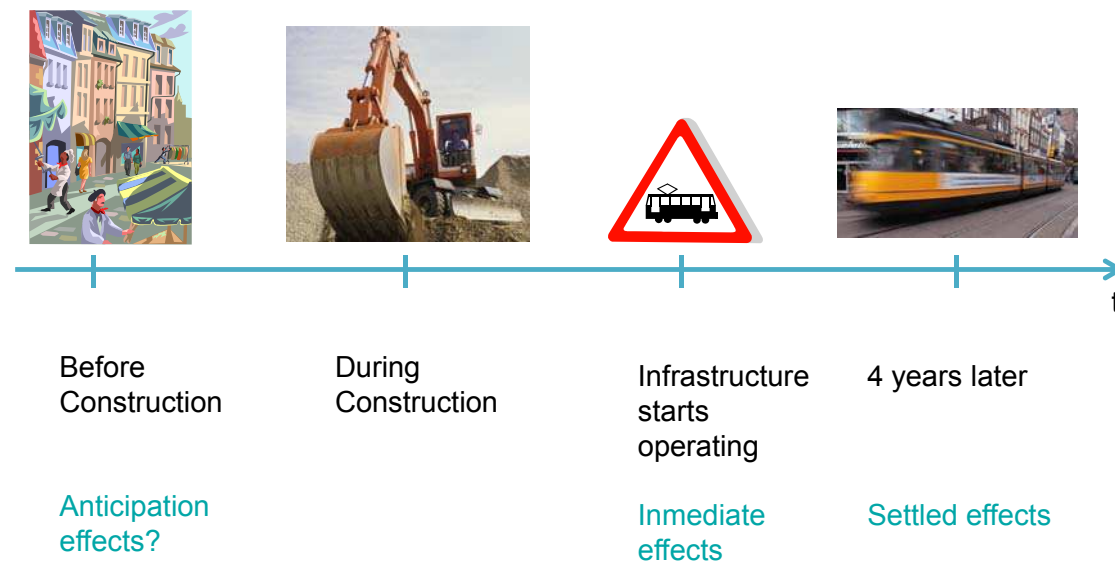


Figure 1: Waves of long term transport infrastructure analyses (Mejia-Dorantes and Heddebaut, 2011)

In France, although there is plenty of literature regarding the assessment of transport systems developed either by the French Transport Ministry or by the Centre of Studies of Resources, Transport, Urbanism and Public Works (known as CERTU), there are almost no studies regarding non-transportation impacts.

The aim of this paper is to focus on an important aspect of long term assessment: firms' location analysis. Hence, we discuss different methodologies to assess the location of economic activities that may be used before the construction of a certain transport infrastructure and after it starts operations. We use as a case study the ex-coal mining area (*ex-bassin minier*), which is a deprived area of Nord-Pas-de-Calais, at the northern part of France. The Transport Authority is the SMT Artois-Gohelle which has planned to build in the near future two new tramway lines that will improve the accessibility in the region -although, by the time this paper was written, the status of project has changed and now it is indefinitely suspended-.

In the current state of the analysis (before construction takes place), perception of a future change is the main issue and an interesting problem that needs to be further investigated. An analysis that understands the mobility patterns of firms in the area, their needs, advantages, and problems, would be very useful to foster their location whenever the new tramway starts operations.

This paper is organized in the following form. After this introduction, the case study is presented. In section three, the methodologies proposed are discussed. Finally, section four presents the conclusions and discussion.

CASE STUDY

This study focuses on the region the ex-coal mining area (*ex-bassin minier*), which is a deprived area of Nord-Pas-de-Calais, at the northern part of France. Figure 2 and 3 shows the location of the territory under study.

It is known as an area which has different socio-economic problems: unemployment, the highest rate of mortality in France and poorly academic performances and failures, among others after the conclusion of the coal mining activity era at the end of the 80's.

To ameliorate the socioeconomic situation of this area, different policies are being implemented aimed at regenerating the socioeconomic activities of these towns. For example, the case of the new Museum of Louvre in Lens, and the improvement of public transportation, which intends to promote the economic, social and environmental situation of the zone. The Transport Authority (SMT Artois-Gohelle) planned to build two new tramway lines (see figure 4 and 5).

The region served by the SMT Artois Gohelle is composed of 115 towns and has around 600,000 inhabitants in an area of around 76,000 hectares. The two main towns are Lens with around 36,000 inhabitants and Béthune with around 26,000 inhabitants. The two tramways are not connected and they would replace two bus routes that count with the greatest number of ridership known as "Bulle (1 and 2)" See figures 4 and 5.

Moreover, it is interesting to note that this area is more dependent to car than in the rest of France, even though this is a more deprived area: Lens, Liévin and Hénin-Beaumont for example, have a level of car ownership close to the 63%; in the case of Béthune it is equal to 71%, whereas the national average is of 60%.



