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PUBLIC WORK PROCEDURES & EXECUTION SCHEDULES IN INDUSTRIALISED COUNTRIES

An OICE Study

**A Comparative Analysis
Of the Most Efficacious Procedures
For the Implementation of Public Works
In France, Germany, Great Britain and Spain**

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1. SUMMARY

1.1 Execution Schedules

This study was presented in Italy at the end of October 2007 in a Conference organized by OICE, the Italian Association of Consulting Engineering Companies and Engineering & Contractors.

The Conference's title was the same of this study and its subtitle "*Implementing a Major Work in 3 Years, In Line with More Advanced Countries*".

Well, although provocative, the subtitle is upheld by real examples of excellence in work implementation, whether single or network, as shown by research data.

Indeed, in France 24 months are required on the average to implement an integrated Design&Build contract for various motorway sections ranging from 22 to 44 km (Lot A85 between Saint Romain-sur-Cher and Esvres, Lot Esvres-Druye, Lot Villefranche-Saint Romain-sur-Cher), including considerable engineering works, by the Concessionary Cofiroute. Three years, on the other hand, are the average time required according to national statistics in Great Britain for the implementation of middling works (up to 30 million euro), with a usual deviation of not more than 5% between estimated and final costs.

Spain, however, is the country with really extraordinary performances: in just 36 months, 56.23 km of the new underground railway - Madrid's Linea Metrosud - were implemented, with 8 interchange and 28 ordinary stations, for an overall figure of 2,086.70 million euro. Again with the Madrid underground, the new station on the Arganzuela line, costing 51 million euro, was implemented in just 18 months. Furthermore, the other two lots for 136 km of underground (Linea 8 and 11 and Metronord) have been implemented for 1.6 and 4.3 billion euro respectively, each completed within 48 months!

Reunited Germany has also implemented gigantic motorway works within a fairly tight schedule: in 12 years, a total of 1100 km (almost 100 km/year) of new motorway for an investment of about 12 billion euro, of which the roughly 100 km A14 lot Magdeburg-Halle, costing 564 million euro, was completed (design, expropriations and construction) in 6 years.

In Bavaria, moreover, between 1991 and 1999, 402 km of new motorway were built, costing about 3 billion euro, as well as 200 km of widening to 6 lanes for 1.6 billion euro.



COMPARATIVE IMPLEMENTATION TABLES

A. MAJOR WORKS

SPAIN

Madrid Underground Extension

Period	Km	New Lines	Interchange stations	Ordinary stations	Duration months	Project cost
1995-1999	56,00	Linea 8 e 11	4	34	48	1.622,70 ME
1999-2003	59,23	Metrosud	8	28	36	2.086,70 ME
2003-2007	80,91	Metronord, Pozuelo, Boadilla, Sanchinarro	6	73	48	4.351,28 ME
TOTALE	196,14	4 linee di Metro e 3 linee di Metro Leggera	18	135	132	8.060,68 ME

Major Lot: Metronord (Madrid Metro Extension 2003-2007)

Item:	80.91 km of tunnel 73 ordinary stations 6 interchange stations 79 stations – 80.91 km line
Cost of project works	3.313,68 ME
Cost of new trains	1.028,6 ME
Total Costs	4.352,28 ME
Project duration	48 months (4 years)



GERMANY

Reunification Motorways

The highest example of production efficiency is given by the Reunification Motorways: 1100 km of new motorways and/or the restructuring of existing motorways, completed (design, expropriations, construction) in 12 years, for a total cost of 12.8 billion euro.

The following details are provided for the 3 lots:

