9TH INTERNATIONAL CONFERENCE ON COMPETITION AND OWNERSHIP IN LAND PASSENGER TRANSPORT

"NEW CONCESSIONS OF URBAN RAILWAY SYSTEMS IN SPAIN"

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SUMMARY

The concessions for the construction and operation of urban railway lines have demonstrated to have a great interest in the development of the transport. As much in France as in England interesting examples in this sense exist: Metrolink in Manchester, Supertram in Sheffield, the tramway of Rouen and Strasbourg or the underground of Toulouse. Actually most of these cities (that has began to develop this new services at the beginning 90ths) or has been constructed or is under construction another line based on the results obtained.

In Spain, although in the past there were important projects in concession. The extensions of the underground of Madrid, as well as the metros of Barcelona, Valencia and Bilbao have been constructed with budgetary financing, although using in some cases an agency in order to not increase the deficit of the public administration. Nevertheless, at the present time a great "boom" of projects of urban railway lines in concession in Spain exists, due to different factors:

1. The good results obtained in Europe.

2. The necessity to improve the system of transport in a great number of Spanish cities - it has more than 40 than the 200,000 inhabitants surpass.

3. The lack of budgetary resources of the local public administrations, who cannot approach the construction of this type of projects, of high cost.

4. The non-existence of a precise legislative frame of financing of the urban and metropolitan transport in Spain.

This causes that already projects in concession in great cities have been materialized:

1. Metro line of Arganda that connects the Spanish capital with two municipalities of the metropolitan Southeast. This is working since 1999.

2. Tramways of Barcelona. The Autoritat de Transport Metropolità, ATM, organism responsible for the public transport in Barcelona, has granted during the last years two biddings for the design, construction, operation, and maintenance of tramways lines that are integrated into the tariff system of the metropolitan area of Barcelona.

3. Light railways of Andalusia, that are under construction after been developed by a B.O.T. system in Seville and Malaga. Granada ones probably is going to be developed by a different system after the last experiences.

4. Light railways of Tenerife in Canaries islands. The financing has focused by a different form from the rest of the concessions that have been included in this paper. In Tenerife the public Administration, the Insular Town hall, is going to construct a tramway network by a contract to a society to a mixed society, Metropolitano de Tenerife S.A. MTSA, in whom private capital is going to participate until a maximum of 30%.

5. New light railways in Madrid and his metropolitan area.

In this paper it is going to be presented the main issues about these project and:

1. Analysis of the problems detected in the alive processes in Spain.

2. A few final considerations of the authors with regard to the participation deprived versus to the public model.

INTRODUCTION

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In this paper it is going to be presented the main issues about these projects and:

- Analysis of the problems detected in the alive processes in Spain.
- Final considerations of the authors with regard to the private participation versus to the public model.

GENERAL OVERVIEW TO SPANISH EXPERIENCES

As it was mentioned above, it has been developed or it is being developed a large number of projects, due to different factors:

- The good results obtained in Europe.
- The necessity to improve the system of transport in a great number of Spanish cities - it has more than 40 than the 200,000 inhabitants surpass.
- The lack of budgetary resources of the local public administrations, who cannot approach the construction of this type of projects, of high cost.
- The non-existence of a precise legislative frame of financing of the urban and metropolitan transport in Spain.

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- New light railways in Madrid and his metropolitan area.

Arganda Metro

The Arganda metro links the Spanish capital to two municipalities in the south-east of the metropolitan area. Bids for the project were requested in May 1996 through a European-wide invitation to tender for a "public works concession for project preparation, performance of works and management of a public service" organised by the Madrid Regional Government. Two groups put in bids and the contract was won by the one formed by Metro de Madrid (42.5%) and a financial institution, Caja de Madrid (25%), together with a group of top-level construction companies (32.5%): Transportes Ferroviarios de Madrid (TFM).

	The bid assessment criteria were: ▪ Period for completion: a maximum of 20 months ▪ Project quality, technical solution and level of equipment ▪ Connectivity with public transport networks ▪ Level of service offered, frequency, time and comfort
▪ Proposed fare structure, subsidies requested and investment to be made ▪ Technical characteristics ▪ The line is 18.3 km long, built openly except for 2km in a false tunnel, with 4 stations	

Barcelona Tramways

Figure 1 annex 3.1: Barcelona Tramway

Autoritat de Transport Metropolità, ATM, the body responsible for public transport in Barcelona, has in the last few years made two invitations to tender for the design, construction, operation and maintenance of tramways to be incorporated into the fare system in the metropolitan area of Barcelona.