Figure 2: Nord-Pas-de-Calais Region

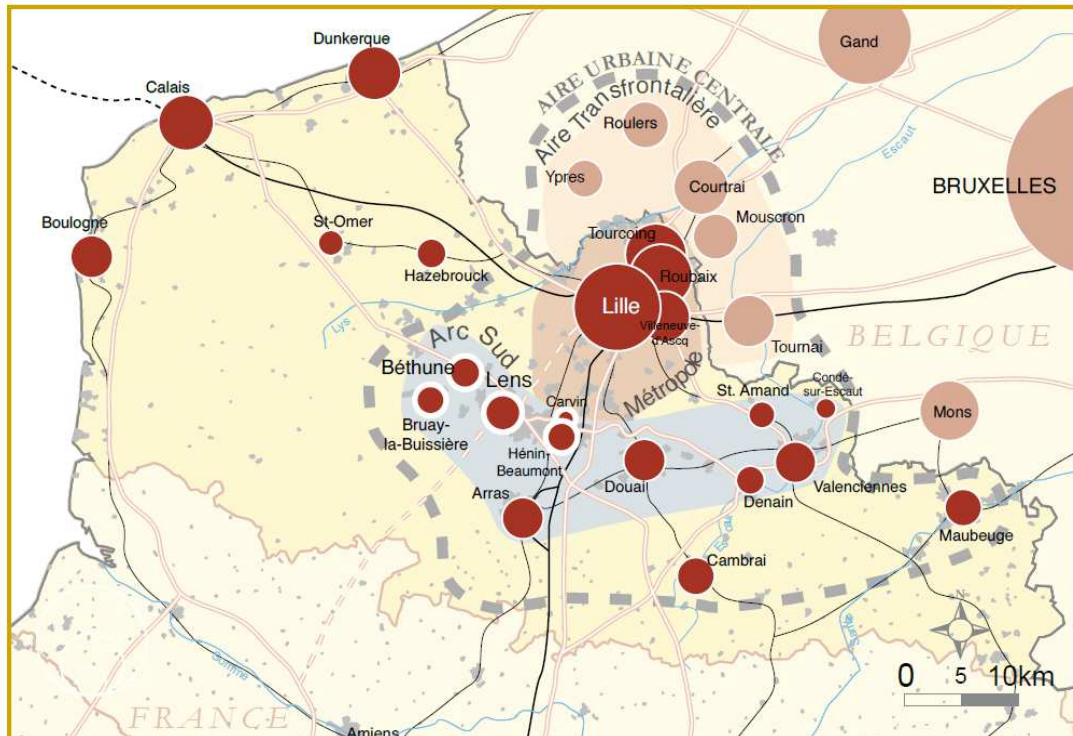


Figure 3. Lille metropolitan area (Source: SCOT Lens Liévin Hénin Carvin)

