SUPPLY CHAIN MANAGEMENT IN THE SPANISH COUNTY OF BAGES. EVALUATION, DIAGNOSIS AND STRATEGIC RECOMMENDATIONS

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Abstract

This project comes from the experience in logistics of the authors, working in private companies and teaching in the University in Manresa (County of Bages), completed with a massive poll to all local companies in the metal industry. It shows how much these small firms are interested in logistics and how they are beginning to change their culture thru projects in the field of logistics.

After evaluating the answers to the test, ways to improve the development in logistics of companies are presented. The final conclusion is that those firms, especially the biggest ones, need more information, public discussion and then, they can continue with simple projects, at low cost, but with important results in clients' satisfaction. The best areas to improve are purchasing and storaging, as well as the circuits of informations

Key words: Logistics, metal industry, Catalonia

OBJECTIVES

During the last 15 years, in Catalonia and other industrial regions in Europe, a new business culture (Amorós, 1998 and 1999) has been developing with a set of techniques, mainly from Japan, as continuous improvement (*Kaizen*), total productive maintenance (TPM), total quality management or Just *in Time* productions systems, enriched with the own tradition of every zone, changing the management system of firms and even their environment.

Among these techniques, logistics must be included as a source of competitive advantages in a customer loyalty building strategy, and as a perfect complement for *Just in Time* productions systems (Cuatrecasas and Tremosa, 1999).

As a strategic factor, incorporation of logistics in enterprise brings changes to the organization chart and to operative level, including the activities of purchasing, production, warehouse, inventory management, transport and distribution, but, over all, it is, before a science or a technique, a new philosophy that changes planning process.

Logistics can be applied to small firms (Gil, 1997) as well as Just in Time (Borda, 1990) and other productions and management techniques have been applied.

The first objective of this survey is to find whether the companies in the Spanish county of Bages (where our University has its site) are interested in logistics. Then, we want to find if managers in those firms have enough knowledge in this field (maybe they have passed a course or had a conference about logistics) and if they think that techniques in the field of logistics can be good for their kind of companies –small firms in the metal industry-

Next, We need to find which activities have been implanted (or are going to be implanted soon). These activities include different elements in the materials flow from suppliers to customers, thru operations inside the firm, and all the information flow and changes in the organization chart (whether the company has a logistics department, its hierarchical dependency, its kind of authority -line or staff-)

When this information is statistically analyzed, we can evaluate it and diagnose about the development of logistics in the companies in our zone and their tendencies. Our study wants to show strong points and weak point of every firm (in comparison with the average result in an anonymous written poll and with the best practices in the world), so then we can propose strategic recommendations as:

University –and other public and private centers- can prepare courses –from introductory level to a master degree-.

Employers' associations can prepare courses or conferences about logistics and decide to get in touch with firms that offer logistic services in order to get better conditions and better price.

Private companies can see its situation in comparison with other firms and evaluate if logistics can bring competitive advantages. First, they will need more information and some courses –beginning with the managers and ending with all people working in the supply chain-. Then, new projects can begin: warehouses, information systems, inventory management, etc.

Public administrations can evaluate the need of sponsoring conferences or courses, decide where communication improvements should be made, or invest in logistical areas.

Other firms like assessment companies, training companies, engineering companies, management software companies or logistics providers can prepare solutions for the metal industry.

In a long term, a next step of our research process could be to control the improvements achieved with the supply chain management culture: reduction in lead times, costs, errors, inventories, and so on. The results of our study can be directly translated to firms in other regions in Spain (and probably in other countries).

We know that many firms introduce projects according to managers' experience (or consulting companies) based on the state of the art solutions but they never use Operations Research algorithms (Cuatrecasas and Tremosa, 1999), so our research could include selected problems study to compare the results.

METHODOLOGY

Objectives of this survey lead to an empirical work. Although the industrial experience of the authors, a more complete information is needed. The first phase is an anonymous written poll . The second phase, according to results in the first phase, is a personal interview with managers of the most important firms.

We know that polls usually end with a low level of answers because of low interest, time limitations, and a factor of mistrust. At the same time, to use this method, a database is needed (to create a mailing list). This database must be prepared joining the addresses of different companies and selecting a representative sample of the structure of the industry.

Because of these problems, we decided to ask the employers' organization Patronal Metalúrgica del Bages (Fortuny *et Al*, 2000) for help because Metal industry is the most representative industry in the county since the 80's, and it can be treated as a M*inicluster* (Sucarrats, 1999).

Understanding that their members could profit from our study, that organization gave us the addresses of all the members. A personal letter and a test have been sent by mail to all the 158 members of that employers' organization.