These projects will be the first urban rail transit systems operated by private companies in Spain. In the first line (Trambaix, which is already in service) the public operators hold 20% of the operating company's capital, and in the second (Trambesòs) they hold 5%.

In both cases the contract was awarded to the same consortium, Tramvía Metropolità, led by FCC and Alstom and with the same private participation in the share capital:

- Operating companies (29%): FCC-Connex, Sarbus, Soler and Sauret.
- Construction companies (40%): FCC, Necso and Comsa.
- Rolling stock manufacturer (25%): Alstom.
- Financial institutions: Banco de Sabadell and Société Générale de Banque (6%).

As it happened, this group was the only bidder for the second line, though on the face of it there are no synergies between the two projects, as shown by the facts that two wagon sheds, two workshops and two control centres have had to be built, as there is no physical link between the two lines. Legally speaking the two concession companies are different. But it was planned that the two lines would be linked up, which would give the tramway great potential, as this would be the most urban section.

Seville Metro

The Seville metro is a project with a long history. Work began on its construction more than 20 years ago but was stopped for technical reasons after 4 km of tunnel had been dug, and from that time it became a subject of political debate, with the continuation of the work being postponed.

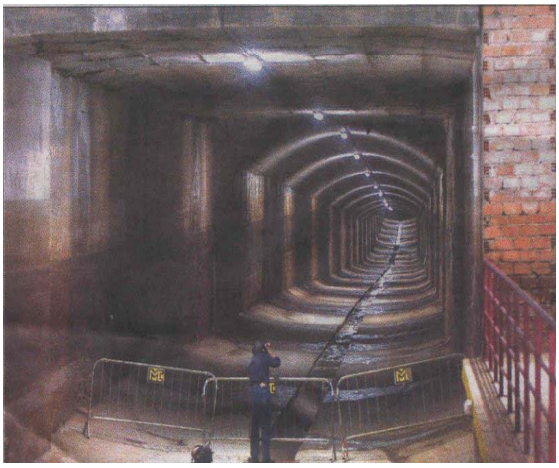

Figure 1 annex 3.2: Seville Metro tunnel

Figure 2 annex 3.2: Sevilla Metro tunnel

To carry out the project, the public company "Metro de Sevilla, S. A." was set up, dependent on the Department of Public Works and Transport of the Andalucian Regional Government and with the participation of the town councils of Seville, Mairena del Aljarafe, San Juan de Aznalfarache and Dos Hermanas.

