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**Évolution du commerce et utilisation de la voiture.  
Distribution des biens de consommation et usage de la  
voiture particulière pour motif achats dans les  
agglomérations françaises. Rapport final.**

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**BEUVAIS CONSULTANTS**  
economic studies - transport and environment

# Setting Up Superstores and Climate Change



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Tours, December 2008

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## SUMMARY

Since the 1960s the big retail stores and their more recent variations (specialised superstores, maxi-discounts) have spread far and wide across French city suburbs. The average size of these stores has grown steadily as has also their power of attraction. Indeed, they tend to be found on the fringes of agglomerations, near bypasses and access to motorways. This article seeks to describe the shopping habits of their customers on the basis of 14 surveys carried out among 5,000 consumers domiciled in three urban areas, and it leads to an assessment

of the effects of the location of these stores on road traffic as well as on concomitant gas emissions. The result of this lengthy evaluation may be summarized in one sentence: carbon dioxide emissions are four times stronger when shopping in a suburban hypermarket than when shopping in a local supermarket. Taking into account the very strong impact on CO<sub>2</sub> emissions of the hypermarket situated on the outskirts, the question arises as to whether, in the light of sustainable development, this is the right model to export throughout the world.

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### Terminology:

Definitions might be different in the UK, in the USA or elsewhere in the world, but in France:

- “supermarché” (translated here by supermarket) is a self-service retail store with a sales surface of more than 400 square metres and less than 2,500 square metres, offering mainly food products;
- “hypermarché” (translated here by hypermarket) is a self-service retail store with a sales surface of more of 2,500 square metres and a large parking area, offering food products as well as non-food products.

## INTRODUCTION

The Committee for deregulation and economic growth in France, known as the “Attali Committee”, after the name of its Chairman, was mandated by the President of the French Republic, Nicolas Sarkozy, to draft a report with recommendations and proposals to boost economic growth in France.

The final report, delivered on 23 January 2008, underlines the need to deregulate the conditions governing the opening of new superstores in order to spur competition in the anticipation that lower sales prices will boost household purchasing power.

Current legislation, which requires an authorisation from the commission for commercial facilities of the “Département” (the CDEC) for the establishment or extension of more than 300 square metres, is to be replaced by the simple agreement of the mayor of the local council in which the superstore is to be set up, whatever the floor area involved.

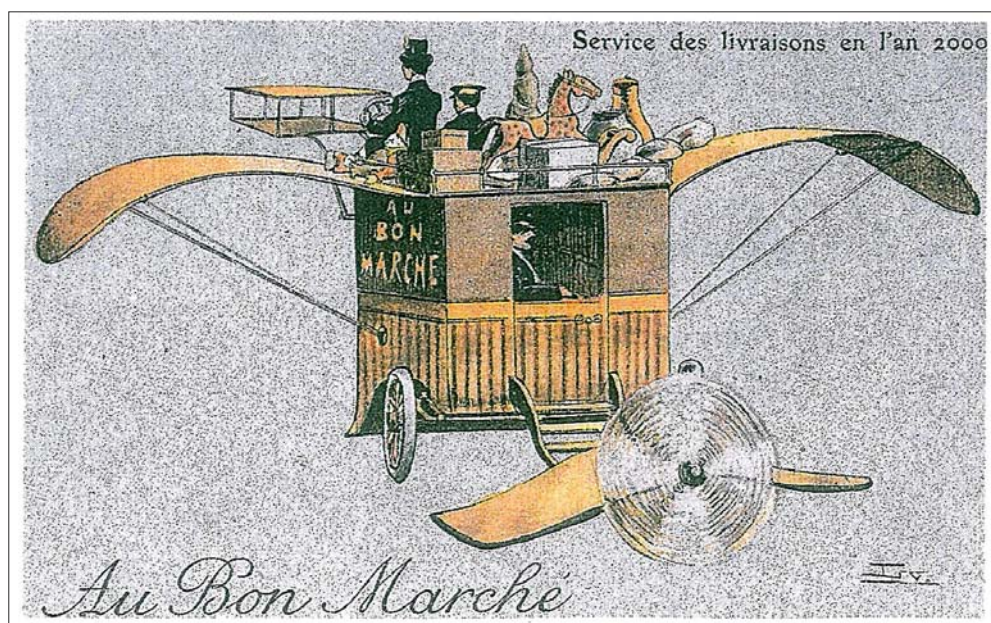
At the same time, the Americans are rediscovering the advantages of proximity. Traumatized by the escalation in oil prices, conjugated with the slump in real-estate, there are clear signs that a number of Americans are ready to call their lifestyle into question. In other words, there seems to be a desire to re-establish social bonds beyond the more or less virtual contacts proposed by the new information technologies. And

local stores could well turn out to be a promising vehicle for such a development.

By way of evidence, Wal-Mart, the number one food-chain store in the United States and in the world, is about to launch “Marketside”, a new concept of the street corner market, covering a floor area of about 1,300 square metres. The first four are to open in the autumn of 2008 in the suburbs of Phoenix. In that very same area, Tesco (number one in the United Kingdom and number three worldwide) has just opened 20 “Fresh & Easy” and plans another 16. These are small food supermarkets out to supply the everyday essentials of a family. Wal-Mart, for its part, reckons that it may well end up with more than a thousand Marketsides securing an annual turnover of 10 billion dollars.

