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A. García Pastor



**Management Committee
COST 342**

**Parking Policy Measures and their
Effects on Mobility and the
Economy**

Subject: Spanish case studies & detailed case study of Madrid.

COST 342/18-E

LIST OF CASE STUDIES. SPAIN (28 of July 2000)

The national inventory in the case of the Spain will be focussed on 12 cities which represent as an average the situation of the whole of the country. These cities have different population, functionality, mobility and they have applied to some extent different solutions for the parking problem.

The cities, and a summary of the main population characteristics are the following:

Cities	Population (1998)
Big metropolitan areas	
Madrid	2.881.506
Barcelona	1.505.581
Medium size cities	
Sevilla	701.927
Málaga	528.079
Valencia	739.412
Zaragoza	603.367
Bilbao	358.467
Alicante	272.432
San Sebastián	178.229
Vitoria	216.527
Tourist cities	
Granada	241.471
Toledo	66.989

In doing the selection, the following criteria have been taken:

- To include big metropolitan areas, where parking problems are widespread in the whole city. Normally the measures are integrated forming a package “i.e. controlled area in the centre, with P&R in the metropolitan area and specific policies on resident parking
- The medium size group can be subdivided according to the type of the city, the main features of mobility and the innovation in the parking measures. It can be found a group of coast cities, not specifically tourist, with an importance on industry and economy (Valencia, Bilbao, San Sebastián). Málaga and Alicante have also this character, but they are influenced also by the tourists in the surrounding areas. Sevilla is one of the main cities in Spain with specific tourist and historical background. Finally, Zaragoza and Vitoria are two cities in inner Spain with a high quality standard of living, where city councils have been committed to environmental measures related to traffic and parking
- The two cities included in the special group have an important historical centre with a lot of tourists along the whole year. The topographical restraints of both cities have also influenced in the general transport and parking policies

Issues	Cities/towns											
	Madrid	Barcelona	Sevilla	Málaga	Valencia	Zaragoza	Bilbao	Alicante	San Sebastián	Vitoria	Granada	Toledo
Population (10 ³)	2.881	1.505	702	528	739	603	358	272	178	216	241	67
On-street supply	X								X			
Off-street supply	X								X			
Fares and ticketing systems	X								X			
Guidance and information	X											
Parking management	X								X			
Private residential parking	X											
Private non-residential parking									X			
Park & Ride	X											
Control and enforcement									X			
Mobility data	X								X			
Economic data	X											

X Existing measures and policies which can be highlighted in the city

X Most important topics to be learned from the city

Mobility and Parking in the city of MADRID

Madrid is a cosmopolitan city that plays a principal role in the activities related to tertiary sector, and where a great number of important companies have their headquarters. From the Public Administration point of view, Madrid is the seat of the Central Government and the Spanish Parliament therefore increasing the idea of centralism which at the same time is reinforced by its geographical position with respect to the Iberian peninsula.

Regarding topography, the city of Madrid is located under the peaks of the Guadarrama mountains, in the valley of the Manzanares river. This makes that the topography is smooth, without many height differences, which appear only in a few points of the city, particularly close to the river.

1. TERRITORIAL BACKGROUND

The region of Madrid has according to the last census (1966) more than 5 million inhabitants which represent some 1,8 jobs in an area of 8.028 km², and an average of 297,1 vehicles per 1000 inhabitants.

The region can be divided into 3 zones:

- The *City of Madrid*, with an area of 606,2 km², a population of 2.866.850 inhabitants (1996) and 1,2 million jobs, thus representing a 57% of the population and 67,5 % of the jobs with respect to the total of the region. The central core of the city has 42 km² and has a population of 915.918 inhabitants which means a density of 21.793,3 inhabitants per km²

The distribution of the population according to age groups shows the following figures: from 0 to 18 years: 513.175 inhabitants (17,9%); from 19 to 64 years: 1.839.644 inhabitants (64,2%) and more than 65 years: 514.031 inhabitants (17,9%).

The population older than 16 years in the municipality of Madrid is 2.466.941 (a 86,1%). Of this population, 1.268.527 are active (51,4%), and the rest are no active (including military service). From the total of active population, 78,2% are workers, and the remaining are jobless.