In this way, a better answering rate is expected, because firms relay on the decisions of their organization. Answers are more homogeneous and comparable but the results of the study cannot be translated to different industries, but the poll can be repeated for other industries (if they are interested in this survey), and even industries can be compared.

The test send to the firms includes 42 questions and a blank box for open observations. It has five types of i*tems*:

- ☑ Those that can only be answered with Yes or No. They are simple to answer and that's because they are preferred.
- ☑ Those that need a single written answer (the name of a department, an amount, etc)
- ☑ Those with an open answer
- ☑ Those with answer to be chosen among those proposed
- ☑ Those whose answer must be ticked in a scale (for example, the number of employees)

Items in the test come mainly from a prior model used to analyze firms in the car sector (Prida and Gutiérrez, 1996), removing the questions about other aspects than supply chain management and enlarging where needed.

The subjects in the test refer to:

- ❑ Interest of the firm in the supply chain management subjects (logistics, warehousing, packaging, Just in Time, project management or marketing)
- ❑ Opinion about the impact of supply chain management techniques on the company
- ❑ Prior training in logistics
- ❑ Prior surveys to improve suply chain management
- ❑ Existence of a logistics department, its dependency on other departments or on general management, and its activities

- Relationship with suppliers (requirements in quality, price dealing, dates, information about orders, errors, joint activities, imposed use of packaging or bar codes, etc.)
- Use of new technologies of information and communications as the electronic data interchange (EDI), the Internet, bar codes
- Computer aided management
- Use of Just in Time production systems
- Inventory (in days) of raw materials, work in process and finished goods
- Improvement projects about warehouses o inventory control.
- Improvement projects about relationship with suppliers.
- Relationship with clients (agreement or imposition) about packaging, bar codes, changes in designs, simplification in transactions…
- Use of logistics providers. Activities
- Customized products
- Control *ratios* in the supply chain management
- Basic data: work force and total sales in 1999.

RESULTS

The basis

Similar studies had been made in Spain. An important study –to contrast with our results- was carried out by Andersen Consulting and the Centro Español de Logística for the Cotec Foundation, in 1998. It connects the best practices (in supply chain management) in the world with its degree of application in the best companies in Spain (within the metal industry). It includes the analysis of the industry and it points to the optimization in purchasing and in logistic circuits as strategic areas to reduce cost and it also points to the terms-cutting to improve customers'satisfaction (Cotec, 1998).

Other studies consulted:

- European Logistics Associations (1998)
- Gutierrez and Prida (1998)
- Cuatrecasas and Tremosa (1999)
- Andersen Consulting and Centro Español de Logística (1992)
- Aecoc and Bossard Consultants (1992)
- European Logistic Consultants (1992)
- Institute of Logistics & Distribution Management (1992)

The European Logistics Association studied 163 companies in Europe –13% of them were Spanish firms-

Gutierrez and Prida (1998) tell about a project made in 1978 by the Escuela de Organización Industrial. That research was specially oriented towards distribution in several industries focused on final consummers.

About Catalonia, we can find a recent publication in Cuatrecasas and Tremosa (1999) including some cases study. In this project, the results of a study by A.T. Kearney for the IESE business school, in 1992, are mentioned.

Some other projects were published in 1992 (AECOC and Bossard Consultants; European Logistic Consultants; Institute of Logistics & Distribution Management) where differences between Spanish firms and other european firms were shown (Badenas, 1993).

The sample

When 10% of the total questionnaires have been filled and returned, 53% are very small firms with less than 50 workers; 27% are companies with more than 50 workers and less than 250 and 20% are bigger enterprises with more than 250 employees (but less than 500) (See Figure 1). With our knowledge about the metal industry, we can say that the smallest firms are low represented in the sample, so the following statistics can be biased. Probably this segment includes the major part of the industry, with firms with little structure and no technicians, focused on the everyday work and not in strategic matters.

There is a positive correlation between labor and sales due to the activity level of companies.