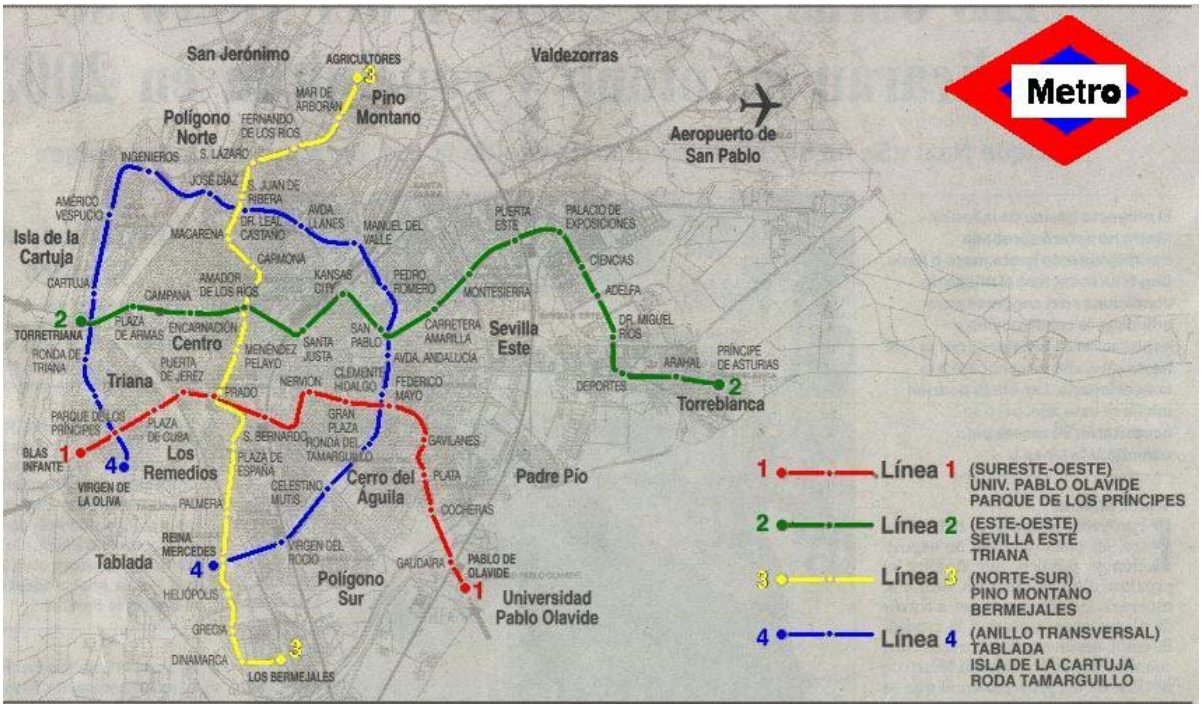

Figure 3 annex 3.2: Plan of Seville Metro
Source: Sevilla Metro

Four lines have been planned, with a total length of 63 km. An invitation to tender was made in 2002 for the design, construction, operation and maintenance for 35 years of the first line, between Mairena del Aljarafe and Dos Hermanas.

Tenerife Metro

The funding of the Tenerife tramway has been approached differently. The public authority in Tenerife, the Island Council, is going to have a tramway network built by means of a concession to a mixed corporation, Metropolitano de Tenerife S. A. (MTSA), in which private companies are to hold a share not exceeding 30% of the total capital.

MTSA was set up in 2000 with 100% public capital – from the Tenerife Island Council (CIT) – and in 2003 an invitation to tender was made to bring a private company into the project. The companies bidding to join MTSA must be operators of light rail transits and will have to make an investment yet to be specified. Initially this was set at 10 million euros (20% of the capital), but as no companies were interested in joining the project under those conditions the amount has been adjusted downwards.

The candidate selection procedure involves following criteria:

- Financial soundness and credit standing
- Technical brief (experience, commitment to transferring know-how, operating study)
- Financial bid, payments for availability and soundness and coherence of the business plan, pursuant to the documents relating to the subsequent concession contract for the building of the tramway network.

Once the private partner joins MTSA, a contract is to be signed between the Island Council and MTSA for the construction and operation of the light rail transit according to the specifications.

Madrid Light Rail Transits

The Madrid Regional Government has set new goals for the participation of private enterprise in the new light rail transits, though in a way not yet fully defined. It appears to be envisaging an operating concession with investment finance.

Under the aegis of the Department of Transport and Infrastructure of the Madrid Regional Government, in 2003-2007 MINTRA is to build 72.7 new kilometres of metro line and 81 new stations, which would serve over 735,000 people.

The works for most of these projects are due to start in September 2004, and will be as follows:

- Extension of the metro network to the districts of Chamartín and Hortaleza. (With 6 stations).
- Extension of the metro network to La Elipa. (Extension of Line 2).
- Extension of the metro network to Villaverde. (Extension of Line 3, with 6 stations).
- Extension of the metro network to the districts of Sanchinarro and Las Tablas. (With 4 stations).
- Extension of the metro network to Alameda de Osuna. (Extension of Line 5, with 2 new stations).
- New station in Arganzuela. (On Line 6).
- Extension of the metro network to Coslada and San Fernando de Henares. (With 8 stations).
- New station in Pinar del Rey. (On Line 8)
- Extension of the metro network to Carabanchel Alto. (Extension of Line 11, with 2 stations).
- Metronorte, sections 1 and 2. (Chamartín and Alcobendas – San Sebastián de los Reyes, with 12 stations)
- New light rail transit to Boadilla del Monte. (With about 15 stations).
- New light rail transit to Pozuelo de Alarcón. (With 12 stations).
- New light rail transit to Navalcarnero. (With 12 stations).