Most of the results presented in this article are the outcome of research entitled “Distribution of consumer goods and private car usage in French urban centres”, carried out by the market research firm Beauvais-Consultants in 2003 for the Directorate of Research and Scientific and Technical Affairs (the DRAST of the Ministère de l'Équipement).

The aim was to compare trends observed in commercial set-ups (size of store, location) and private car usage (market share, length of travel).



## FROM THE DEPARTMENT STORE TO THE HYPERMARKET: 150 YEARS OF INNOVATION

The first *department store* was created by Aristide Boucicaut in 1852 under the sign “Au Bon Marché” (“bon marché” = low-priced), in Paris: “the only building specially built and intended solely for the use of a major business in novelties”. It introduced a great number of innovations: the customer was king and was to be treated as a friend, entry was free (customers could stroll around without being bothered), prices were fixed (no bargaining) and were inexpensive (by reducing the margin on each article, 13% as against 50% practised at the time by stores, but involving a big volume of sale), articles were returnable (a guarantee of quality). There was furthermore a greatly increased spectrum of products exhibited (if the customer did not find what she had come for, she would end up by discovering, in the next department an item that she had not intended to buy when entering the store), a home delivery service (for any order above 25 francs), mail order sales (as from 1867, through a catalogue), and in the user-friendly store, customers could “enjoy life” by getting free refreshments at the buffet or reading the papers in the library. At the end of the 19<sup>th</sup> century, the formula was adopted in the United States (by Roland Macy) and in England (by Charles Harrod).

The first *popular store* was created in 1928 by the Nouvelles Galeries under the sign “Uniprix”. It aimed to satisfy the current needs of the working class clientele, both as regards food and general merchandise (for the most part clothing, and all sorts of items). Popular stores were to invent the concept of affiliation and develop distributor brands. The formula stemmed from the United States where, already in 1879, Frank Woolworth had created the “Great 5 cents Store”; besides, the popular store was initially called “the single price store” because of the sales procedure whereby all merchandise was offered at a single price or with only a few price differences.

The creation of the first *supermarket* dates from 1957, when Henri Bardou opened a 750 m<sup>2</sup> store in Paris, rue Pierre-Demours (in the 17<sup>th</sup> arrondissement). A second supermarket was established the following year in Rueil-Malmaison. It bore the sign “Express Marché” of the Goulet-Turpin, and covered a sales area of 560 m<sup>2</sup>. The concept

was based on self-service, discount and an extensive sales area. Gondolas, trolleys, refrigerated windows... all these came from the United States. In fact, it was a follow-up to the study trips made by French traders in the United States where the first supermarket was set up in 1932.

The first *hypermarket* opened in 1963 at the initiative of Marcel Fournier, of Jacques and Denis Defforey, who launched, in Sainte-Geneviève-des-Bois (south of Paris) the formula “everything under the same roof” (food and non-food, the latter representing two thirds of the sales area). The surface area was, of course, considerable (2,500 m<sup>2</sup>), allowing for mass self-service sales. Prices were low (much lower than those of supermarkets) and 400 parking places were on offer to attract customers from far and wide. The principle of the simultaneous presence of food and non-food products was to be exported to the United States under the new trade name “*supercenter*”.

The *specialist superstore* made its appearance in a number of sectors over several years: household electrical appliances with Darty in 1966 (with its famous guarantee extension called the “contrat de confiance”, i.e. trust contract), household furnishings and equipment with Conforama in 1967, DIY with Castorama in 1969 in Englos over a 5,000 m<sup>2</sup> surface area, and then, considerably later, sports with Décathlon in 1976. The specialist superstores have gained their footing generally through their proximity to hypermarkets (with which they often share parking facilities), their low prices, but, above all, through the choice on offer; finding in one single place all the essentials needed to set up house, for example, was a totally new idea at the end of the sixties.

The first *maxi-discount* was established in Croix in the North in 1988. This was an Aldi store; the idea came from Germany (it went further than the formula proposed in 1975 by Erteco, now become Ed, the grocers). The concept is based on the low cost of purchase linked to a reduced assortment (a maximum of one thousand references, thus allowing increased volumes) and few, if any, national brands with, instead, distributor brands or even products without brands, and limited overheads due to simplified presentation and reduced staff.

## DEVELOPMENT OF STORE SIZE AND LOCATION

The travelling salesman, who, as representative of a manufacturer, would travel across the country to collect orders from trades-people and subsequently have them delivered by haulers, is only gradually losing ground because this business has long been conducted along individual lines.

The history of mass distribution is relatively recent but in less than 50 years, mass distribution has moved up to the top of the business classification ladder, a position formerly held by oil companies or car manufacturers. This is true in the United States with Wal-Mart but also in France where businesses in the distribution sector have witnessed a staggering acceleration. These businesses have deployed various strategies to increase their turnover (diversification, concentration and internationalisation) and to reduce running costs through information technology and cooperation with industry.