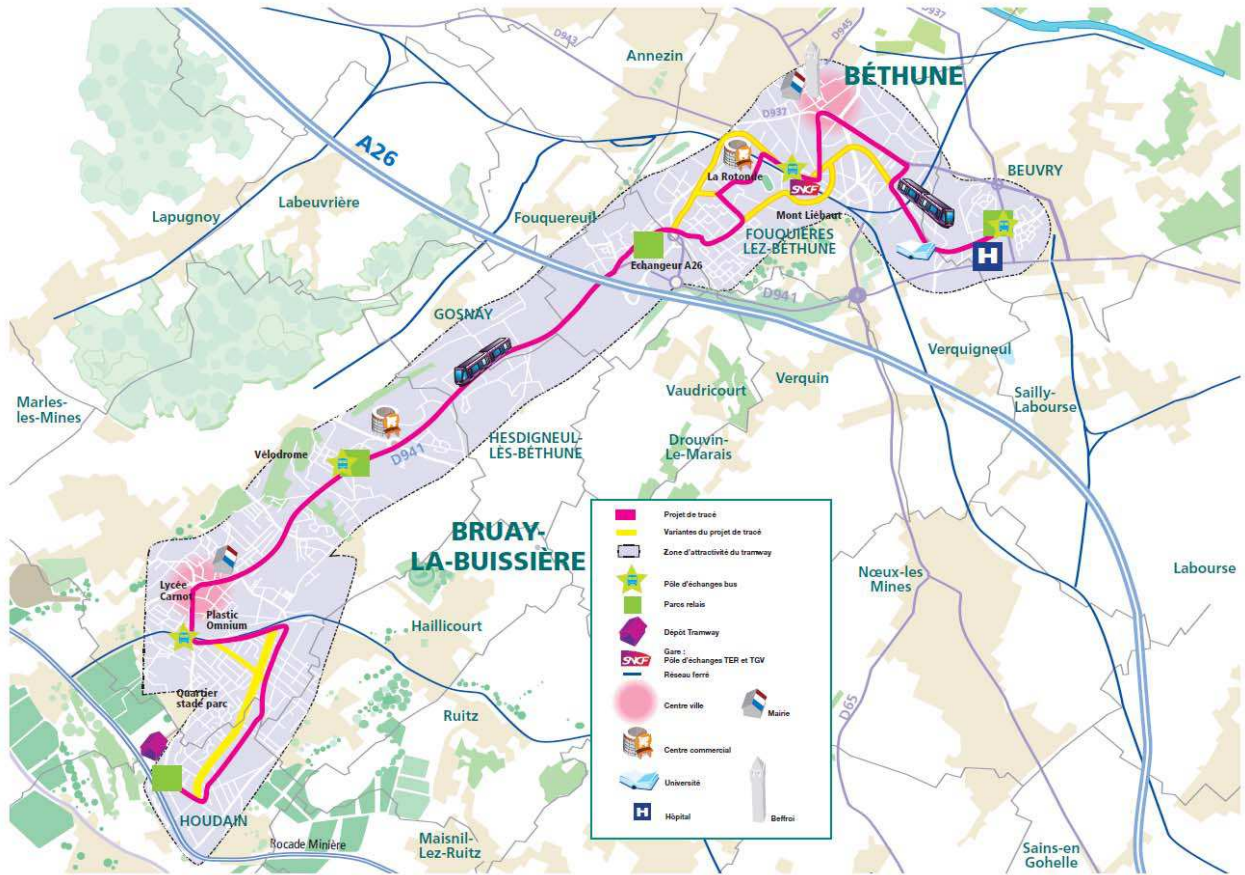


Figure 4. (Source: SMT)

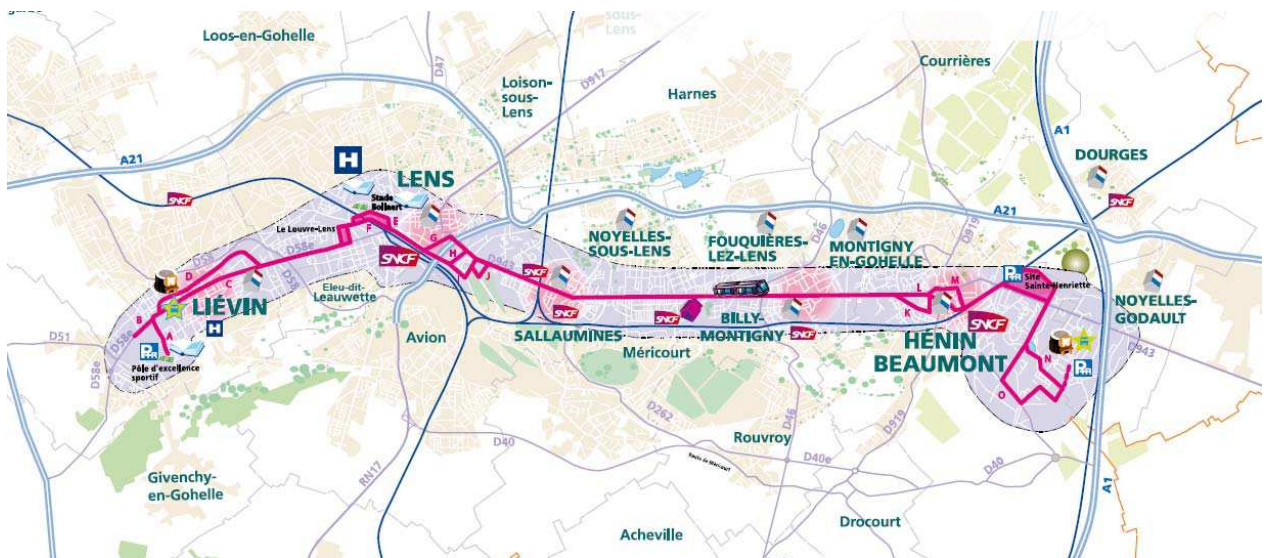


Figure 5. (Source: SMT)

The socioeconomic conditions of the area are shown in the following graphs (figure 6-10). They were obtained from the French Institute of Statistics and Economic Studies (INSEE) (Institut National de la Statistique et des Études Économiques, 2011). For the territories under study (known as “Communes”) we present different facts. For example, how population has evolved during the last years for each Commune, and the type of population (men/women) per age (figure 6). It is

interesting to note that the difference among the percentage of women and men is higher for the people older than 65 years. This is related to the fact that men used to work in the mines, which was a very tough job.