The authorities are considering whether to run the projects on a BOT basis because of a public deficit problem, or as an operating concession.

LEGAL NOVELTIES IN CONCESSION PROCESSES IN SPAIN

The new Spanish Concessions Act (Law 13/2003 regulating concession contracts in public works) establishes a new legal framework, whose main characteristics are as follows:

- It maintains the basic concept of concessions and the award procedure, and respects the existing special provisions in each set of sectoral regulations, extending the concession model to all public works and to all levels of public administration and public bodies dependent thereon.

- It provides that public subsidies may be cash and non-cash contributions and that the consideration for the licensee may be the price for use of the works and the return associated with the operation of the shopping area adjoining the infrastructure.

- It provides the possibility of using the "shadow toll" system and cross-funding for different public works provided that they have a functional relationship and affect each other's operation.

- It provides the obligation to restore the economic equilibrium when this is substantially altered (either way).

- It regulates the following concession-funding systems: issues of bonds and other securities, securitisation of assets, concession mortgages and equity credits.

- It sets a maximum period of 40 years for concessions for construction and operation of public works, and 20 years for operating concessions.

- It provides a very interesting clause: the progress clause, which will be remarked on in detail below.

An innovation in the new regulations of particular significance to infrastructure users is the so-called progress clause, included in article 244.4, pursuant to which the licensee must ensure that the infrastructure complies with what is provided at any one time, according to the progress of science, in applicable technical, environmental and user-safety legislation. That is, the licensee is obliged to make any investments that may be required to adapt the infrastructure to the applicable technical standards, thereby guaranteeing the quality of the service offered to users.

Furthermore, the Act provides for the introduction in concession specifications of mechanisms for measuring and assessing the quality of service offered by the licensee to the infrastructure users.

The quality parameters established may serve as a basis for the application of financial benefits or penalties to the licensee, according to what is provided in the corresponding specifications, and this will also have highly positive effects on infrastructure maintenance.

The introduction of assessment for certain service quality parameters involves a profound change in maintenance operations, with the focus switching from the infrastructure itself as an asset to the infrastructure as the physical means of providing a particular service, its ultimate purpose.

THE VARIOUS PARTNERS IN SPANISH CONCESSIONS

Consortia may include all or just some of the agents involved in the process: engineering companies, civil-engineering construction companies, rolling-stock suppliers, system specialists or integrators, railway operators, financial partners, consulting companies or project managers. These agents may be partners or be covered by external contracts:

- The construction companies do the civil engineering work. Given the great importance of the sector in Spain, they are normally also responsible for managing the supplies and electromagnetic installations for the system as a whole. Construction joint ventures in the licensee consortium are often responsible for the project as a whole.

- Rolling-stock suppliers may also be partners, in which case they provide the system technology and are responsible for its integration. Another option is for them to be suppliers of the consortium, in which case the role of integrator may be played by a specialist rail engineering company acting as technical assistant to the consortium.

- The railway operators, if they are integrated in the consortium as partners, will be responsible for the operation and maintenance of the system for the duration of the concession. To achieve the purpose they must offer specific quality and cost conditions. Their involvement as subcontractors involves the risk of lack of coordination between the construction project, the operating project and the reality of the future operation. If the authorities award a BOT project to several groups that may not have railway operators, the decision-taker is left in doubt as to the conditions under which the operation will actually take place and the

problems that may arise owing to the operator's non-involvement in the performance of the project.

- The licensee consortium may or may not include financial partners, depending on the type of finance for the project. Their presence enhances the licensee's interest in the long term, which coincides with that of the authorities.

- The engineering companies conduct demand studies in some cases, draw up projects for the construction work and the installations, take charge of the works management (which the authorities delegate to the licensee), and support the operators. If they are partners their involvement in the project will be greater.