1) A14 Magdeburg - Halle <i>Project</i>	Construction of new 4-lane motorway Length: 98.9 km (Lessor: DEGES) Investment: circa 564 md euro (construction & expropriations) Planning: August 1991 Start of Works: April 1994 End of Works: November 2000
<i>Summary:</i>	1 st project to be completed of the Reunification Motorway Plan
2) Lubeck - Stettin <i>Project:</i>	Construction of new 4-lane motorway Length: 306.4 km (Lessor: DEGES) Investment: circa 1.6 md euro (construction & expropriations) Planning: 11 March 1991 Start of Works: May 1994 End of Works: December 2005
<i>Summary:</i>	The longest new-built motorway in Germany since 1945
3) A71 Erfurt - Scheinfurt <i>Project:</i>	Construction of new 4-lane motorway Length: 96.3 km (Lessor: DEGES) Investment: circa 1.28 md euro (construction & expropriations) Planning: Start 1991 Start of Works: October 1994 End of Works: December 2005
<i>Summary:</i> Multiple	engineering works of an exceptional kind 31 motorway bridges of less than 100 m, 6 tunnels totalling 14.02 km in length, including the longest German tunnel of 7.9 km



Motorways in Bavaria

Period: 1991-1999

Values for completed works

Overall data:

NEW-BUILT	36 Lots
	401.9 km
	6119.30 md DM Total
6-LANE EXTENSIONS	30 Lots
	200.8 km
	3239.8 md Total

GREAT BRITAIN

High-Speed Railway Line

PARIS-LONDON

Construction of km 109 in English territory + St Pancras station in London

OVERALL COST: 8.57 MD euro

PROJECT DURATION: 10 years

FRANCE

(continues)



B. MEDIUM-SIZE WORKS

FRANCE

COFIROUTE: Motorway DBFO

Integrated contract for Lot A85 between Saint Romain-sur-Cher and Esures (44 km)

Completed in: 24 months

GREAT BRITAIN

Mean National Statistics for Works Worth about 30 ML Euro

Procedure: Design & Build

Completed in: 3 years

Deviation between contractual and final cost: ca. 5%

C. PRODUCTIVITY DATA PER COUNTRY

GREAT BRITAIN:	High-Speed Paris-London Railway 10 years: works for 8.57 MD
SPAIN:	Madrid Underground 11 years: works for 8.00 MD
GERMANY:	Reunification Motorways 12 year: works for 12.8 MD



1.2 Contractual Formulas & Procedures

Research on the four major EU countries revealed that, in public work implementation, many different factors determine greater or lesser observance of time and cost estimates, connected with historical, cultural, social and economic aspects that cannot be quantified in percentage terms, and can be identified only as general trends. Three, however, can be indicated as important and common to the countries considered: 1) attention – including legislative attention – to the project planning phase and/or cost rationalisation. In this connection, see the various German Acts passed on Acceleration and Simplification for projects of national interest, and the English principle of *best value for money*, based on nationwide ten-year plans (health and schools), actuated by means of a centralised purchasing organisation, frame agreements, standardisation of projects and contracts; 2) accuracy in preparing the technical documents prior to the tender, as shown by the *Replanteo de la obra*, the Spanish validation of technical documents, administrative permits and the project, or the articulated public tradition in France of the *maîtrise d'oeuvre*; 3) the completeness and accuracy of the design and related technical documents, as well as checking during execution, as found in the British specialisation that includes the figures of the architect, the design assistant and the quantity surveyor, and the traditional German precision in projects drafted according to the DIN NORMEN.

Of slightly less important in itself, on the other hand, is the contractual formula: indeed, examples of excellence in observing time and cost estimates are found both utilising the traditional procedure of separate design/execution award, and with the various formulas for integrating design and execution (from the English *Design & Build*, to the French *conception-construction*, to the Spanish *contratación conjunta*, and including the most recent contractual PPPs, in the form of contracts and/or concessions).



COMPARATIVE TABLES

**Comparative Table of Factors Impacting the
Planning & Rationalisation of Public Expenses¹**

Factors	Trends	Assessment per Country			
		France	Germany	Britain	Spain
Laws & procedures for accelerating/simplifying/planning projects	All countries emphasise the need to contain public spending and improve its effectiveness by utilising private capital, but with different practical results	-	+	+	+
Spending rationalisation standards & procedures:	Different positions, seeing English leadership in a) & b), German in c), followed by France at a distance.				
a) design standardisation	For a)	-	=	+	=
b) centralised purchasing; frame agreements	For b)	+	-	+	=
c) splitting into lots	For c)	=	+	-	-
Overall Assessment		=	+	++	=

¹ The new directives were first incorporated by the United Kingdom (photocopy incorporation in 2004), by France with 2 successive and articulated measures (Code 2004 and 2006), by Germany in 2006 with “partially photocopy” standards and, lastly, by Spain in November 2007, after a troublesome passage. All provide for the application of new juridical institutions for centralised purchasing, framework agreements, competitive dialogue, electronic bids, etc. Only France and Spain limit the frame agreements to maintenance works, while France extends competitive dialogue also to below the threshold.