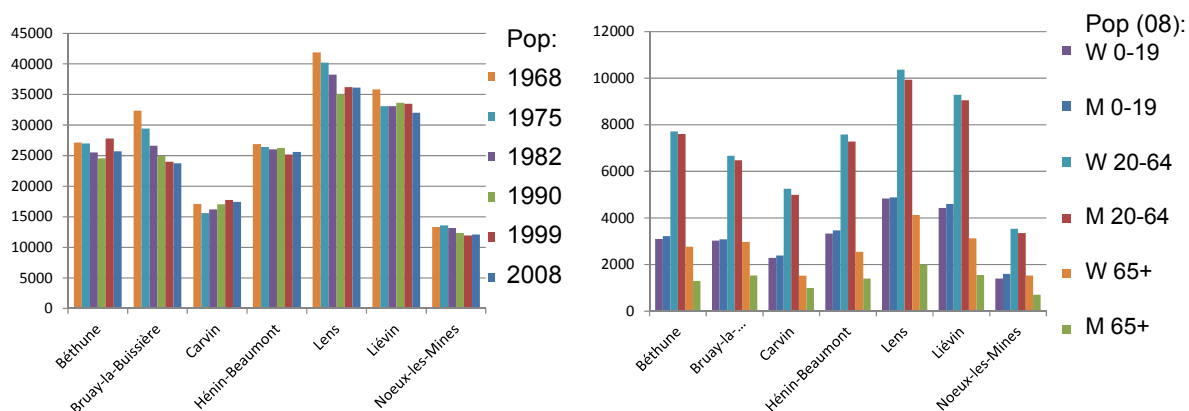


Figure 6. Population in the study area (INSEE)

Figure 7 shows the type of economic activities in the region. Most of the people are non-skilled workers, and jobs are focused on commerce and services (see figure 8). Moreover, figure 9 shows that the rate of unemployment in the area has not importantly diminished in a decade, although more firms have localized in the area (see figure 10).

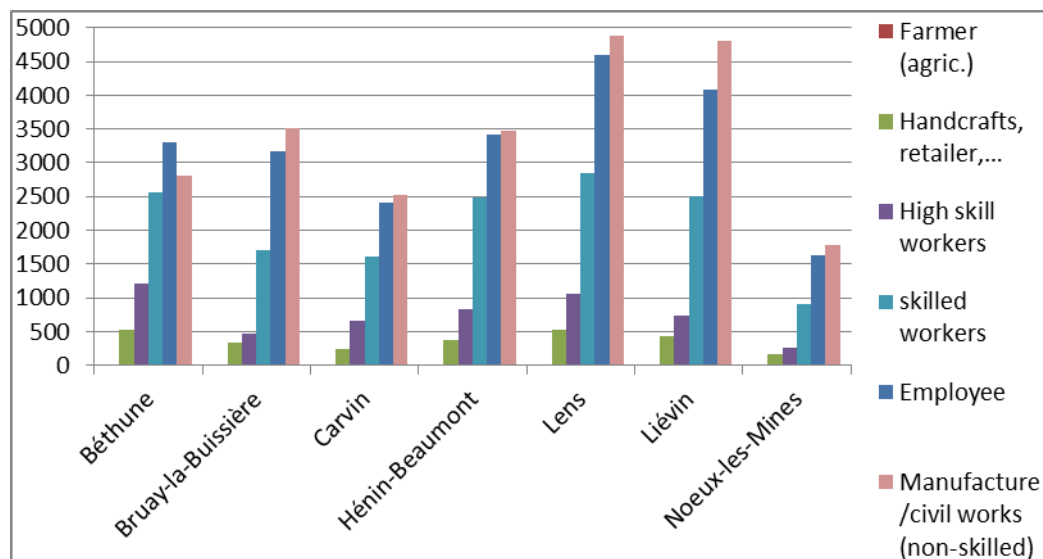


Figure 7. Types of economic activities (INSEE)

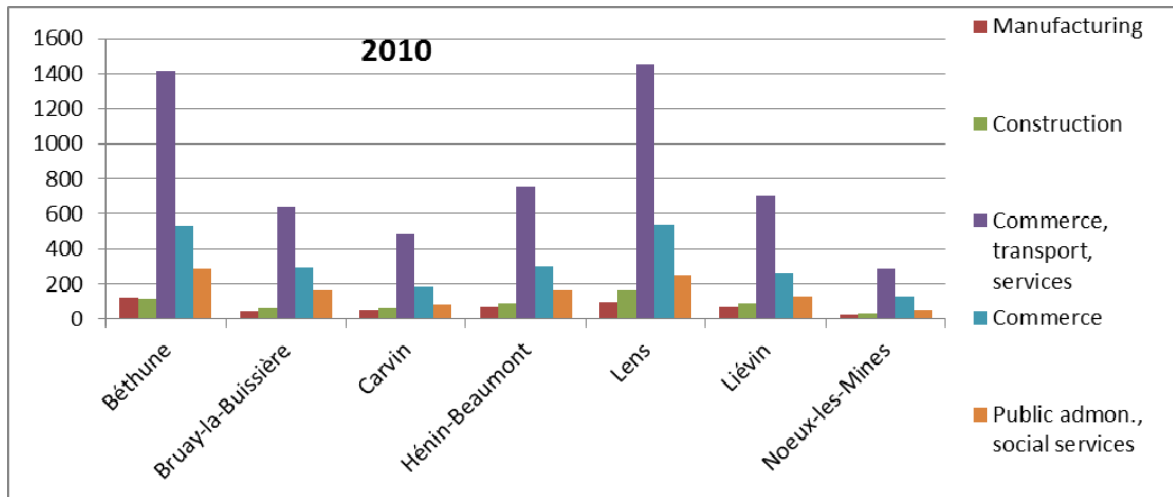


Figure 8. Comparison on employment from 1999-2008 (INSEE)