ROLES OF THE VARIOUS PLAYERS IN A SPANISH CONCESSIONS

PARTICIPANTS	ROLE
Construction groups	▪ Partner in the concession generally with leadership through the construction group's concession company ▪ Construction and even installations
Rolling-stock manufacturers	▪ As partners, they supply the rolling stock and are responsible for its integration ▪ As suppliers, possibly belonging to the supply joint venture with the construction company
Operators	▪ Their presence as partners is not usual in Spain but guarantees experience and involvement in the long term ▪ The great importance of construction groups in Spain causes operators to remain as subcontractors
Financiers and banks	▪ They supply the capital and financial guarantee ▪ They are normally little involved in the formation of the business ▪ They may be involved only as advisors on financial arrangements
Consultants	▪ These may work for: - The licensee - The construction joint venture ▪ They may be involved in: - The bid - The project - Works management: quality control - Consulting on operation ▪ Their role as partners is still controversial

Source: Own data

PROBLEMS DETECTED IN TENDER PROCESSES IN SPAIN

Generally speaking, the risks detected in an analysis of various experiences, and Spanish ones in particular, may be classified as follows:

PROJECT AND CONSTRUCTION RISKS

TYPE OF RISK		ACTIONS ON THE PART OF THE LICENSOR TO LIMIT IT
Innovation in design		▪ Choice of a proven system
Increase in cost		▪ Good definition of the project (tender with construction project including detailed cartography and geotechnics) ▪ Choice of a construction company with experience ▪ Turnkey project with risk transferred to the construction company
Delays		▪ Good definition of the project ▪ Choice of a construction company with experience ▪ Application for authorisations and permits well in advance ▪ Specification of penalties in the turnkey contract
Constructor-operator relationship		▪ Good definition of the project ▪ A precise agreement between the construction company and the operator on the commissioning procedure, including guarantees ▪ Choice of a single constructor/operator, or of a constructor and operator belonging to the same group
Good performance	Quality of work	▪ Choice of a construction company with experience ▪ Good definition of parameters ▪ Establishment of controls and existence of rigorous methodology and control equipment
	Relationship between subcontractors	▪ Choice of a single construction company that takes responsibility for the works as a whole
Unforeseen circumstances	Geological	▪ Performance of preliminary studies
	Meteorological and others	▪ Insurance

Source: Manual for planning, funding and roll-out of urban transport systems, 2004. Zamorano&Bigas&Sastre

OPERATING RISKS

TYPE OF RISK		ACTIONS ON THE PART OF THE LICENSOR/LICENSEE TO LIMIT IT
Demand	Overall demand	▪ Performance a good traffic study including all possible hypotheses ▪ Exhaustive planning of parameters in the scenarios and acceptance of reasonable hypotheses
	Demand/price elasticity	▪ Performance of preliminary sensitivity studies ▪ Study of other experiences (of other systems in the same city and of the same system in other cities)
Acceptable fare level		▪ Setting of a suitable fare level ▪ Determination of fare adjustment formulae according to the roll-out of the project
Reduction in income	Non-payment of subsidies	▪ Signing of strong government commitments, if necessary through multilateral agencies ▪ Sale of collection rights: securitisation
	Advent of competitive transport systems making it necessary to lower fares	▪ Establishment of non-competition or financial equilibrium clauses with subsidies in the event of change in the specified conditions ▪ Preliminary signing of cooperation agreements with all the levels of government involved in the project
Operating cost overrun	**Increase in operating costs**	▪ Choice of an operator with experience ▪ Precise definition of the operating agreement
	Increase in public authority requirements	▪ Specific contract clauses covering changes in the requirements of the public authority and specifying the need to re-establish the financial equilibrium in the event of modifications

Source: Manual for planning, funding and roll-out of urban transport systems, 2004

ECONOMIC AND FINANCIAL RISKS

TYPE OF RISK		ACTIONS ON THE PART OF THE LICENSOR TO LIMIT IT
Financial parameters	**Rise in the price index**	▪ Risk coverage instruments, insurance, guarantees ▪ Indexing of fares to the price index
	Interest rate	▪ Risk coverage instruments, insurance, guarantees
	Exchange rate	▪ Risk coverage instruments, insurance, guarantees ▪ Revenue in strong currencies ▪ Local funding ▪ Optimum alignment of revenue and payments in the various currencies
Financial commitments (Refinancing / counterparts)		▪ Insurance

Source: Manual for planning, funding and roll-out of urban transport systems, 2004