Comparative Table of Joint-Separate Award Procedures *

Project Award Procedures	
I – Separate design/execution awards	EU average 60%
	Max. ca. 90%: Germany and France Average ca. 75%: Spain Min. ca. 10% Great Britain
II – Joint design/execution award (+ related services):	
a) PPP (final/executive design):	max. ca. 20% Great Britain
Contracts and concessions:	av. ca. 12% Spain EU average 10% min. ca. 5% Germany, France
b) Integrated contract (final/executive design):	
ca. 50% Great Britain	EU average 25%
and contract award to General Contractor (final/executive design)	
III - Other types of award (negotiated procedure, direct award, etc.):	EU average 5%

* Values indicate the trends of 27 EU countries

Award Procedures for Projects above the threshold	
OPEN	Prevalent in Germany Limited in France & Spain Marginal in Great Britain
RESTRICTED	Absolutely prevalent in Great Britain Prevalent in France & Spain Relevant in Germany



Prevalent Award Criteria for Projects above the threshold

In all countries considered, prevalence of the criterion of the economically most advantageous bid, with preponderant price factor, except, partly in Great Britain

Table of Most Popular Contractual Formulas

PPP and integrated contract – Design & Build (D&B) – are the two contractual formulas recently on the rise in the EU.
PPP is the formula that has shown the most growth over the past decade in all EU countries: most widespread in Great Britain (ca. 20% of overall spending, particularly in the building sector), ca. 12% in Spain, ca. 5-8% in France & Germany².
In Spain, the prevalent formula is concession, both for building and for infrastructure, while particularly in Great Britain there is a kind of neutrality in contractual typology, with an increasing number of unspecified mixed contracts (contracts or concessions).
Design & Build is the formula that has recently seen the greatest rise: in Great Britain, Holland and the northern countries, where it is now decidedly the most prevalent form of award.

² A recent survey (Nov. 2007) carried out by DLA Piper on the PPP in Europe shows an increase to two figures in 2006 (+37%) for the third year running, reaching a total of 73 M euro in the EU. For PPP projects implemented in 2006, the most active countries are – in order – Spain, France, Italy, Greece, Ireland and Austria. On the other hand, as regards PPP projects being tendered, the leader is Italy, followed by Great Britain (10 MD of tendered projects), followed by Germany, Greece, France, Belgium and Spain.

A further aspect showing great development is project dimension, which has grown by 50% in value in one year in France and Germany. The sectors mainly involved in completed PPP projects are: Roads (60%), Railways (22%), Defence (4%), Health (4%), followed by airports, water supply, waste treatment, prisons, schools, ports, sport, each with 2%.

The sectors mainly involved by PPP at the tender stage in 2006, on the other hand, are: Railways and light Underground Railways (56%), Defence (10%), Health (9%), Sport (8%), Schools and Airports (5%), Water Supply (4%), Prisons (1%).

The most important aspect of this survey is confirmation of the spread of PPP in capillary fashion throughout the 27 EU countries and, in particular, a strong presence of PPP tenders in eastern countries in 2006.



Design & Build in Great Britain

- TENDERS: ca. 50% of all contracts
ca. 100% of major works
- PROJECT DEFINITION METHOD: collaboration by all contractual parties.
- DURATION OF TENDER & DESIGN DEFINITION: long (1-2 years for average projects of ca. 30 ml euro)
- AVERAGE COST DEVIATION BETWEEN FINAL AND EXECUTIVE DESIGN: ca. 5% (average deviation with traditional method: ca. 30%)
- COMPLETION DELAYS: marginal (97% of major motorway contracts awarded using the D&B method with target price (ECI): completed within the deadline or in advance.
- DISPUTE LEVEL (for tender and execution): marginal

