

## NEW MODEL FOR LOGISTICS AND SUBCONTRACTING DISTRIBUTION PROJECTS AT UNIÓN FENOSA S.A.

*Javier Rodríguez Domínguez.*  
**NORCONSULT S.A. C/Lérida 44 2ª Planta,**  
**28020 Madrid, España.**  
**Tel: 91 567 60 00 Fax: 91 571 45 93 E-mail: NU001132@uef.es**  
*Florentino Quinteiro Puertas*  
**UNIÓN FENOSA S.A. C/Capitán Haya 53**  
**28020 Madrid, España.**  
**Tel: 91 567 60 00 Fax: 91 570 43 49 E-mail: UF564250@uef.es**

### SUMMARY

*This model can be defined as an integrated project for re-engineering both the process of contracting projects and the procurement logistics.*

*The model is founded on a relationship of trust between Unión Fenosa and the suppliers of goods and services and on its/their management capacity. As a result of this trust, Unión Fenosa delegates to its suppliers a number of activities which it had previously carried out itself and which, far from adding value, were actually an obstacle to execution of the projects in certain phases.*

### RE-ENGINEERING SUBCONTRACTING

In 1996, Unión Fenosa carried out about 26,000 distribution-related projects at a cost of 6.157 Bn Ptas. All projects had traditionally been handled in the same way and progressed through the same phases. An analysis of the projects revealed that they could be classified into three fundamental groups on basis of the amounts involved.

1. Requests from customers, with budgets under 250,000 Ptas. These accounted for over 53% of projects in numerical terms but only 10% in terms of cost. They were referred to as turnkey or unsupervised projects.
2. Projects with budgets over 4 Mn Ptas. These accounted for 1% of the total number but 40% in terms of costs. They were referred to as unique projects.
3. Projects subcontracted under supervision: projects with budgets between 250,000 Ptas and 4 Mn Ptas. They accounted for the remaining 46% of projects and 50% of total cost.

### Turnkey projects

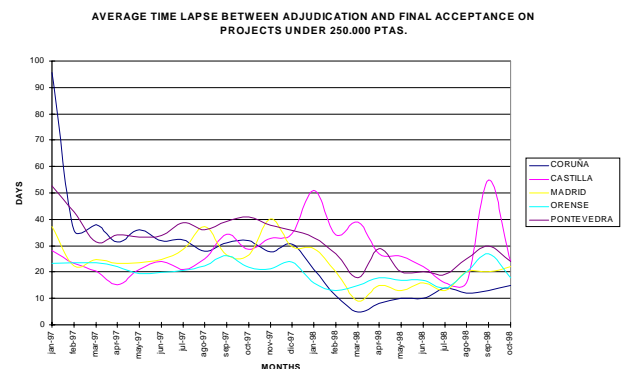
With the first group it was decided to implement a number of simplifications in order to shorten execution times at the expense of a slight increase in costs due to the loss of the

margin gained through Unión Fenosa's greater bargaining power.

Firstly, once the project had been adjudicated, the subcontractor was expected to provide both labour and materials (hence the name) and bring the project into service. Subsequently, at the offices, the final acceptance document (RTE) was issued, enabling the subcontractor to invoice. Quality control was exercised after the fact by sampling.

This type of contract was first implemented in July 1997. Close monitoring resulted in a number of small adjustments which enabled the average time taken by the project to be reduced by 30%-50%, depending on the area. This type of subcontract is now fully operational and is providing satisfactory results.