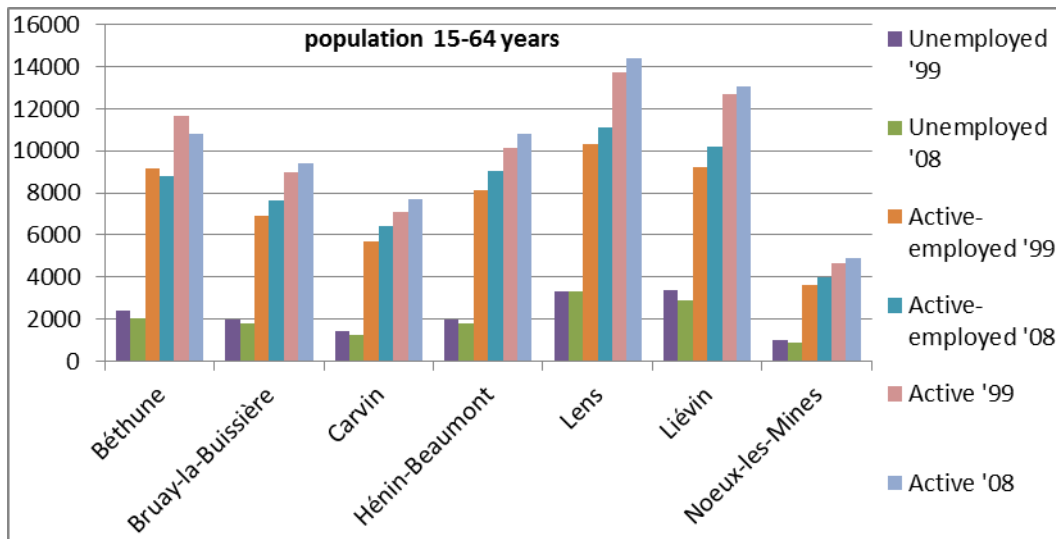


Figure 9. Comparison on employment from 1999-2008 (INSEE)

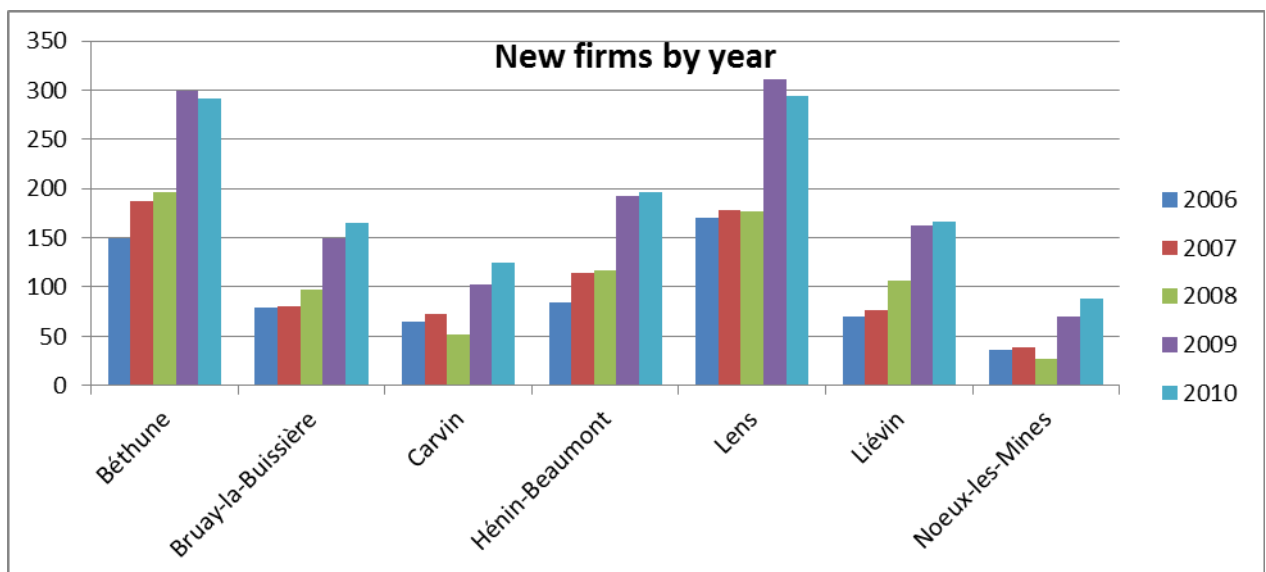


Figure 10. New firms by year (INSEE)

According to Caratini (2012), in Béthune, the owners of retail stores believe that due to the new tramway their customers will go away more easily to other areas for shopping, that in other towns, such as Bruay, the downtown will be even less crowded than nowadays.