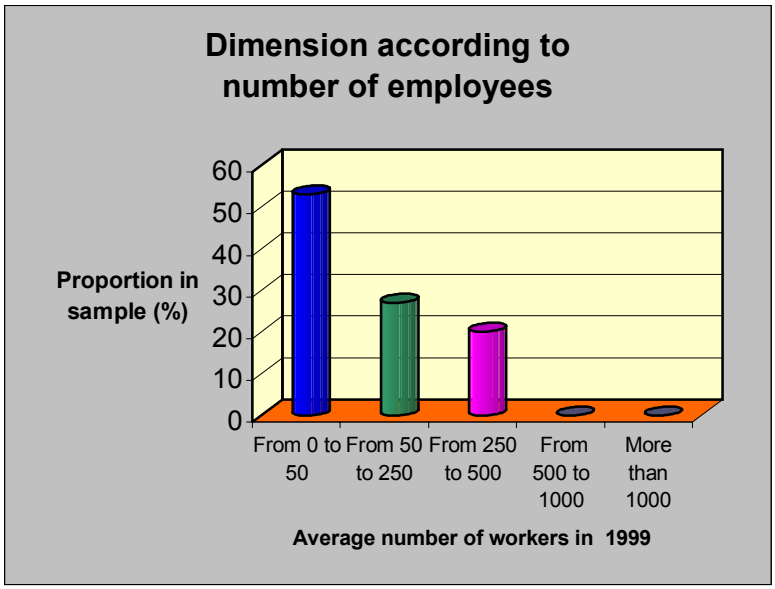

Figure 1. Classification of firms in sample according to number of employees

Interest in logistics

87% of those polled show interest in supply chain management (some of them have already implanted some logistical projects while some don't know anything about this subject). Some blank answers (7%) can be understood as the need of more information.

By dimension, 75% of the smallest firms answer positively, 7% negatively. All companies with more than 50 workers answer positively (Figure 2).

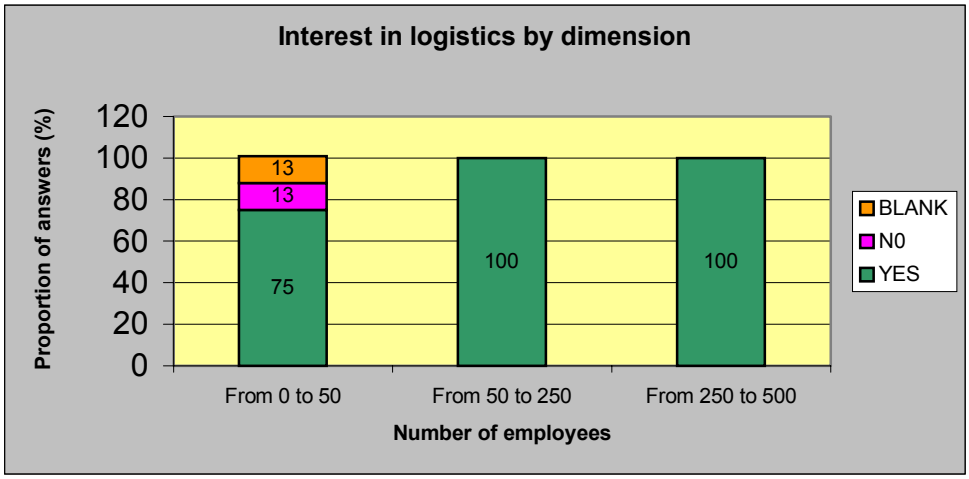

Figure 2. How many firms (in per cent) in those polled are interested in logistics, by cattegories (number of employees)

Prior training or information

67% of those polled have passed a managerial course about logistics (some of them with a master degree). 33 % answer negatively to this question. All them belong to smallest firms. For future training, companies seem to be interested in product management, packaging, marketing, just in time, inventory control and integrated supply chain management.

Supply chain management as a way to reduce cost

Supply chain management aims to satisfy customers in a very competitive market, not to be a leader in cost but who knows the cost of an unsatisfied customer? Full logistic cost brings a new concept, different from tradditional accountancy.

Bigger firms think logistics can help in reducting cost. But firms with a number of employees less than 250 have a divided opinion .

Prior studies o projects in firm to improve logistics

Only a 33% of those polled admit to have developed a study or project to improve logistics (Figure 3). In all these companies, managers have passed courses about logistics. Some of the firms polled (47 %) use logistic data for management (38% of those who believe that supply chain management can be helpful in reducing cost). Most used data are transportation information (complaints) , purchasing costs, storage cost and inventory turnover.