### Turnkey Projects



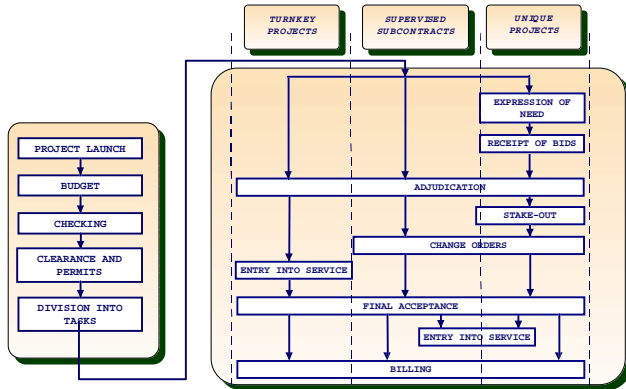
### Supervised subcontracted projects

As with turnkey projects, these are adjudicated to subcontractors who have been working with the company for a given period of time (minimum: one year). This is the system which Unión Fenosa traditionally applied to all contracts.

Stake-outs and change orders are the responsibility of the subcontractor (there will not be Unión Fenosa personnel on hand) and the subcontractor is allowed to continue working

without interference provided that the total changes do not exceed  $\pm 5\%$  or 200,000 Ptas. If these limits are exceeded, the modifications must be approved by the Unión Fenosa personnel supervising the project. If the changes exceed 250,000 Ptas, a new economic authorisation is required.

*Subcontracting: Overview*



The materials are provided by both the subcontractor and Unión Fenosa.

The final acceptance document (RTE) is always issued in the presence of our personnel and prior to entry into service.

A single invoice is accepted once the RTE has been issued. The results of this new form of subcontracting plus the re-engineering of logistics are described later.

**Unique projects**

The differences in subcontracting this type of project in comparison with supervised subcontracts are as follows: Because of the amount involved, these projects are put out to tender individually.

Stake-outs, change orders and RTEs are always issued in the presence of UF personnel.

Partial billing is allowed on the basis of project progress. The final invoice is issued after issuance of the RTE.

This type of contract is currently at the pilot phase together with the new procurement logistics. However, a number of conclusions can be drawn (discussed later).

**RE-ENGINEERING LOGISTICS**

To date, material procurement logistics for Unión Fenosa distribution projects followed the traditional warehouse-based model. Unión Fenosa reached agreements with its suppliers, and sent orders to them; the suppliers responded by shipping materials to the company's warehouses. Then, material vouchers were issued for each project and were given to subcontractors who exchanged them for the materials; if the material became unnecessary at any time

due to a change order, it had to be returned to the warehouse with a return slip.

In contrast, the newly re-engineered procurement system is based on the following points:

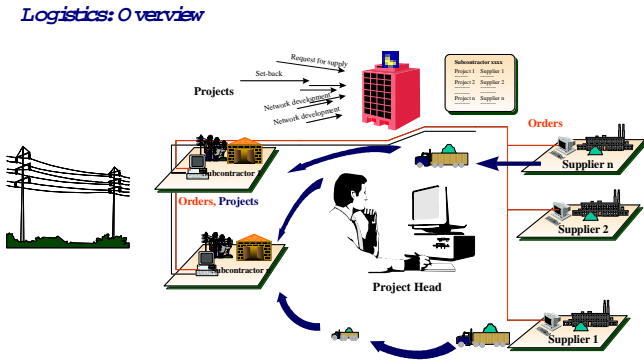
1. The materials are delivered directly by the supplier to the subcontractor without having to pass through Unión Fenosa's warehouses.
2. Unión Fenosa continues to establish agreements with its suppliers.
3. Unión Fenosa groups projects as much as possible when adjudicating them and establishes an order of priority.
4. Subcontractors become depositories of Unión Fenosa-owned material and store it appropriately until it is installed on site. They are also responsible for entering data on stake-outs, change orders and RTEs in the system.
5. Considerable IT support. The Project Head is provided with a computerised diary to provide an overview of the project at any time but his/her intervention is only required in the event of discrepancy. Subcontractors are provided with the Subcontractor Access Module (MAC) which allows them, at any time, to:

- ⇒ Ascertain the projects adjudicated to them, and their status.
- ⇒ View the list of all the materials which Unión Fenosa must provide to execute the projects, with an indication as to whether they have been received, whether the order has been issued or whether it is pending issuance.
- ⇒ View the orders which have been issued and the related suppliers, with contact telephone numbers.
- ⇒ Enter the materials shipped by suppliers.
- ⇒ Enter all the data relating to the projects adjudicated to them. Stake-outs, change orders and RTEs.