- *The metropolitan area* with 1.913.804 inhabitants (38% of the total living in the region) and an area of 2.280,7 km² consisting of 49 municipalities of various sizes being 6 of them between 150.000 and 200.000 inhabitants.

The distribution of the population according to age groups shows the following figures: from 0 to 18 years: 517.704 inhabitants (27%); from 19 to 64 years:

1.261.787 inhabitants (65,9%) and more than 65 years: 134.313 inhabitants (7,1%).

The population older than 16 years in the metropolitan region of Madrid is 1.512.803 (a 79%). Of this population, 873.459 are active (57,7%), and the rest are no active (including military service). From the total of active population, 78,1% are workers, and the remaining are jobless.

- The rest of the Region of Madrid consists of 129 villages of small/medium size in an area of 5.141,4 km² and a total of 241.636 inhabitants (4,8% of the total of the region)

The distribution of the population according to age groups shows the following figures: from 0 to 18 years: 56.816 inhabitants (23,5%); from 19 to 64 years: 147.803 inhabitants (61,2%) and more than 65 years: 37.016 inhabitants (15,3%).

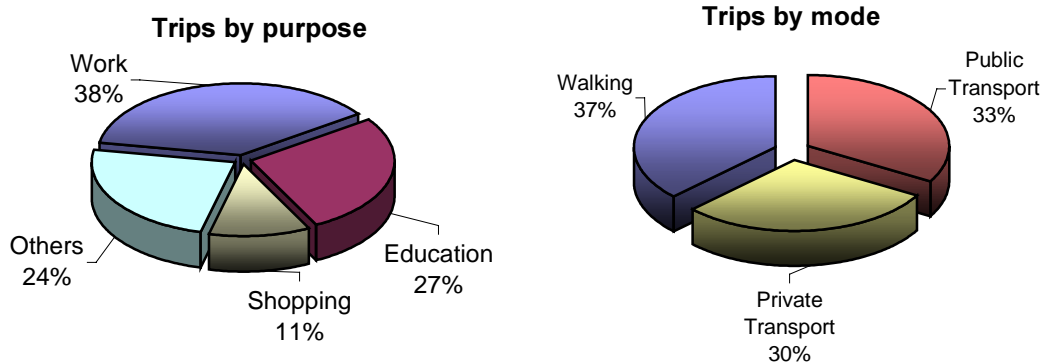
The population older than 16 years in the rest of the region of Madrid is 195.366 (a 80,9%). Of this population, 100.663 are active (51,5%), and the rest are no active (including military service). From the total of active population, 79,7% are workers, and the remaining are jobless.

2. PUBLIC AND PRIVATE TRANSPORT IN THE REGION

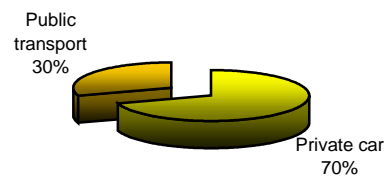
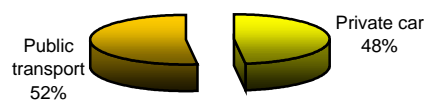
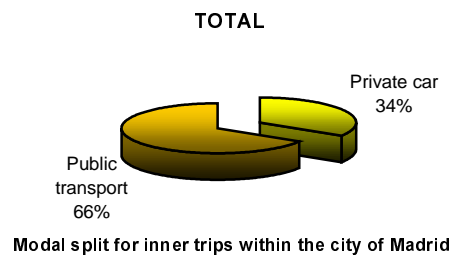
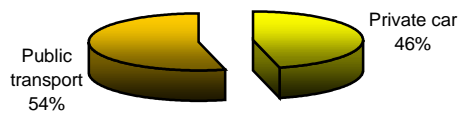
- **General Mobility:**

The number of daily trips within the Madrid region amounts up to 10,6 million, according to 1996 data, keeping a certain balance between modes with a slight relevance of walking trips followed by public transport. The breakdown by mode of transportation is shown below:

• **Modal split of total trips in Madrid:**



• **Modal split for motorised trips**



These figures show a similar participation in the three main modes (walking, public transport and private transport), for the total number of trips. Trips to/from work are the main purpose, followed by education. Both of them (compulsory mobility) are 65% of the total trips, that means that 2 of every three trips are due to compulsory mobility.