In 2002, in France, the retail trade and automobile trade gained a turnover of 343 billion euros. In constant euros, the turnover of the retail trade increased on an average by 1.4 per year and per inhabitant. The market share of the food sector remained steady (around 54%) while the share of food in the household budget showed a downward trend. This can be ascribed to the policy of regular diversification carried out by these companies who sold more and more non-food products: fuel, travel, financial products, jewellery, micro-computer technology, flowers, drugstore products, and perhaps, in the near future, cars. Within the food sector companies, there is evidence of a steady rise in superstores. For example, supermarkets and hypermarkets combined saw their share in total food turnover increase from 68% in 1990 to 79% in 1999.

### SIZE: THE INCREASE IN THE AVERAGE SIZE IS THE RESULT OF AN INCREASE IN THE TOTAL SURFACE AREA AND A REDUCTION IN THE NUMBER OF STORES

The increase in the average surface area of stores between 1982 and 1992 has been estimated at 39% by a survey carried out by the INSEE (National Statistical Office). The following figures are drawn from that survey:

*Table 1: Development of store size between 1982 and 1992 (in m<sup>2</sup>)*

Stores	Surface area	Total area in 1982	Total area in 1992	Progression over ten years
Food except for bakeries	more than 400 m <sup>2</sup>	7,160,000	12,246,000	71 %
	less than 400 m <sup>2</sup>	5,950,000	5,132,000	-14 %
Non-food except for pharmacies	more than 400 m <sup>2</sup>	10,514,000	14,832,000	41 %
	less than 400 m <sup>2</sup>	14,087,000	15,196,000	8 %
<b>Total</b>		<b>37,712,000</b>	<b>47,406,000</b>	<b>26 %</b>
Stores	Surface area	Number of stores in 1982	Number of stores in 1992	Progression over ten years
Food except for bakeries	more than 400 m <sup>2</sup>	5,201	8,145	57 %
	less than 400 m <sup>2</sup>	122,884	90,461	-26 %
Non-food except for pharmacies	more than 400 m <sup>2</sup>	9,580	14,125	47 %
	less than 400 m <sup>2</sup>	230,220	218,811	-5 %
<b>Total</b>		<b>367,885</b>	<b>331,542</b>	<b>-10 %</b>
Stores	Surface area	Average area in 1982	Average area in 1992	Progression over ten years
Food except for bakeries	more than 400 m <sup>2</sup>	1,337	1,503	9 %
	less than 400 m <sup>2</sup>	48	57	17 %
Non-food except for pharmacies	more than 400 m <sup>2</sup>	1,098	1,050	-4 %
	less than 400 m <sup>2</sup>	61	69	13 %
<b>Total</b>		<b>103</b>	<b>143</b>	<b>39 %</b>

Source: INSEE-Results n° 391 May 1995



Saint-Pierre-des-Corps, France – © Gérard Proust, *La Nouvelle République*.

This increase in average size is the result of two contrasting phenomena: an increase in the total surface area of 26% and a 10% reduction in the number of sales outlets over nine years. No identical study is available for the following decade but it can be assumed that the average store size is still on the increase.

For example, as concerns superstores dealing primarily with food, as has been noted above, the first stores occupied an area of 560m<sup>2</sup> (in Rueil-Malmaison in 1958) or 600m<sup>2</sup> (Les Hauts-Champs near Roubaix in 1961) to attain, in 1996, an average surface area of 1,602m<sup>2</sup> (1,074 hypermarkets covering a total area of 6,175,500 m<sup>2</sup> and 7,334 supermarkets covering a total area of 7,297,300 m<sup>2</sup>, i.e. a total surface area of 13,472,800 m<sup>2</sup> for 8,408 superstores).

This transition of the average size from 600 m<sup>2</sup> to 1,600 m<sup>2</sup> is attributable first to the increase in the number of hypermarkets within the total number of food superstores right up to 1974, to the increase in the average size of supermarkets which progressed from 821 m<sup>2</sup> in 1981 to 990 m<sup>2</sup> in 1997, and to the passage of certain supermarkets into the category of hypermarkets further to the extension of their sales area beyond the threshold size of 2,500 m<sup>2</sup>.

As for the size of hypermarkets, where there had been a gradual downsize tendency, the past decade would seem to mark an upward trend. It is to be noted in particular, that the number of hypermarkets with a surface area of over 15,000 m<sup>2</sup> has grown from 13 units in 1993 to 21 units in 2000.

**Table 2: Development of the average size of the various generations of hypermarket**

Decade period	Number of Stores	Total area (m <sup>2</sup> ) today	Average area (m <sup>2</sup> ) today	Total area (m <sup>2</sup> ) at start	Average(m <sup>2</sup> ) at start
1952 to 1961	2	9,007	4,504	9,007	4,504
1962 to 1971	156	1,166,102	7,475	1,116,801	7,159
1972 to 1981	460	2,819,555	6,129	2,663,433	5,790
1982 to 1991	464	2,279,984	4,914	2,072,867	4,467
1992 to 2001	138	759,689	5,505	681,688	4,940
<b>Total</b>	<b>1,220</b>	<b>7,034,337</b>	<b>5,766</b>	<b>6,543,796</b>	<b>5,364</b>

Source: LSA database file (February 2002).