The process works as follows: once the projects are ready for adjudication, Unión Fenosa groups them (as far as possible), assigns priorities and adjudicates them to subcontractors. A batch process is run periodically which groups materials by subcontractor, class and type of adjudication, and this is what the Procurements department ultimately uses to issue orders for material.

Through their MAC access module, subcontractors consult these orders and contact the suppliers to agree with them (based on the subcontractor's internal resources) about the amount of material to be delivered and the date and place of delivery (either at the subcontractor's warehouse or directly to the site). All this process is supervised at Unión Fenosa

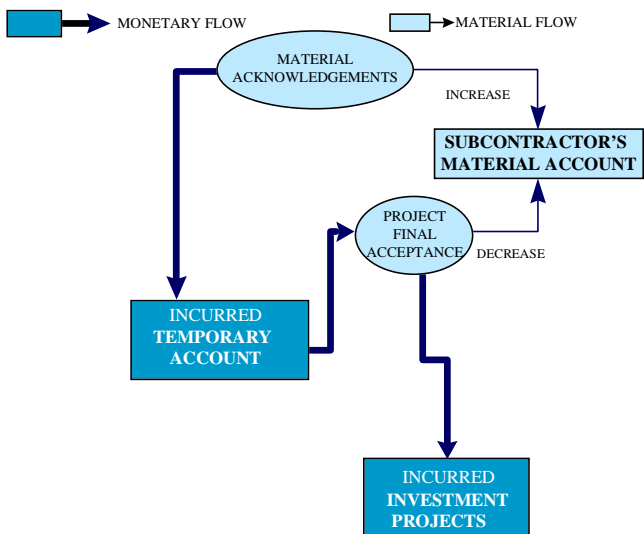
by the Project Head, who only intervenes if there are discrepancies between the supplier and the subcontractor.



Under this system, materials are not pre-allocated to any specific project; rather, any material can be used in any project that needs it. Material needs are updated on-line whenever the subcontractor modifies a project with a change order.

The Unión Fenosa materials on deposit at the subcontractor at any given time (either at the warehouse, on site or installed in projects not yet certified) are registered in the Subcontractor Materials Account. Each subcontractor has just one account in a given geographic area.

When an order is issued to a supplier, the amount of the materials is added to the amount committed in a transitory warehouse account. Once the subcontractor enters the order, the supplier is allowed to invoice it. Once the supplier invoices the order, the amount is transferred to the incurred balance of the transitory account and the commitment is relieved of the same amount. The amount of materials is only charged to projects once they are accepted and it is accrued at the price of the oldest orders forming part of the final acceptance document (RTE).



Clearly, in order for this model to be viable and not involve an excessive increase in material costs, the number of orders for each subcontractor must be grouped as much as possible to allow suppliers to optimise transport and avoid shipping charges.

## Pilot implementation of projects under the MEGA Plan

It was decided to pilot this system in May 1998 with the first block of projects under the MEGA Plan (a plan for improving Galicia's electricity infrastructure running for several years and conducted in co-operation with the Galicia Regional Government).

This type of project was chosen because:

1. They are planned projects, i.e. they are not customer requests. The projects are brought into service in line with UF's internal priorities.
2. They are implemented in a small geographical area (Galicia).
3. They were already being adjudicated in blocks (groups of projects) and, therefore, it would be easier to group materials and make the orders more attractive to suppliers.
4. These projects were arranged under the "supervised subcontract" system.
5. The first block was put out to tender in early May 1998. A total of 203 projects were adjudicated to 14 subcontractors for a total of 943 Mn Ptas.

**Monitoring the MEGA Plan model.** A pilot project evidently needs close monitoring in order to be able to draw conclusions and adjust the model to make it as efficient as possible.