METHODOLOGIES

Three different methodologies are proposed. They depend to some extent on the possibilities we have to obtain micro-level datasets. They are based on spatial analysis, which represents a collection of techniques that use spatial referencing associated with each data value under study. The importance of spatial analysis lies on the fact that results of any spatial analysis are not the same under a re-arrangement of the spatial distribution of the events under investigation (Chorley, 1972; Haining, 2003).

The current state is “without infrastructure and works” also known as the “state zero” of firms’ location. For that sake, it is proposed to use the methodology used by Mejia-Dorantes (2011) by means of spatial multinomial logit models and Kernel analysis, which are based on spatial analysis. Afterwards, we propose to use questionnaire surveys focusing on retail firms to elicit the perception of managers about the change in their living environment.

Spatial multinomial logit models

The methodology presented in the following paragraphs is based on the model developed by Mejia-Dorantes et al. (2011; forthcoming).

A model for unordered categorical variables was used, also known as polytomous variables. In the model, one of the outcome classes is arbitrarily set as the base outcome. For ease of interpretation, in this study “vacant” is chosen as the reference category. It is based on the possibility that each address has to be in used by a certain economic activity, which is named “portal”.

The spatial version of the model incorporates a spatial weights matrix. The probability of a *portal* being in state j depends on a set of covariates x and also the presence/absence of other businesses in the neighborhood (an occupancy ratio).

The occupancy ratio at location i for activity class k gives a measure of agglomeration in the preceding time period. This ratio is calculated based on the spatial weights matrix and occupancy as follows:

$$P_j = \frac{e^{\beta'_j x_i + \sum_k r_i^k}}{1 + \sum_{j=1}^{m-1} e^{\beta'_j x_i + \sum_k r_i^k}} \quad (1)$$

Further information on the above formula may be found at Mejia Dorantes (2011) and Mejia-Dorantes et al. (forthcoming). Table 1 shows the sectors under study:

Table 1. Sectors description

Sector Description
BC1 Manufacturing firms
BC2 Construction firms
BC3 Retail and related business activities
BC4 Food service and hotel business activities
BC5 Transport, storage and communication firms
BC6 Finance, insurance, real estate, rental and other enterprise services
BC7 Health and vet; social services; cultural and recreational; sport activities
BC8 Others
BC9 Vacant

Kernel estimation method

There are different statistical methods that have proved their utility for urban analysis (Maoh and Kanaroglou, 2007; Mejia-Dorantes et al., forthcoming). One of them is the point pattern analysis, which evaluates the distribution of events over an urban area. It is useful to analyze the firm location evolution over time and its clustering. Kernel surfaces are a powerful tool for the exploration of the spatial and temporal characteristics of clustering especially useful when variables are a subset of a total (Bailey and Gatrell, 1995; Cressie, 1991). Figure 11 shows an example of the resulting map.

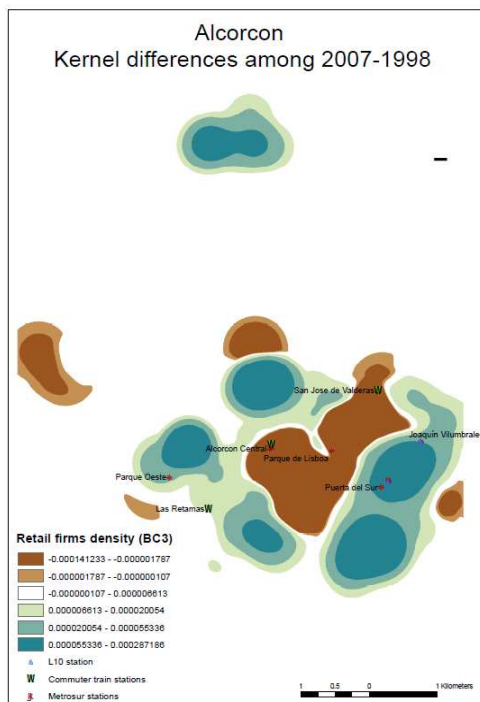


Figure 11. Kernel map from for retail activities. Source (Mejia-Dorantes et al., forthcoming)