After the announcements by the Carrefour group to create 200,000 m<sup>2</sup> of new sales areas and by the Casino group to target for 100,000 m<sup>2</sup> in 2005, Auchan has announced an extra 60,000 m<sup>2</sup> (LSA, 16 September 2004). Since the Raffarin Act has frozen

the possibility of opening new superstores, these, for the most part, concern extensions. The trend therefore still points to an increase in the average size of superstores dealing mainly in food.

## LOCATION: A TENDENCY TO FAVOUR LOCATIONS IN THE AGGLOMERATION FRINGE

There are more than 300,000 stores in France. There is therefore quite a strong probability of being not too far away from a store but one is faced with the question of the public transport network for access to superstores, especially hypermarkets that are relatively

few in number. For example, in the area under the SCOT (official land planning chart) study in Tours, there are only 7 hypermarkets out of a total of around 20,000 stores.

**Table 3: Location of shops in the perimeter of the Tours SCOT in 2001**

Zone	Number of stores according to size			Population Inhabitants (99 general census)
	Less than 300 m <sup>2</sup>	Between 300 m <sup>2</sup> and 2 500 m <sup>2</sup>	More than 2 500 m <sup>2</sup>	
Tours city district	7,254	2,393	2	132,820
Suburban districts	3,956	3,187	4	101,351
Greater suburban districts	2,104	693	1	104,906
<b>Total SCOT</b>	<b>13,314</b>	<b>6,273</b>	<b>7</b>	<b>339,077</b>

Source: OET-Basile-COMMETT-AUAT-INSEE

Very broadly speaking, the density of hypermarkets depends on the density of the population; high in the Paris region and low in the south of the Massif Central (in Lozère there is still no hypermarket). But, when focusing on a given urban area, it is to be noted that hypermarkets are not situated in the densest areas and even tend increasingly not to start up in such areas.

The “communes-centres” (city districts) of the major agglomerations account for only 23% of the hypermarkets (the remaining 77% being situated therefore in the sub-city districts of these large urban units). This percentage dropped from 27% for superstores set up between 1962 and 1981 to only 18% for set-ups between 1982 and 2001.

**Table 4: Development in the location of hypermarkets\***

Period of establishment	Total surface area as of 1 <sup>st</sup> February 2000 (m <sup>2</sup> )			Share of inner city district
	Inner city district	Other locations	All locations	
1962 to 1971	94,569	247 305	341,874	28 %
1972 to 1981	268,201	730,816	999,017	27 %
1982 to 1991	151,928	596,943	748,871	20 %
1992 to 2001	31,900	233,260	265,250	12 %
<b>Total</b>	<b>546,688</b>	<b>1,808,324</b>	<b>2,355,012</b>	<b>23 %</b>
20 last years	183,918	830,203	1,014,121	18 %
20 preceding years	362,770	978,121	1,340,891	27 %

(\*) Urban units of 200 000 to 900 000 inhabitants.

Source: LSA database file (February 2002).





Tours, France – © Studio J.-J. Moreau.

A hypermarket, despite its image of a great peripheral sales area, avoids setting up in the greater suburban environment, that is to say, the urban area not situated in the city unit. It tends instead to favour the *agglomeration fringe*.

To give an example, taking the three “départements” of the Val-de-Loire (Indre-et-Loire, Loir-et-Cher and Loiret) as a whole, the agglomeration fringes accounted for 51% of the sales area as against 24% for the greater suburbs, 16% for the small towns, 5% for the rural areas and 3% for the urban centres.

To take another example, in mid-2002, the Toulouse region numbered 3 hypermarkets in the Toulouse “commune” (city district), i.e. 28,025 m<sup>2</sup> for 309,301

inhabitants according to the last census, and 9 hypermarkets over the remainder of the city unit, i.e. 97,786 m<sup>2</sup> for 370,806 inhabitants. No hypermarket exists in the remaining urban unit although 203,807 persons live in this greater suburban ring.

This location benefits on the one hand from customers from the near-by dense zone and on the other hand from customers from the suburbs with rapid access to the hypermarket via the motorway or the bypass.