INDIRECT RISKS

TYPE OF RISK		ACTIONS ON THE PART OF THE LICENSEE/LICENSOR TO LIMIT IT
Force major	Natural catastrophes	▪ Equilibrium clauses, appropriate legislation ▪ Insurance
	Political embargoes, wars, etc.	▪ Coverage by bilateral or multinational agencies
	Permits, licences	▪ Involvement in the project of the competent tiers of government ▪ Prior commitment of government to facilitating administrative processes
Financial risks (economic / financial / energy / devaluation crises)		▪ Coverage by bilateral or multinational agencies ▪ Renegotiation clauses ▪ Adaptation of agreements and open agreements
Institutional and legal risks	**Changes in indirect legislation**	▪ Renegotiation clauses ▪ Adaptation of agreements and open agreements
	Legal actions brought by third parties	▪ Check compatibility of the existing legal framework with private participation in public service projects ▪ Strengthen the legal and institutional framework in advance
	Conflicts between local groups	▪ Coverage by bilateral or multinational agencies ▪ Strengthen the legal framework in advance
Social acceptability of public-private participation		▪ Run public information campaigns sufficiently in advance and keep them up during construction and commissioning ▪ Emphasise information on quality ▪ Establish a suitable fare structure, balanced with the previously existing one ▪ Improve quality of service

Source: Manual for planning, funding and roll-out of urban transport systems, 2004

Having set out the generic risks that are encountered, we may sum up the main specific problems in the latest tender processes as follows:

- The periods for preparing bids, no doubt influenced by media coverage in electoral processes, have been short, no longer than four months. These periods are clearly critical for the preparation of the corresponding demand studies and tender projects, which help define the investment costs. The periods are too short given that the investments are large and the operating period long, which ultimately involves high operation and maintenance costs over a long time.

- In the case of Seville, the lack of homogeneity in the passenger fares proposed by the bidders was a problem in the award process, as it was difficult to compare the bids. Other aspects were:

  - The bid preparation costs were very high, owing largely to the architecture projects.
  - The equity credits were not particularly attractive.

- Another practical problem in the comparison process was the lack of homogeneity in bid structure, which made it hard to tell (for example) how many park-and-ride places were included: some included this detail in the text, others in drawings, others in the budgets.

- The fare set in the Malaga metro tender process for use by all bidders was €0.72 excluding VAT. That is, a much higher fare than the current one for city buses, which is €0.55. The specifications said that this fare was to be used in the financial model for determining revenue and subsidies. But they did not specify that it was to be used for calculating demand, which caused confusion among the bidders. If this fare is used for estimating demand, taking into account that most of the passengers expected to use lines 1 and 2 of the metro will come from public transport, the difference in fare between the two modes reduces uptake and therefore requires a greater financial contribution from the regional government. This was the interpretation made by most of the bidders, who thought this was the spirit of the specifications. The winning group, led by FCC but with strong involvement of local companies,(SANDO, VERA, y AZVI) took the specifications literally and used the specified fare for calculating revenue in the model but estimated demand using a fare equal to the bus fare, which is how things will actually be. This meant that their financial bid was very competitive, and as a result they won. In the next tender a fare should also be set to facilitate comparison, but it should be closer to the fare that will actually apply – equal to the bus fare or slightly higher.

- The fact that there was only one bidder in the tender processes for the Santa Cruz de Tenerife light rail transit and Tran Bessos in Barcelona means the processes were not properly conceived, as it is vital for there to be competition:

  - In Tenerife there was just one bidder, with partial public participation. This reflected the lack of guarantees for the awardee, as according to the specifications it would have no interest in the success or failure of the operation. This is another vital aspect of these processes, as there must be risk and benefit involved if it is to make sense for private enterprise to take part. In a way, the Tenerife tender process is reminiscent of the one for the Arganda metro, for which there were two bidders, but not natural bidders, as there was a public operator in each group. The guarantees were insufficient or the risks excessive.
  - In the Tran Bessos tender, the sole bidder was the winner of the previous tender for the Baix Llobregat tramway, led by FCC and Alstom, which allowed the group to negotiate clearly favourable terms.

Though the project is now past the tender stage, we should note the problems in the working of the concession company because of disputes between partners with very diverse interests. This is reflected in the constant changes of management that have occurred in Barcelona and that are now occurring in Seville.

Finally it is worth noting the delay in the tenders for the light rail transits in Madrid due to uncertainty about the management and finance system – either BOT or a concession for operation only. All this depends on whether the formulae are accounted for as public deficit.