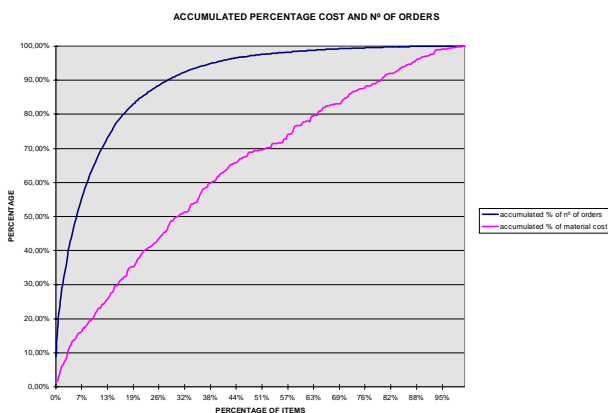
The aspects which were monitored were basically as follows:

1. Deviations from budget, classified by project designer and subcontractor. Clearly, the greater the deviations, the less efficient the model. Where there are deviations, there is almost certainly material which is ordered but which is ultimately not needed (increasing the assets in the subcontractor's warehouse) or there were orders for small amounts of material (which suppliers penalise by charging for shipping).
2. Rotation of materials in subcontractor warehouses. The greater the turnover, the lower will be our volume of material inventory.
3. The subcontractors' warehouses and the form in which they store our materials were supervised.
4. The percentage of ordered items was checked against the percentage of the purchasing volume and the number of orders issued.

**Conclusions and corrective action taken as a result of monitoring.** The following conclusions were drawn as a result of monitoring the pilot implementation:

1. It was decided to rate each contractor in terms of budget deviation and rotation of Unión Fenosa-owned material and include these factors in a quality index with which to penalise or reward subcontractors in future tenders. In the event of very deficient materials management, the contract with Unión Fenosa might be terminated.
2. As well as taking the material storage into account in the quality index, storage instructions were drawn up to guide subcontractors as to how they should store Unión Fenosa-owned materials until they are installed on site.

**Logistic for the MEGA Plan: Managing material and orders**



3. It was found that 90% of the purchasing volume was accounted for by just 50% of the orders and just 14 classes of material (e.g. poles, transformers, conductors). However, there were also items ordered very frequently (e.g. sockets, clamps, arresters, insulators) which did not belong to those 14 classes, so their volume of purchases was actually small. It was decided that the subcontractor should supply these materials directly (except where, because of their vital function in supply quality assurance, they should be supplied by Unión Fenosa to ensure the use of standard materials, e.g. the case of arresters) since, because of the small monetary amount involved, the price differential which Unión Fenosa could have saved by using its greater bargaining power was negligible, whereas these items were greatly distorting the process of optimising orders.

**Pilot implementation on unplanned projects in Ciudad Real.**

Nevertheless, the pilot trial of the model in the MEGA Plan was sufficiently satisfactory to encourage the company to undertake a second pilot study in October 1998 on another

type of project: unplanned projects (customer requests), under all forms of subcontracting (turnkey, arranged and unique projects).

Since this pilot scheme was to be conducted with unplanned projects, i.e. those whose need for entry into service is imposed by the customer, it was decided to adopt an extremely cautious approach, considering that this type of project combined with all the subcontract types presented a number of unique features and problems whose resolution might complicate the model. These included the following:

1. It is common practice to reach agreements with the customers whereby the customer performs part of the work in exchange for Unión Fenosa providing it with part of the material. How to provide the material in this case?
2. Where would the subcontractor take re-usable material which is recovered, considering that Unión Fenosa demands that, on new projects (i.e. not maintenance), subcontractors use new material and that the subcontractor performing these projects in a given area was not always the maintenance subcontractor?
3. Where to take the surplus material from the subcontractor's warehouse when the contractual relationship with it was severed? This problem is particularly important in the case of contractors adjudicated a unique project which do not have a running contract.
4. To handle possible breakdowns, maintenance subcontractors need to have a minimum safety stock of parts. If each subcontractor receives such a stock, the material inventory would be increased.
5. Since these projects are unscheduled, it would not always be possible to group them in order to generate material orders large enough to avoid shipping charges.