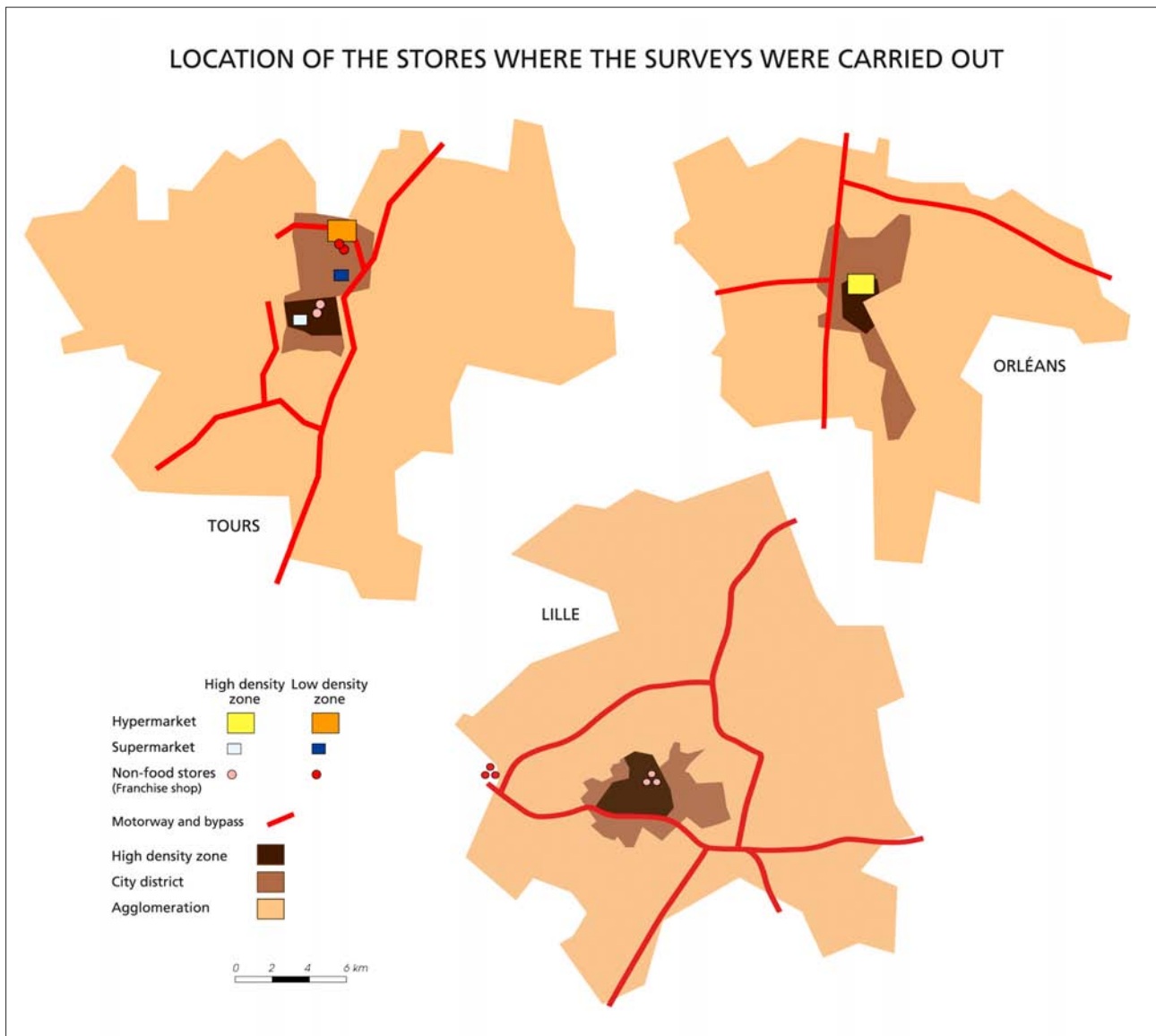
What is needed now is to assess the road traffic consequences of this increase in the average size of stores and the tendency to favour locations in the agglomeration fringes.

# SHOPPING BY CAR: A SURVEY AMONG 5 000 CONSUMERS

In order to measure the effects of location of stores and their size in terms of market share as well as the length of travel by private car, 14 surveys have been carried out among 5,000 consumers, in zones of high and low density, in the outskirts and in the inner-city areas of Tours, Orléans and Lille, of which 4 were carried out in non-food stores (franchise shops), 2 in

supermarkets and 2 in hypermarkets. Travel links between home, work and store and other purpose-destinations both to and from the store were taken into account.

The “home-store-home” case is the most frequent even where the car is the means of transport used.



*Table 5: Proportion of “home-store-home” trips according to travel mode (pedestrian or car driver)*

	Pedestrians	Drivers
Supermarket in high density zone	82 %	52 %
Supermarket in low density zone	75 %	50 %
Hypermarket in high density zone	46 %	51 %
Hypermarket in low density zone	70 %	66 %

The adjoining table shows results attributable to shopping trips as conventionally broken down:

**Table 6: Distance covered by car per purchase (in metres)**

	High density zone		Low density zone	
	Supermarket	Hypermarket	Supermarket	Hypermarket
To	2,110	5,100	2,450	6,770
From	1,590	4,680	1,870	5,900
<b>Attributable</b>	2,530	8,710	3,060	10,540
Home	1,900	6,070	1,870	8,380

It is to be noted that the distance we attribute to shopping is greater than the so-called destination purpose, also called the upstream purpose (to reach the store after the preceding purpose). And yet, when

going from home to the store and directly back again, it is the whole loop that has to be attributed to shopping (marked “attributable” in the Table).