In motorised trips, public transport is the main mode with a 54%. If it is considered the origins and destinations, it can be seen that this importance of PT is even higher in the inner trips in the municipality of Madrid (66%), as a result of the PT network density and the accessibility. For radial metropolitan trips between the metropolitan area and the central city, it is still public transport the main mode with 52%. However inner trips in the metropolitan area, basically transversal trips are made in private transport (70%), as a consequence of less PT supply and less congestion problems.

- ***Institutional framework of transport***

The sole authority within the public transport system is the Consorcio Regional de Transportes de Madrid (CRTM) which was formed in 1985 in an effort to co ordinate all transport modes and operating companies which constituted the public transport system of Madrid.

The operators that are co-ordinated by CRTM are Metro, urban buses of Madrid (EMT), and suburban buses, operated by different private companies

Among the responsibilities of the Consorcio de Transportes are those related to the programming of the services supplied, the establishment of the fare policy, the implementation of multimodal tickets, the maintenance of a stable financial framework, the global planning of transport infrastructures, and the development of an integrated image for the public transport system.

In the RENFE case, as a company not dependent on the Consorcio, its relationship is governed by contracts and agreements that define the conditions on fare aspects and services.

Regarding the highway networks, the organisations in charge of the planning, financing and construction are those with responsibilities depending the type of network:

- In the case of municipal highways, the city councils are responsible for planning, construction and management (including signals, traffic lights, etc.) The Land Use Master Plans and other planning tools define the hierarchy and the proposals of the municipal highways
- The highways of the General Interest Highway network (main access motorways which are part of the principal interurban connections) are responsibility of the Ministry of Development for planning, financing and construction as well as management. Surveillance and management systems (ITS, etc.) are performed by the General Direction of Traffic.

- Finally, the regional network with an interest for the regional Government of Madrid is responsibility of the Direction of Roads of the Consejería de Obras Públicas, Urbanismo y Transportes de la Comunidad de Madrid

In the case of urban parking, city councils are responsible of construction, licences and operation. The different existing typologies of parking facilities make that there are several public parking off-street with public or private management, while in the case of the city of Madrid, there is an on-street parking regulation (O.R.A. zone), which is managed by the city council.

Regarding P&R, this type of parking facilities is linked generally to suburban railway stations, being its construction and management performed by RENFE, through agreements with the municipalities, direct management, etc.

- *The Public Transport System* can be characterised as follows:

MODE	SUPPLY				DEMAND		
	COMPANY	NB OF LINES	LINES LENGTH (Km)	Vehicle-Km (10 ⁶)	YEARLY PATRONAGE (10 ⁶)		Passenger-km (10 ⁶)
					Tickets	Boardings	
Metro	METRO	12	135,2	98,1	437	655,6	2.329,2
Urban buses	EMT	182	2.915 (*)	94,6	547,7	547,7	1.916,9
Suburban Buses	33 PRIVATE COMPANIES	309	16.294 (*)	118,9	236,6	236,6	2.200,4
Suburban Railways	RENFE	11	484,3	87,2	143,5	171,9	2.138,2

Source: Data of Consorcio Regional de Transportes, 1998.

(*) Bus distances correspond to round trips of each line. Underground and Suburban railways distances are double track.

It is worth to highlight the importance of the buses network to the extent that supply demand level, they have a similar weight than the railway suburban lines and underground in both urban and metropolitan areas.

Fare Policy:

It is the responsibility of the CRTM the establishment of the fare policy once it has been previously approved by the Regional Government.

There is a multimodal transport document (Abono Transportes) which can be used unlimitedly in all PT modes of transport, Buses, metro and railway, which is valid for a certain period of time (one month or one year) and for a chosen zone. For that the Region of Madrid has been divided into seven zones each one having a common tariff for all transport modes.

It must be pointed out that tariffs referred to suburban trains (service provided by RENFE) are established by the Central Administration although the Abono Transporte can be used in its network.

- *Private Vehicle*

Madrid's road network comprises seven interregional radial motorways/ expressways and other secondary roads. The total amount of that roads provides 32 lanes to the city of Madrid with a theoretical capacity of 64.000 vehicles in peak hour. The following figure highlights the principal routes.