COMPARATIVE TABLE OF OVERALL EXECUTION SCHEDULES

- **GERMANY: REUNIFICATION MOTORWAYS:** 12.8 md euro
Planning period – including political decisions – to completion: 1991-2005, i.e. 14 years for 1100 km of new or radically restructured motorway (12 years considering construction only)
- **SPAIN: MADRID UNDERGROUND EXTENSION**
4 LIGHT UNDERGROUND LINES (total of 18 interchange stations and 135 ordinary ones) covering 196.4 km, at a global cost (including materials) of 8,061.68 ml euro, implemented in 132 months (12 years)
- **GREAT BRITAIN: PARIS-LONDON HIGH-SPEED RAILWAY**
Client: High Speed 1: 109 km of new track in England + renewal of St. Pancras station in London: cost 8.75 md. Completion time: 10 years



2. THE CONTEXT OF THE COUNTRIES CONSIDERED

2.1 The Weight of the Different Contractual Formulas for Works

The traditional formula of prior award of the design (meaning the design adjusted to the tendering of the work), separate from its execution, is still the method most utilised in Europe (notwithstanding the strong competition of the integrated design and execution formula). Although no precise statistics can be given for its percentage utilisation, it may be reasonably assumed to be around 60% of projects, though with considerable fluctuations on the different markets (maximum ca. 90% in the Austrian, German and French context, minimum ca. 10% in England and Holland and the Scandinavian countries). In none of these, however, does it fall below 45-50% of public works spending.

Especially over the past decade (and with a rapidly increasing trend during the past few years), the traditional formula of separate awards for design and execution has seen a significant erosion in favour of the Design & Build – D&B – formula and Public-Private Partnership – PPP – including both execution and concession. Both these latter formulas assign to the private sector the design (final and executive) as well as implementation and, in the case of PPP, also the long-term financing, maintenance and management of the related service (up to 35 years)³.

Design & Build is the most widespread formula of collaborative procurement, the final stage of that vast cultural process on innovating procedures and roles in the award and execution of public work contracts, with the aim of rationalising public spending according to the basic principle of *best value for money*, which sees its greatest expansion in Great Britain.

Collaborative procurement incorporates several innovative concepts based on the logic of “collaboration” and not “antagonism” between the contractual parties: in particular, the idea of a sustainable and fully informed allocation of contractual risks among the parties, the requirement for a cost assessment referring to the entire life-cycle of the work, as well as opening to design and technological innovation at each phase of the contract award and implementation procedure.

³ It should be noted that the PPP contract award winner often subcontracts execution with D&B contracts.



This award method – now widespread in the United Kingdom – involves a prolonged initial effort (from 1 to 2 years on the average) to reach full design definition, and can be broken down as follows, according to the typical progress of any project of medium dimensions:

- National or local public lessor: political decision
- Award method: Design & Build
- Amount: 30 ml euro
- Tender on preliminary design (prepared by consultants selected by tender), even only for services: 3-4 months
- 2 different restricted tender procedures:
 - A) fixed price
 - B) target price
- Award procedure for A) and B): economically most advantageous bid
- Assessment criteria for A):
 - o Price: ca. 60-70%
 - o Quality: ca. 30-40%
- In the case of B), the criteria are inverted, with a price of 30-40%
- After the initial bid, a step-by-step design definition procedure, progressively eliminating bidders, up to the final tender, usually involving two finalist bidders
- Selection of the preferred bidder
- Final award after any further negotiations
- Definition of executive design (and consequent negotiations): ca. 6 months
- Execution of the work: ca. 3 years (average data)
- Final cost of the works: average cost variation: ca. 5% (average cost variation with the traditional method: ca. 30%).

The general trend to use the D&B type A formula (and the use of the more negotiated type B for motorway contracts) has brought excellent results in containing any deviation between estimated and execution costs and schedules, to the widespread satisfaction of the sector's operators, both public and private.



The second formula – contractual PPP – is undergoing constant increase since the end of the 'nineties on all EU markets, with peaks in Great Britain (the so-called PFI), Scandinavian countries, Holland and Spain (where the concession is prevalent), in all countries reaching 15-20% (and even slightly over) of the totals cost of the works. In France and Germany, it is just starting and covers about 5-8%.