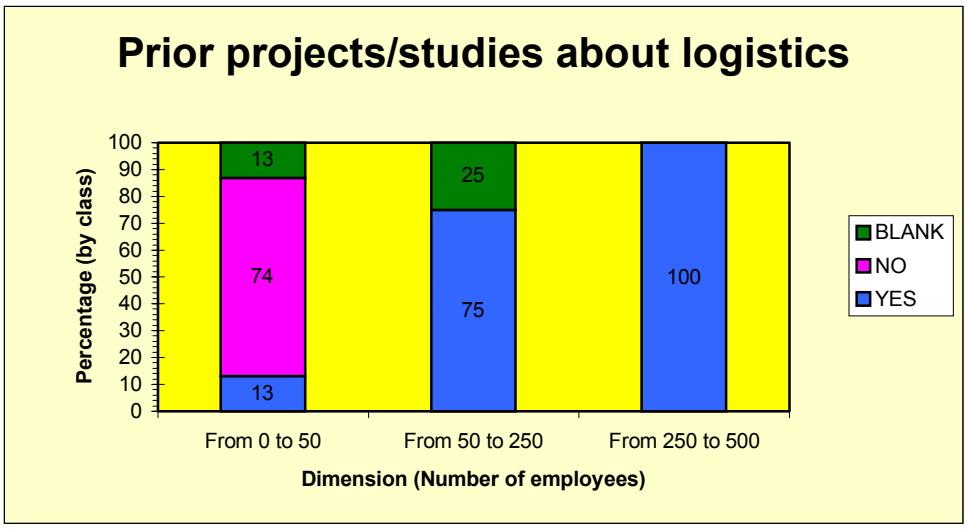

Figure 3. Prior studies or projects to improve logistics
Firms sorted by categories (number of employees)

Logistics on organization chart

Supply chain management needs horizontal coordination (between all areas implied in materials management) rather than hierachy and tradittional departments. 53% of the polled firms have a logistics department –only a 37% of the smallest firms-. In 50% of those firms with a logistics department, it depends directly on general management. In other companies, it depends on operations or production department (for further details, see Figure 4). In all firms, logistics department has a line authority and its activities are purchasing, production planning, distribution and transportation. Some firms add storage (warehouses) or production.

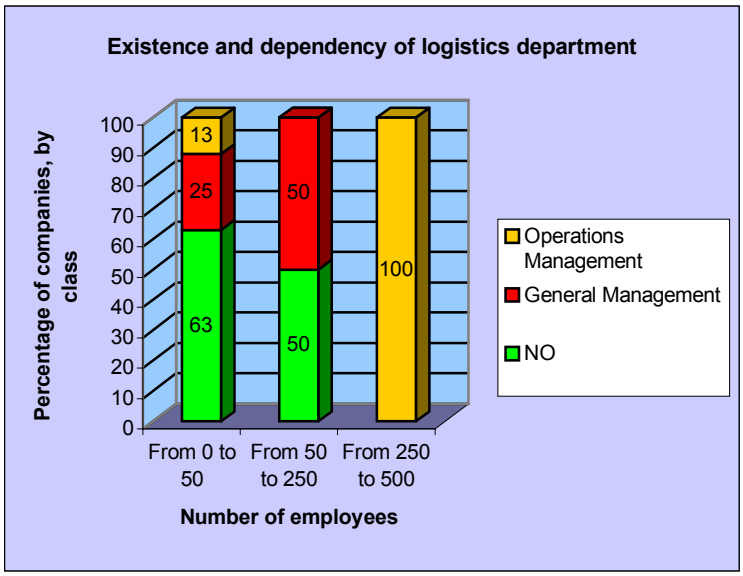

Figure 4. Existence and dependency (on management or other department) of logistics departement

Supply chain

Beginning with suppliers and purchasing, 43% of the polled firms do not ask for certification (for example, ISO 9000 series) to any of their suppliers. The answer changes if we sort firms by number of employees: biggest firms are much more demanding. All firms deny to be interested in having a great number of suppliers. 33% of them (specially biggest firms) confirm to be cooperating with suppliers or working in projects to achieve suppliers involvement (packaging, bar code, periodical delivers, desing improvement, etc). Figure 5 resumes the degree of suppliers involvement achieved by firms (combining the answers to several questions and turning it to numbers in a scale from 0 to 100).