Bearing these questions in mind, the consumption of materials during a year in Unión Fenosa's several geographical zones was analysed, concluding that although consumption of these materials was more or less constant throughout the year on a company-wide basis, there were peaks and troughs in demand when it was broken down. Moreover, the total consumption of certain materials by some subcontractors during the year was half or one-third of the minimum delivery which the supplier was willing to make.

In view of the possibility that the pilot scheme might commence at a point of peak demand, it was decided to provide the subcontractor's warehouse with an initial stock which was approximately the average monthly consumption of materials in that geographic area in 1997. October 1998 ultimately proved to have a very low demand for materials to be provided by Unión Fenosa and only turnkey projects were adjudicated.

In view of this experience and the problems listed above, it was clear that this type of project (the most frequent type at Unión Fenosa) required a minimum degree of storage space, which is termed the “Logistics Platform” to distinguish it from the traditional warehouse. The platforms should overcome the problem of supplying material to subcontractors.

In order to minimise the amount of material inventories in subcontractors’ accounts, it was decided to allow the Project Head to order transfers between subcontractors’ warehouses in order to avoid unnecessary shipping costs (subcontractor A - platform - subcontractor B) when the conditions were appropriate (e.g. transfer of fast-turnover material from a subcontractor whose contractual relationship with Unión Fenosa comes to an end to another nearby subcontractor).

Moreover, it became very clear (as had already been detected in the MEGA Plan pilot scheme) that, in order to foster direct supplier-subcontractor relations, it was necessary to modify the criteria for adjudicating materials which the purchasing department was using.

**Decision on the supply route.** After running the batch process leading to the issuance of orders for the material required to execute the projects adjudicated to the subcontractors at any given time, and before the orders are actually issued, the amounts of materials in those orders must be compared with the pre-set minimum amounts. If the order amount is below the minimum threshold, a material voucher is issued for the material to be issued by the platform against the subcontractor’s material account.

The amount of material to be ordered in this case is:

$$\text{AMOUNT} = A - \text{OPD} - \text{MI} - \text{IV} - \text{OIP} - \text{PT}$$

Where:

**A:** Amount of Unión Fenosa material required by each subcontractor for its projects.

**OPD:** Amounts in the form of **Orders Pending Delivery** by suppliers.

**MI:** **Material Inventories** in the subcontractor’s warehouse.

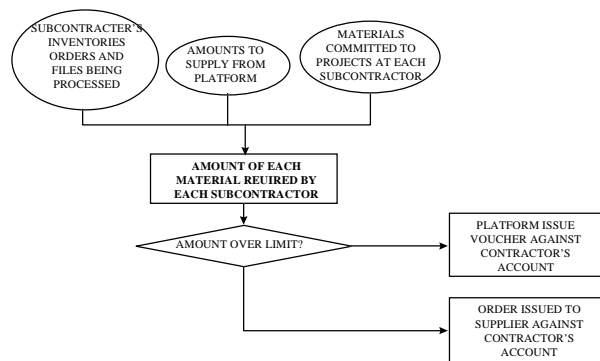
**IV:** Amounts of materials for which **Issue Vouchers** have been issued but which have not yet been picked up.

**OIP:** Amounts of materials which are in **Orders In Preparation** which have not yet been issued.

**PT:** **Material Pending Transfer** to/from another subcontractor (this amount is positive if the subcontractor is to receive material in the transfer, and negative if it is to send material).

The aforementioned issue voucher differs from the traditional warehouse voucher in that it is not linked univocally to a specific project. If the amount to be ordered exceeds the limit, an order is issued directly to the supplier, thus attaining greater efficiency in material procurement.

**Adjustments to the Model: Supply route decision tree**



Materials to be delivered to the customer under the aforementioned agreements are issued from the logistics platform by giving the customer an issue voucher with the agreed amounts of materials.