On top of that Madrid has two complete beltways, both within the municipality of Madrid, the M-30 (internal ring road of a equivalent radius of 10 km) and the M-40 (intermediate ring road of a equivalent radius of 20 km) .A new M-50, an external ring road, is under construction.

In the A-6 motorway (north-east of the city) there are special lanes for high occupancy vehicles (Bus VAO) which can be used by public buses and private vehicles with 2 or more occupants. This lane is reversible in such a way that early in the morning it operates in one way and late in the afternoon in the opposite.

The main figures o car-ownership are:

- Motorization rate is 301 cars/ 1.000 inhabitants, 0,927 cars per family.
- 31% of the households have no car, while 51% have one car and 18% have two or more cars



Source: Road Map 1997. Ministry of Development

- *Suburban Railways Network.*



Source: Commuter train service map: 1999 RENFE fare zones.

- *Functional scheme.*

The suburban train network operated by RENFE within the Region of Madrid runs over 289 km which corresponds to 484,3 rail roads, with 80 stations. The network structure has the following characteristics:

- Atocha Station can be considered as the central station for suburban trains in Madrid since all lines pass through or arrive there.
- The axis Atocha-Chamartín is the biggest North-South urban axis, very well integrated in the business centre area of Madrid with 6 lines offering a supply of a train every 3.3 minutes at peak hours.
- The axis Aluche-Atocha-Mendez Alvaro the second one in importance, with transfer facilities with the Metro but less integrated in the business centre. This service is provided by C-5 line with frequencies every 3,3 minutes.
- There are two other lines which do not use the North South corridor but both end up at Atocha Station with 16 services per hour at peak hours.
- Line C-7 links the West metropolitan area with the city centre forming a circular line.

Total number of stations of the suburban commuting train network amounts to 80 distributed as follows:

- 30 stations inside Zone A out of which 12 have transfer facilities with the Metro network.
- 14 stations inside Zone B1, 13 in B2 and 7 in B3
- 10 are the stations in Zone C1 while the number of stations in Zone C2 are 11.

Daily demand of the suburban railway network is of 760.000 passengers being Line C-5 the busiest one with some 300.000 passengers that is 40% of the total. This line provides public transport to the South of the Metropolitan area where some 1.000.000 inhabitants live.

• ***Inbound and outbound modes in the suburban railway station:***

In the metropolitan area, commuters basically arrive to or leave railway stations on foot. At least two out of three passengers walk to the stations while the rest uses buses and very few private cars (either as driver or as passenger). The reason of walking to the railway station, in the majority of the cases, is due to the high population density of the metropolitan municipalities and the location of the stations, very close to the centre of such municipalities. It must be born in mind that these stations were built at the beginning of last Century.

Data corresponding to 1998 for the stations outside the municipality of Madrid are as follows:

	Inbound passengers		Outbound passengers	
	Passengers	%	Passengers	%
Walking	181.821	69,3	165.888	67,8
Suburban buses	47.639	18,2	53.947	22,0
Car driver	19.454	7,4	16.283	6,7
Car passenger	11.778	4,5	6.566	2,7
Taxi, motorcycle, others	1.676	0,6	2.123	0,8
TOTAL	262.368	100	244.807	100

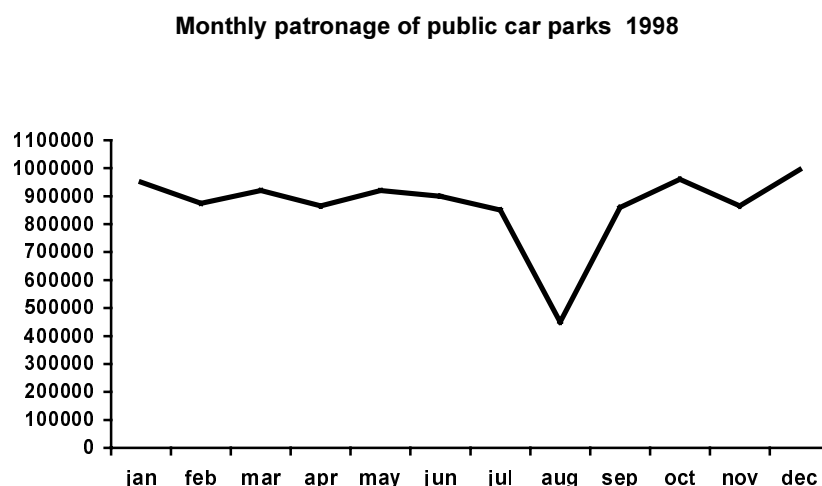
The difference between inbound passengers 262.368, and outbound ones 244.807 is due to the use of train commuting services to come to Madrid early in the mornings and the use of bus services going home late in the afternoon