The trend is now on the increase everywhere, however: now all governments, including countries most resistant to PPP, such as Germany and France, as well as new EU members in the east, have provided suitable basic regulations and PPP support structures and officially declare that they wish to reach at least a stable 15-20% of global spending on public works by 2010⁴.

Outside the United Kingdom, in the other 3 countries examined (Germany, France and Spain), other formulas of joint design-execution award (final and executive design by the assignee), i.e. the integrated contract (conception-construction, tender competition, etc.), award to a general contractor (*marché global*; main contractor and similar) encounter precise legislative and applicative limitations. This means that formulas that have always been used in the private sphere are limited in the public sector to works involving particular technical and/or architectural difficulties, recourse to avant-garde technologies, design innovations, special urgency, etc.).

It should also be noted that the general contractor formula for the public sector, as outlined by our Contract Code, i.e. a contract with a private sector award of the final/executive design, partial pre-financing and implementation with remuneration on completion of the work), is essentially an Italian invention⁵ based on a scarcely applied Belgian precedent (*marché public de promotion*) of the 'nineties. Indeed, the promoter differs from the main contractor in drafting – when required – only the executive design and not taking part in pre-financing, and differs from PPP because the key element of the partnership is remuneration linked to the service over a period of time.

⁴ Also owing to the fact that such spending is outside the public budget, and to the stabilisation effect it has on the budget owing to its reimbursement in annual rates. In actual fact, as a tool, PPP is in perfect harmony with the globalisation of the economy and the active role of the private sector, and even OCSE – in a very recent survey published in Paris last May – encourages its use as the only alternative to the constant decline in public resources earmarked by member-states for infrastructure, from 9.5% in 1990 to 7% in 2005 and continuing to fall throughout the world.

⁵ Equally an Italian invention, envied by many countries, is the formula of the promoter (with few and less valid precedents in Spain, Great Britain and Scandinavia, where, however, it has developed very little).



2.2 Development Factors that many influence the design function

Two factors emerge in the European panorama that make design central: the first - particularly in Great Britain – concerns the planned approach to vast-scale spending (nationwide spending plans for schools and health with optimised territorial intervention), which now goes hand-in-hand structurally with recourse to new juridical institutions such as central purchasing and framework agreements, as well as innovatory contractual formulas for public-private participation (e.g. the so-called structural PPP).

The second, for the moment, takes second place and concerns what may appear as the opposite process, i.e. the systematic, obligatory splitting of contracts into lots, which has always been the rule in Germany, and is now the basic principle of the French *Code* and guideline for the government, which is now attempting to make it a principle at European level (with the specific exemption for SMEs in the WTO Agreement, as obtained right from the start by the US)⁶.

⁶ The Small Business Act – SBA, 1953 – forms the foundation of US policy in favour of 22 million SMEs, which globally employ about half the workforces employed at national level. The SBA forms part of the Federal Acquisition Regulation and governs the award of “direct” or “reserved” public contracts to SMEs.

According to SBA provisions, the various Federal Departments – Defence, Health, Public Works, etc. – are obliged to earmark between 5% and 10% of total annual spending in favour of SMEs, “newly-incorporated” firms and those of a social nature, such as cooperatives, or else located and utilising manpower in disadvantaged areas.

The tenders launched for such “minor” firms may have a maximum ceiling of US\$ 100,000, are earmarked for them and may also be awarded with bids exceeding 10% of the market value of the related services: SMEs belonging to the particular State (the Federal structure of the US is highly decentralised) in which the project is planned are given priority in such tenders, if they have a limited turnover – around US\$ 15 million – but each state determines its own threshold values - and a limited number of employees – the maximum federal number is 500, etc.

SMEs owned or associated with larger groups are excluded from such tenders.

The operating arm of this policy in favour of SMEs governed by the SBA is the Small Business Administration, a Federal Agency with the task of assisting and directing SMEs, which, with only 150 officers, manages about thirty different operational programs, with overall funding for the present year of US\$ 800 million.

The Federal Agency’s most important program aims at increasing SME access to public tenders: the most active Department in this policy is Defence, which each year earmarks about US\$ 50 billion for SME orders.