The Survey Questionnaire

Literature is relative scarce on the use of questionnaire surveys to assess how a future infrastructure may impact on the urban environment. In this respect little is known on the use of surveys related to the location of economic activities and transportation. Survey questionnaires are generally applied in travel behavior modeling (Gatersleben and Appleton, 2007; Heinen et al., 2011; Ory et al., 2007; Ory et al., 2007; Ory and Mokhtarian, 2005; Páez and Whalen, 2010; Redmond and Mokhtarian, 2001). To our knowledge, only few exist, for example, the study carried out for the Jubilee line extension (Wofinden, 1998a). Unfortunately, the former is a study which was not entirely published. On the other hand, the one from the Sevilla metro (Castillo-Manzano and López-Valpuesta, 2009), focuses on the retail sector during the construction phase. There is another study on the Hong Kong metro expansion (Loo, 2009). Button et al. (1995) present a remarkable research on the location of firms in a region of Scotland. Later, Leitham et al. (2000) present an interesting study on stated preference surveys for industrial location. In this case we are dealing with an infrastructure not currently available and our aim is to study the retail sector.

Different authors mention that a metro line may be an important instrument for revitalizing retail commerce (Banister and Berechman, 2000; Banister and Berechman, 2001; Banister and Thurstain-Goodwin, 2011; Castillo-Manzano and López-Valpuesta, 2009; Mejia-Dorantes, 2011). However, as commented by Becky Loo (2002), little is known about the perception and response of people about a major transport infrastructure change. This comment should be extrapolated for economic activities towards a new transport infrastructure.

As concluded by Loo (2009), questionnaires are a very useful tool to evaluate the people's perception about their living environment. Sell et al. (1988) mention that the availability, quality and timing of information are important for the perception of change. They also conclude that temporal factor affects awareness, therefore people is more concerned about a project when it is under execution rather than when it is under planning. Moreover, the process of imagining change is directly influenced by the level of information and certain socio-economic characteristics. For example, Loo (2009) states that people's subjective feelings and evaluation on the impact of a certain infrastructure were significantly associated with their knowledge about the spatial location of it. Existing literature also shows that personal characteristics are significant determinants of people's perceptions about their living environment (Becky P.Y, 2002).

Herein, we will be able to observe the differences between actual location and ideal. For that reason, we will interview managers/owners of retail firms in the region of study. We must be careful with chains, since they are many times located following certain corporate strategies.

The construction of questionnaires is a complicated task, and the definition, selection and ordering of questions should be deeply studied on beforehand. For example, as mentioned by E. Martin (2005) and Presser et al. (2004), it is important to carry out pilot surveys to assure that further problems are controlled on beforehand.

Although different types of stratifications are possible (Transportation Catchment areas: in/out of them; and multiple stratifications: for example by re-grouping economic activities), by now it is

planned to use a simple random sampling. The location of firms who have responded could be geo-referenced to observe the spatial distribution of responses. Hence, it will be possible to use a W-matrix for spatial relationships.

In this analysis we make use of both revealed and stated preference survey methods. The questionnaire (see table 2) intends to capture the following explanatory variables:

- Objective location characteristics (current)
- Subjective location characteristics (current)
- Desired location characteristics
- Attitudes regarding the future tramway projects
- Socio-demographic characteristics

Table 2. Questionnaire information

Desires	Type
if you could improve the characteristics of your current location (for the benefit of your business), what would you change? Grade from 1-4 where 1-notably important / 2-importance / 3-Minor importance / 4-not important/	
Space (more m2)	Categorical
More parking availability	Categorical
Less pollution	Categorical
Higher environmental quality of the neighborhood	Categorical
Less traffic jams	Categorical
Closer to road links	Categorical
Closer location to public transport (bus stops)	Categorical
Closer location to public transport (train stations)	Categorical
Closer location to public transport (tramway stations)	Categorical
More cycling infrastructure (either parking or cycling lanes)	Categorical
Private transport restrictions (pedestrian only streets)	Categorical
More work force availability	Categorical
More firms around you (agglomeration economies)	Categorical
More safety	Categorical

PERCEPTION (of future possibilities) and Attitudes	
"some people think that the two tramway lines will improve the area, for others, this is not true. For you, to what extent you agree with the following statements (1-Totally agree / 2-Partially agree / 3- Partially disagree / 4- Totally disagree)	
Variable	Type
The viability of the firm is menaced by the externalities during construction	Categorical
The new tramway will trigger economic opportunities for our firm	Categorical
Job opportunities will be greater by the new tramway	Categorical
The landscape changes triggered by the new tramway will be positive	Categorical
The level of pollution after the opening of the new tramway will decrease	Categorical
Traffic jams after the opening of the new tramway will diminish	Categorical
Population in the neighborhood will increase after the opening of the new tramway	Categorical
Would you change your location to any other further away from the tramway line?	Dummy (1 - yes / 0 -no)
Would you change your location to any other closer away from the tramway line?	Dummy (1 - yes / 0 -no)
The public services provided by the local government are satisfactorial	Categorical
There is a strong and good sense of community in this neighborhood	Categorical
Do you agree with the benefits of the "Versement transport" policy?	Categorical
Recycling is important for the environment	Categorical