3. CAR PARK POLICY IN THE REGION OF MADRID

There is not an integrated parking policy in the Region of Madrid. Parking policies are defined by each Municipality in an individual manner, without co ordination. So that:

- In Madrid City Centre there is , since 1980, a zone where parking is restricted to a certain time by using special tickets. The use of such tickets is today 10% of what it used to be when the system was introduced 20 years ago mainly due to the low efficiency of the control system and legal measures to enforce it. The approximate number of park places in the regulated zone is 46.000 and the existing fare is 80 PTA/hour
- At the same time and since 1982 (where Madrid Council has liberalised the construction of parking facilities in residential areas) the Madrid Council has been building different types of parking facilities:
 - Public car parks, also called rotational car-parks. There are 20 with 8.965 places. The hourly fare in these parks is 250 PTA/hour. They have a special card to use any of them: Tarjeta Bono Red) The Bono Red system is a smart contactless card valid for these public parks, which is reloaded with a certain amount of money (normally 1.000 PTA). The price of the card is also 1.000 PTA.
 - Car-parks for residents amounting 186 and 67.479 places
 - Mixed ones (rotational and residents) 23 with 9.110 places for residents and 6.006 places for normal pay parking.

Demand of the public car parks in 1998 was 11 million of vehicles, with a monthly distribution as appears in the following graphic:



Among the most significant data of the use of the public car parks in Madrid, it can be highlighted that the average stay time is 2,16 hours/day ad the daily use of each place is 2,12 vehicles. This shows that each park place was used an average of 458 hours/day in the year 1998.

Car-park facilities are completed by public car park of private property and private car parks of which there is no data available.

Finally it must be stressed that no strong measures are taken against people parking indiscriminately in double line or in bus-lanes. There is not a car park policy embracing all car parks not only the ones located in the city centre but also those in the outskirts (commuters network park and ride), since the former depend on the Madrid Council and the latter can depend either on the Regional Authorities (Consortio Regional de Transportes) or on the suburban rail operators (RENFE) or even on the local municipalities.

There are also other important schemes in the city centre of Madrid, which have affected the park system. The most significant is the conditioning of certain areas of the city centre, with the goals of reducing speeds, traffic calming, reorganisation of the public way, improvements for pedestrians and eliminate double parking. This has led to a reduction of on street parking places and a better distribution of the existing ones.

Regarding information and guidance on parking in the city centre, there is a panel system which shows information on the location of the closest public parks and an idea of the occupancy (free, medium and full).

Finally, one of the main transport policies of the city council of Madrid is the construction of highway tunnels in the city, addressed basically to the mobility in private transport. In some cases the construction of these tunnels has been linked to off street parking garages, which allows to finance the cost of tunnels.

4. PARK AND RIDE FACILITIES IN THE SUBURBAN RAILWAY NETWORK IN THE REGION OF MADRID

The existing system is based on the railway network that has a total of 80 stations out of which only 49 are considered as having a park and ride facility (Stations in the city centre are not included here). 5 of the 49 stations charge for the service provided the rest are free and 4 have indoor car parks while the rest are built in the open air. In the very near future and in the axis of the N-VI road two new car parks will be incorporated to the network (paying car parks), Aravaca and Villalba (Indoor) thus increasing their present capacities to 500 and 1200 vehicles respectively.