### MARKET SHARE OF A CAR : A CLEAR “LOCATION EFFECT” .... BUT A MINOR “SIZE EFFECT”

The impact of the store location can be highlighted by comparing stores of comparable size. For food stores, the surveys carried out in Tours and Orleans between 1995 and 1997 show that, for supermarkets, the drive from the centre to the outskirts practically doubles the market share of a car. As for hypermarkets, the drive from the centre to the outskirts more

than doubles the market share of a car.

In the non-food sales sector, the surveys carried out in Tours and Lille show that 42% of customers come by car when out to make a purchase in the city centre, whereas the proportion rises to 95% in the outskirts.



Lille, France – © Jean-Marie Beauvais.

To the extent that the market share is closely linked to location, it is interesting to understand why customers go to the outskirts rather than into the city centre or vice versa. It must first be remembered that, among those who frequent the outskirts, 33% do not know that an identical store is to be found in the city centre. And, among those who frequent the centre, 44% do not know that there is an identical store in the outskirts.

The main reason for the choice, in one case out of two, is the proximity. In the outskirts, proximity is cited as the main reason for 55% of customers. The second reason is the fact that one has other things to do not far from the store: for the most part, other purchases, and, perhaps also an outing to the restaurant or to the cinema. The third reason clearly opposes the two locations: the outskirts are chosen because access and parking are easier whereas the centre is chosen for the pleasure of the outing.

This time, stores of different sizes but situated in similar urban fabrics are compared. It appears, from the surveys carried out in Tours and Orleans between 1995 and 1997, among mostly food superstores, that in the high density zones, the passage from 1 000 m<sup>2</sup> to 6,000 m<sup>2</sup> does not lead to an increase in the market share of a car. In the lower density areas, the market share rises in proportion to the surface but, this time, the increase in the sales surface is very high since the passage is from 1,000 m<sup>2</sup> to 10,000 m<sup>2</sup>.

As may be noted, the size effect is not as evident as concerns the market share of a car. Finally, the results relative to the impact of a newly opened superstore on the market share of a car may be summed up in the Table below. It shows that driving from an inner-city location to a location on the outskirts can practically double the market share of a car for a given product and a given store.

**Table 7: Market share of a car: location effect**

	High density zone	Low density zone
Camàieu (women's wear), Lille	30 %	94 %
Yves Rocher (beauty products), Lille	35 %	93 %
La Grande Récré (toys), Tours	46 %	97 %
Célio (young people's wear), Lille	48 %	92 %
Jules (men's wear), Lille	53 %	100 %
<b>The five stores taken as a whole</b>	<b>42 %</b>	<b>95 %</b>
Supermarket	36 %	68 %
Hypermarket	37 %	85 %

### LENGTH OF TRAVEL: A MINOR "LOCATION EFFECT"... ...BUT A STRONG "SIZE EFFECT"

The distance covered for a purchase motif is expressed by the distance covered for a purchase motif only for customers who have come by car. Moreover, this is the distance ascribed to a purchase which, in the case of a shuttle service, includes both the home-purchase trip and the purchase-home trip (journey there and back).

When comparing two stores of comparable size to study the impact of location on the distance covered, it is to be noted that the size of the store, supermarket or hypermarket brings no influence to bear on the increase in distances covered: the increase in length of travel is 21% when the store is situated on the outskirts compared with the centre.

One could also compare, with the same data, two stores situated in a comparable urban fabric and study the impact of size on the distance covered. It is then to be noted that the impact of the size of the store on the distance covered by car is very important: +244% for the hypermarket compared with the supermarket, whether or not seen from the position of a dense zone. The distance to be covered is to be seen in relation to the density of the network of stores in the area. The rarer the type of store, the greater the probability of having to cover a great distance. Let us remember that there are more than 7,000 supermarkets as against "only" 1,200 hypermarkets; 3.4 times more kilometres are needed to drive to a hypermarket than to a supermarket.

**Table 8: Distance driven for shopping purposes (in meters): effect of location and size of store**

	Supermarket	Hypermarket
High density zone	2,530	8,710
Low density zone	3,060	10,540

One therefore has to check and evaluate a link between, on the one hand, the size of the store and the length of distance to the store and, on the other hand, the location of the store and the market share of a private car. The impact resulting from these two factors (size and location) taken simultaneously can be expressed through the following ratio: *car x kilometre for 100 € of shopping*. This indicator takes into account not only the market share of a car