Material which is recovered is returned using return vouchers generated by the Project Head.

Shipping is handled by Unión Fenosa’s own transport unit or is subcontracted to third parties.

**Adjustment of the adjudication profile.** To improve the workings of the model and foster direct supplier-subcontractor relations, it is necessary to modify the adjudication profile. In 1998, adjudications were made as follows:

All orders for one material (e.g. a conductor of a given cross-section) were issued to one supplier and those for another material to another supplier (even if both suppliers are able to supply either material). In order to aggregate material needs into a smaller number of orders, it was necessary to perform an adjudication by geographical areas (e.g. all conductors for a given geographical area are ordered from a single supplier). Large suppliers find this form of supply more attractive.

**Estimation of the costs of the Logistics Model.** The economic impact of implementing this model was analysed. The costs of Unión Fenosa’s traditional warehouse model (only the Coruña, Pontevedra, Orense and Madrid warehouses were considered) were compared to an optimised traditional warehouse model (only Coruña and Madrid) and the New Logistics Model.

Naturally, costs which are avoidable (both variable and fixed) were considered as savings while distinguishing between short-term and long-term savings; the saving in

expenses due to the reduction in the number of people required for processing is a saving in the medium term, though not in the short term.

A comparison was made of the costs associated with:

1. Hours of company personnel required to feed each process.
2. The opportunity cost of renting warehouses and the related maintenance costs (using two assumptions: 500 Ptas/m<sup>2</sup> per month and 1,000 Ptas/m<sup>2</sup> per month)
3. The costs of transporting materials from Unión Fenosa warehouses to sites.
4. Financial costs of storing materials under each model.
5. Increased material cost under the new logistics model due to the new conditions of supply (values were obtained using an increase of 0% and 7% over the traditional model).

The results were found to be most sensitive to three assumptions:

1. The opportunity cost assigned to the warehouses.
2. The increase in material prices under the new supply conditions (this was the most sensitive factor).
3. The volume of material passing through the platforms. If a large volume is processed, the costs rise due to the need for more storage space and more personnel hours to manage the materials, and there would be a reduction in the price of the materials since orders are always for more than the minimum delivery (i.e. no shipping surcharge). Moreover, the supplier can offer a lower price on some materials since it is more economical to deliver to a central depot than to organise delivery routes to the subcontractors' warehouses.

Inserting figures gave the following results:

In the short term, applying an optimised version of the traditional warehouse model would save Unión Fenosa 28 Mn Ptas – 68 Mn Ptas. Under the new Logistics Model, the effect ranged from 95 Mn Ptas in savings to 100 Mn Ptas in losses depending on the assumptions.

In the long term, maintaining the traditional warehouse model but using only two warehouses was estimated to save 40-70 Mn Ptas. In contrast, the savings under the new Logistics Model ranged from 0 to 270 Mn Ptas. The saving depends essentially on the purchasing department's bargaining power in maintaining material prices.

Logically, in order to obtain numerical results it was necessary to insert values for a number of parameters, some of which will not be known accurately until further experience is gained in piloting the model.

However, independently of these results, what is clear, and what really matters, is that the switch from a traditional warehouse model (mainly fixed costs) to a logistics model such as the one proposed here (mainly variable costs) inverts the cost structure. However, the new structure is undoubtedly better adapted to the demand for efficiency and cost-cutting which the Spanish electric utilities are experiencing under the new situation of liberalisation in the electricity market.

## **CURRENT SITUATION OF THE MODEL**

The conceptual and functional design of this model have been approved and the appropriate supporting computer application is currently being developed.

Work is proceeding in parallel on two new modules (which are at quite an advanced stage). One (MIP) is for subcontractors carrying out projects for Unión Fenosa and another (MAT) is for subcontractors in charge of processing projects with the public administration. Both modules are based on the philosophy, set out above, of delegating to the subcontractors all the tasks which would provide no added value if conducted by Unión Fenosa personnel.