Park and ride facilities offer a total of 14.850 places dividing same in the following types:

Type of car park	Surface	Indoor	TOTAL	Free	Paid	TOTAL
Nb of P&R	48	4	52	44	5	49
Nb of places	11.300	3.300	14.850	10.400	4.200	14.850

Stations in the suburban railway network with Park and Ride facilities

Station name	Nb places	Fare zone	Station name	Nb places	Fare zones
Alcalá de Henares	190	B3	Las Zorreras	90	C1
Alcorcón	500	B1	Leganés	93	B1
Alpedrete	14	C1	Los Molinos	33	C2
Aluche	350	A	Majadahonda	1.179	B2
Aranjuez	370	C1	Móstoles	77	B2
Aravaca	80	A	Móstoles-El Soto	1435	B2
Azuqueca	40	C1	Orcasitas	164	A
El Barrial	1000	B1	Pinar de las Rozas	1245	B2
Cercedilla	50	C2	Pinto	50	B2
Ciempozuelos	100	B3	Pozuelo de Alarcón	65	B1
Collado Mediano	70	C1	Puente Alcocer	70	A
Coslada	363	B1	San Fernando	225	B1
Cuatro Vientos	25	A	San José de Valderas	308	B1
El Goloso	50	B1	Santa Eugenia	37	A
El Pozo	120	A	Serna, La-Fuenlabrada	637	B2
Escorial, El	110	C1	Torrejón de Ardoz	62	B2
Fuencarral	65	A	Tres Cantos	534	B2
Fuenlabrada	130	B2	Valdemoro	161	B3
Galapagar-La Navata	55	B3	Vallecas	40	A
Getafe Centro	70	B1	Vicálvaro	126	A
Getafe Industrial	40	B1	Villalba	200	B3
Getafe Sector 3	975	B1	Villaverde Alto	171	A
Las Margaritas-Universidad	540	B1	Villaverde Bajo	264	A
Las Matas	360	B2	Zarzaquemada	1211	B1
Las Rozas	706	B2			

Note: Paying car parks are shown in bold letters.

Demand

According to the surveys that are annually made for getting information on the demand of suburban railways, the distribution of access and egress modes to the stations are the following:

Access modes	Passengers	Percentage
Walking	327,590	56.8
Metro	99,563	17.3
Urban buses	45,858	8.0
Suburban buses	56,619	9.8
Car as driver	23,947	4.2
Car as passenger	17,448	3.0
Long distance railways	1,330	0.2
Taxi, motorcycle, others	3,694	0.6
Total	576,050	100.0

Egress modes	Passengers	Percentage
Walking	319,057	56.8
Metro	108,166	17.3
Urban buses	47,491	8.0
Suburban buses	65,944	9.8
Car as driver	19,354	4.2
Car as passenger	9,116	3.0
Long distance railways	2,429	0.2
Long distance railways	2,429	0.2
Taxi, motorcycle, others	3,95	0.6
Taxi, motorcycle, others	3,95	0.6
Total	575,515	100.0
Total	575,515	100.0

Fare policy

Tariffs of the paying car parks are as follows:

- PTA 100/day (0,6 EURO) for travellers not using single tickets. Tariff contemplates a maximum of 14 hours .
- PTA 2000/month (12 Euro) for travellers using monthly season tickets.
- PTA 500 /day (3 EURO) for travellers using single tickets
- PTA 175/hours (1,05 EURO) for each hour exceeding the 14 allowed.

Other issues of interest

- With reference to facilities for people with reduced mobility it must be highlighted that only in rehabilitated or new car park they are being introduced.
- The management of the car parks is done through private franchise with little or nil public control.
- Automatic paying facilities are non existent. They are done via an attended cabin.
- With respect to intermodality most of the stations have bus services (urban and suburban) and some stations such Aluche, Vallecas and Vicalvaro have Metro transfer facilities.
- There are not complementary services such as public telephones and cafeterias although in all stations served by the car park they do have such facilities.
- With regards to the cost (average updated to 1.999) this amounts to 625.000 PTA (3.753 EURO) per parking place indoor or 110.000 PTA (611 EURO) per place in the open air. These are the figures for the latest car parks built in Las Rozas and Getafe Sector III.

Case of Madrid

Regarding the action COST 342, the case of Madrid has, among all the aspects that have been mentioned, the following interesting features for further study:

- Resident parking policy
- Park & Ride policy
- Fare policy in the public car parks (smart contactless card Bono red)

About all these aspects, a more detailed description will be elaborated, a detailed inventory with more figures and disaggregation, patronage and effects on mobility and economy.