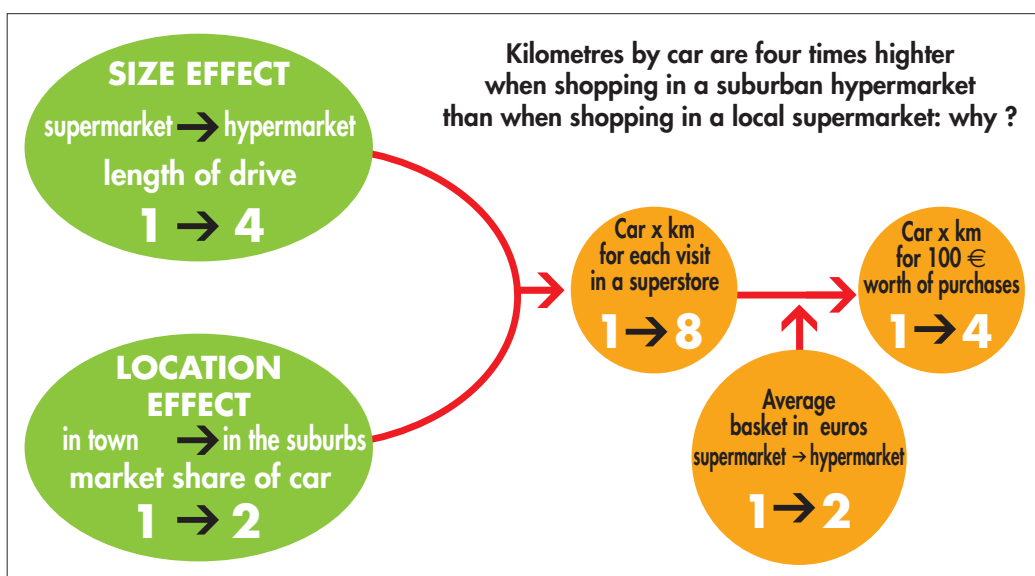
and the length of the drive, but also the average basket (car-kilometre ratio generated by the food superstores as estimated by the MT55 Report of the DRAST in 2001), i.e. the total value of goods bought at each visit, purchases that can be more or less frequent depending on household habits and the home-store distance (the average basket is greater when shopping is done in a hypermarket than when done in a supermarket and greater when a car drive is involved).

**Table 9: Calculation of the efficiency ratio (car . km / 100 € worth of shopping, in 2000)**

	Supermarket		Hypermarket	
	High density zone	Low density zone	High density zone	Low density zone
Average basket in francs				
Clients coming by car	200	158	344	335
Overall clients	131	127	218	302
Length of drive (metres)				
Clients coming by car	2,530	3,060	8,710	10,540
Market share of car	36 %	68 %	37 %	85 %
Overall clients	911	2,081	3,223	8,959
Efficiency ratio (car.km / 100 Fr F)				
Clients coming by car	1.27	1.94	2.53	3.15
Overall clients	0.70	1.64	1.48	2.97
Efficiency ratio (car.km / 100 €)				
Clients coming by car	8.3	12.7	16.6	20.6
<b>Overall clients</b>	<b>4.6</b>	<b>10.7</b>	<b>9.7</b>	<b>19.5</b>

The result of this calculation is that 100 € worth of purchases gives 5 kilometres by car for a supermarket in a high density zone, 11 kms for a supermarket in a low density zone, 10 kms for a hypermarket in a high

density zone and 20 kms for a hypermarket in a low density zone. Between these two extreme cases the ratio is 1 to 4.



## CONCLUSION

With an indicator like “Car x km for 100 € worth of purchases” one can evaluate commercial urbanisation policies from the point of view of the generation of car traffic flow, but also from the point of view of an increase in the greenhouse effect, since emissions depend directly on the kilometres.

These kilometres driven by car may be translated in terms of carbon dioxide emissions on the basis of the estimates provided by the Ademe (“Energy and environmental efficiency of modes of transport. Public synthesis”. Deloitte, 30 January 2008), which take into account the occupancy rate of cars and cover all cars on the road and not only new cars. According to this

document, assuming that the cars are driven in urban or suburban zones with half the number being powered by petrol and the other half by diesel, the results show an average emission of 187 grams of CO<sub>2</sub> per traveller x km. To determine emissions by car x km and not by traveller x km, one deducts an average rate of occupation in urban or suburban zones of 1.3 passengers per car, so that the emissions may be estimated at 243 grams of CO<sub>2</sub> per car x km.