COMPARATIVE COSTS IN RECENT EXPERIENCES

This section makes a comparative analysis of investment costs in several European and Spanish cities. The conclusions are as follows:

- The available investment data for France show that construction costs there are three times higher than in Spain.
- In Spain the project with highest costs is the one in Seville, because of the longer underground section.
- The project development periods are very variable but are normally 10 to 20 years. The case of Seville is exceptional in that it began in the 70s as a public development and ended up as a BOT project.
- Yearly passenger investment is high; the lowest levels are in the two projects in Barcelona.

COMPARATIVE ANALYSIS OF RECENT EXPERIENCES

City	Length	Investment (millions of euros)	Investment ratio (€m/kms)	Development period from the start of planning (years)	Management system (years of concession)	Demand in millions of passengers per year	Investment ratio by annual demand
CROYDON	28	317 (2000)	11,3	12	B.O.T. (99)	-	-
TOULOUSE	10	220 (1993)	22	20	B.O.T. (redeemed after 4 years)	-	-
ROUEN	11.20	472 (1994)	42.20	10	Private operation	18	26
BAIX LLOBREGAT-BARCELONA	16	217 (2000) 288 (with financial costs)	13.5 18 -	10	B.O.T. (25)	17	12
TRAMBESOS	14.1	205 (2002)	14.5	12	B.O.T. (25)	11	18
SEVILLA	19	428 (2003)	22.5	39	B.O.T. (32)	15	28
VALENCIA	10	150 (1995)	15	10	Public	6.5	23

Source: Own data

CONCLUSIONS IN RESPECT OF THE FUTURE CONCESSION PROCESS IN SPAIN

As we have seen, in recent years there has been a proliferation of private involvement in rail projects in Spain, where these were traditionally public affairs. On the basis of international experiences but also of the experience of traditional concession systems in Spain, there follows a summary of some conclusions of our analyses:

- There are errors still being ironed out in tender processes, but those in Andalucia are notable for the competition that there has been, vital to a proper utilisation of private enterprise.

- But in these tender processes the economic aspect has been of particular importance in the award process and has given rise to problems of bid comparison.

- Comparative investment costs in public and private solutions show that these are appreciably higher in the case of BOT systems and that only opportunity costs can justify the application of those systems, though this should not be taken too far, as it might remove such opportunities in the future.

- The extent of the participation of construction companies remains a problem in relation to the need for greater involvement by operators and other agents such financial institutions and consulting companies.

- BOT concessions are undoubtedly one form of funding but are not a cure-all, and do not release the authorities from the obligation to define projects properly and to control their quality. We should not forget that these projects not only address the issue of mobility but also and above all contribute to the very nature of a city. In fact, urban development costs are normally significant and the need for agreements between social agents is a key issue.

- Finally, demand risk in this type of project is high and must be shared, so the band system based on risk-sharing is a very interesting option.

BIBLIOGRAPHY

- Kerf Michel. March 1998. Concessions for infraestructura: A Guide to their design and award. World Bank Technical paper nº 399.
- Zamorano Clara. Mayo de 2003.Madrid. Análisis de casos en España. Congreso Mundial de la UITP.
- Zaragoza 2004. Actas del VI congreso de ingeniería del transporte.
- Abril 2003. Análisis de casos en España. El punto de vista del consultor. Jornada sobre la iniciativa privada y la vuelta de los tranvías- CICCP en MADRID.
- Camaho Ferney y otros autores. Tranvías y metros ligeros: financiación y gestión. XVIII curso general de transportes terrestres
- Zamorano Clara, Bigas Joan y Sastre Julián. Junio 2004. Manual de planificación, financiación e implantación de sistemas de transporte urbano. Editado por el Consorcio de Transportes de Madrid.
- Izquierdo, R. (1997) gestión y financiación de las infraestructuras de transporte terrestre. ASOCIACIÓN española de la carretera
- Sánchez Soliño, A. y Maté D (2002). Medidas fiscales y financieras de apoyo a la inversión privada en infraestructuras. Puntos de debate. Revista de obras públicas.
- Comisión Europea (2001). La política de transportes europea en el horizonte 2010: la hora de la verdad. CE.
- CICCP.2002. Libro Verde del Transporte en España.
- Orsellli Jean. Orleáns, 2004. Le "Tramway" un concept qui sor des rails. Paradigme.