Knowledge of the project:	Description	Type
Participation in the Concertation meetings	1- yes / 0-no	Dummy
Date Opening and Status of the project		open question
How long will you be from the closest stop?		Continuous
Cost of the trip		Continuous
Information provided by the local authorities about the project	1 - notably good / 2 - good / 3 - poor / 4 - very poor	Categorical

Current location and accessibility factors	Type
How do you see the location of your store regarding the following categories Grade from 1-4 where: 1-notably important / 2-importance / 3-Minor importance / 4-not important	
Road links	Categorical
Rental costs	Categorical
Building characteristics	Categorical
Site amenities	Categorical
Image of area	Categorical
Pollution	Categorical
Access to markets	Categorical
Access to suppliers	Categorical
Workforce availability	Categorical
Public or local government assistance /aids	Categorical
Educational facilities	Categorical
Housing	Categorical
Recreation facilities	Categorical
Neighboring firms (agglomeration economies)	Categorical
Car parking employees	Categorical
Car parking clients	Categorical
Bus links	Categorical
Rail links	Categorical
Water links (channels)	Categorical
Security	Categorical
Others:	Categorical

Characteristics of retail firm	Description	Type
Store location	Geo-referenced address to measure urban accessibility	Continuous
Town	1 Lens / 2 Bruay la Bruissière / 3 Béthune...	Categorical
Type of retail store	1 clothing / 2 groceries / 3 Electronics...	Categorical
Chain?	1- yes / 0-no	Dummy
If yes: Location of main offices/Origin	1 Regional / 2 National / 3 International	Categorical
If yes: Number of stores		Continuous
If yes: Number of stores		Continuous
Size of the store (m2)		Continuous
Number of employees		Continuous
Type of clients	1 - neighbours / 2 -from out of the neighbour / 3 - people passing by	Categorical
Clients' average age	1- Teenagers / 2 - (20-40) / 3 - (40-60) / 4 - retired / 5-all type	Categorical
Number of stores around 100 m of you		Categorical
Age of firm since the beginning of activities		Continuous
Time at current location		Continuous

If a previous location:	Description	Type
Years at previous location		Continuous
Place of previous location:	1- Same neighborhood / 2- Other Neighborhood/ 3- Other town / 4- Other region	Categorical
Grade from 1-4 where 1-notably important / 2-importance / 3-Minor importance / 4-not important/ how important the following characteristics were for moving from the prior location:		
Expansion		Categorical
Space restrictions		Categorical
Parking restrictions		Categorical
Bad location		Categorical
Pollution		Categorical
New market opportunities		Categorical
Road links		Categorical
Public transport		Categorical
Water links (channels)		Categorical
Work force		Categorical
Agglomeration economies /firms around you		Categorical
Security		Categorical

SOCIODEMOGRAPHIC (At the end of the survey)	Description	Type
Charge of the person answering this questionnaire		Categorical
Age of the person answering the questionnaire		Continuous
Gender	1- Woman / 0 - Man	Dummy
Education	1 - Basic / 2 - Bac. / 3- University studies	Categorical
Do you work full time?	1- Yes / 0- No	Dummy
Residence: Do you live in this area? For how long?	1- Yes / 0- No	Dummy / Cont
How do you come to work to this place?	1- Car / 2- Walking / 3 - Bus / 4 - Covoiturage / 5 - Taxi / 6 - others	Categorical
How often do you come to this place?	1- Once a month / 2- once every two weeks / 3 - Once a week / 4 - More than once a week / 5 - everyday	Categorical

Although at the beginning this study is a cross-sectional one, the final goal could be a *panel study*. As explained by Richardson (1995), when carrying out a panel study it is selected a sample at the start of the time-series and it is retained the same individuals within the sample for the entire series of surveys. Therefore, it is possible to follow the changes of perceptions of the sample during a period of time. Disadvantages on panel data are well known, therefore, it will be only possible to observe if this is possible, once the first wave is carried out. Different public organizations in the region could continue with the different waves.

CONCLUSION AND DISCUSSION

The lack of availability of datasets should not be an obstacle to carry out this kind of research. There is in fact, an opportunity to develop new ideas and propose new approaches.

Literature shows that urban changes are not automatically perceived to be good by the people affected by them. However, in the analysis carried out by Loo (2002), people perceived that the retail sector was one of those industries best benefited by the construction on a new infrastructure.

Herein, apart from the methodology proposed by Mejia Dorantes (2011) to analyze firm patterns, we have proposed a questionnaire to focus on the retail sector using stated and revealed preference surveys. Different hypothesis will be tested, such as factors that influence location choice among different types of retail activity. Moreover, we will analyze the choices they have made along with hypothetical situations. We look forward to understand their location patterns and to elicit if the future tramways may trigger certain economic impacts. We believe that this approach is quite interesting and that the information that may be elicited from it will contribute to the literature.

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