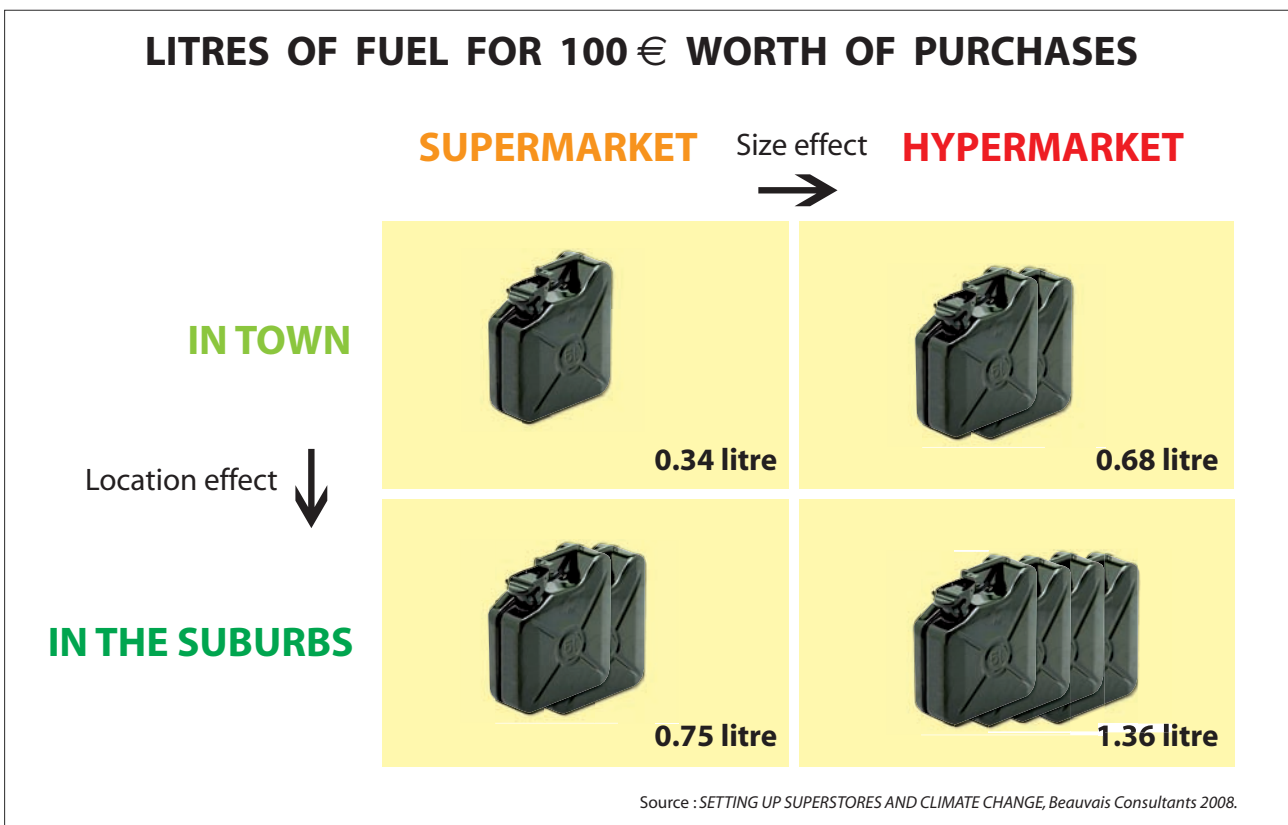
Thus, for the same household basket of 100 €, carbon dioxide emissions attributable to transport may be estimated at:

**Table 10: Carbon dioxide emissions attributable to final transport for purchasing**

	Supermarket		Hypermarket	
	High density zone	Low density zone	High density zone	Low density zone
Car x km for 100 € worth of purchases	4.6	10.7	9.7	19.5
Litres of fuel for 100 € worth of purchases	0.34	0.75	0.68	1.36
CO <sub>2</sub> grams for 100 € worth of purchases	1,100	2,600	2,400	4,700

The result of this lengthy evaluation may be summarized in one sentence: **carbon dioxide emissions are four times stronger when shopping in a suburban**

**hypermarket than when shopping in a local supermarket.**



The Boiteux report (Commissariat general du Plan, La Documentation française, 2001) proposes that these emissions be expressed in currency terms with a view to investment options. The “Instruction-Cadre” (official circular) of 25 March 2004 proposes withholding 100 € per ton of carbon, i.e. 6.6 € cents per litre of petrol and 7.3 € cents per litre of diesel, which would amount to approximately 50 cents for 100 kms.

Taking into account the very strong impact on CO<sub>2</sub> emissions of the hypermarket situated on the outskirts, the question arises as to whether, in the light of sus-

tainable development, the hypermarket situated on the outskirts is the right model to export across the world.

At a time when, further to the “Grenelle de l’environnement” (official consultation on environmental issues), measures are being taken to orientate demand towards products that emit fewer greenhouse gases, (bonus when purchasing a car that consumes less oil, zero-rate loan to improve housing insulation), one might ask whether urban commercial planning that affects the future should not also be assessed from the point of view of carbon dioxide emissions.

### The model as exported: a French hypermarket in Izmir (Turkey)

The city of Izmir is situated in the western part of Turkey, deep in the Bay of Smyrna, on the Aegean Sea. With its 3.4 million inhabitants, Izmir is the third city of Turkey, after Istanbul and Ankara.

In 1995, Turkey numbered 440 supermarkets and hypermarkets. These superstores accounted for 16% of the market as against 89% in the United Kingdom and 62% in Germany.

There are several hypermarkets in Izmir: Tanzas, Migros and Carrefour. The latter is situated in the Karsiyaka quarter (in the recent part of town, between the north bank of the Bay and the motorway E87), on the fringes of the agglomeration but not far from high-rise dwellings.

The Izmir Carrefour hypermarket covers a surface area of 47,500 m<sup>2</sup>. By way of comparison, the Quimper one, also designed by EMA, covers only 20,000 m<sup>2</sup>.

The floor mass plan, as well as the layout of the sections within the large food hypermarket, is familiar to the French visitor, with, from right to left, leisure, clothing, cleaning materials, food and, finally, the battery of cash-registers. The range of goods on offer is essentially Turkish.

The car park seems to be oversized. Indeed, many customers come by bus. Moreover, Carrefour has organised its own shuttle bus service (photo 1). Finally, for those who come by bicycle, the distributor has provided a sheltered and guarded garage (photo 2).



Izmir, Turkey – © Jean-Marie Beauvais.