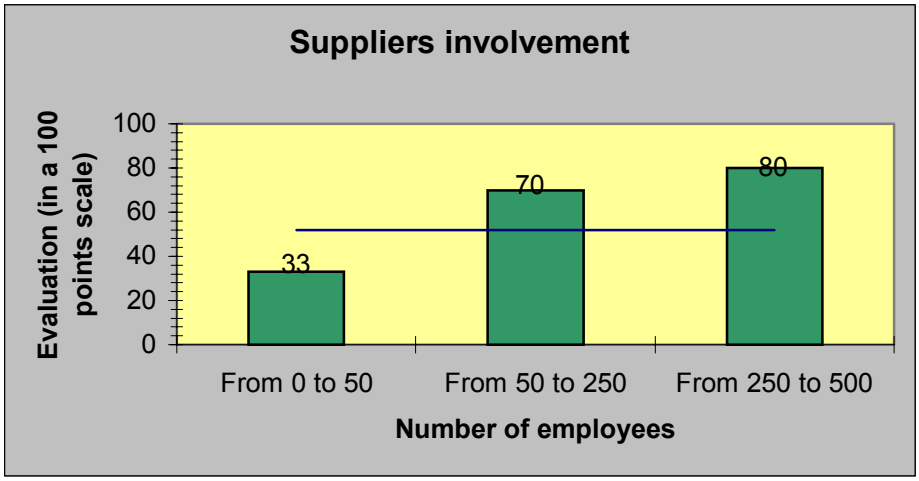

Figure 5. Mesure of the degree of suppliers involvement, in a range from 0 to 100 points. The blue line shows the overall average.

Several items on the questionnaire refer to distribution system and customer involvement: (information from clients, errors in this information, changes in orders, information given to customers about the development of their orders, cooperation in internal projects, etc.) Figure 6 turns the answers to numbers in a scale from 0 to 10.

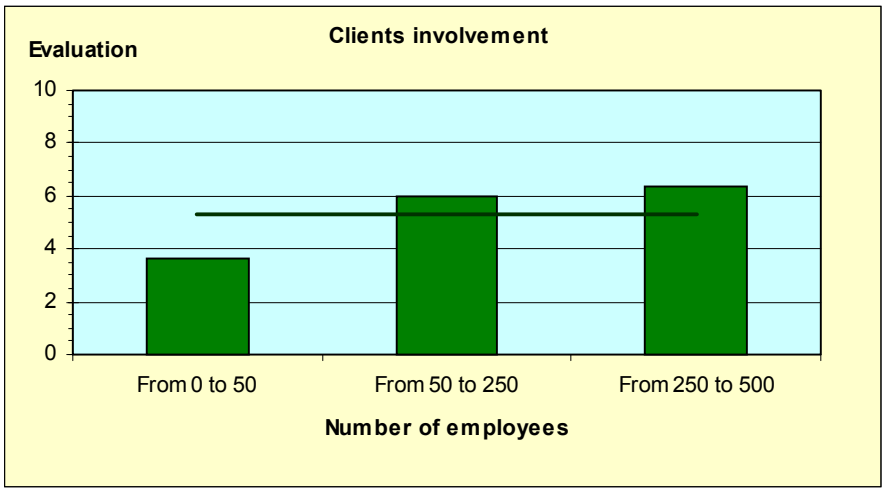

Figure 6. Degree of customer involvement in a scale from 0 to 10.
Black line is an overall average (with 2.2 points standard deviation)

27% of the polled firms have agreements with logistics providers (50% of them are companies with more than 250 workers). The activities of those providers are basically transportation of raw materials and finished goods but in some cases material movement inside the plant and storage are included.

Supply chain includes operations management so some of the questions in the poll refer to production and storage. Only 27% of those polled use just in time techniques (for example, group technology cells), and those firms have more than 50 workers. 67% of the companies have improved their warehouses (for example, with automated storage and retrieval systems), but the inventory (in days) is still too large (See Table 1).

Materials stored	Statistical values (days) in sample				
	Minimal	Maximal	Most frequent	Average	Tipical Deviation
Raw materials	4	90	30	35	25
Work in process	0	120	30	26	35
Finished goods	0	120	30	26	35

Table 1. Average inventory levels, in days.

Information system

67% of the companies in sample use software about logistics and operations (storage, purchasing, planning and scheduling) but only 40% with an integrated system. Only 26 % of the firms know about EDI and only a 33% uses bar code to identify materials or finished goods. 67 % of the companies use the Internet.

CONCLUSIONS

Firms in the metal industry are interested in logistics, and that is a strong point and an opportunity to develop certain improvements in supply chain management. Any changes must be preceded by information and training. The county has private and public (University) centers that can organize courses or conferences. The employers' association can also organize a professional meeting.

The region is near Barcelona and many companies are suppliers of the car industry in Barcelona, so the county of Bages could be interesting for logistics providers that could work with many firms.

Many firms are working to improve the relationship with suppliers and clients. They are also improving internal operations system, but many changes are still beginning.

Smallest firms have difficulties to improve in management, but they could benefit from global programs in the region (existence of logistics providers, courses, meetings, etc.). Those companies have a special sensibility. Local consultants on management can help them to develop simple ideas to improve the relations with clients or suppliers at low cost (for example, transmitting daily lists of prices by email).

As the Cotec study (1998), we realize that best strategies (used in the best companies in Spain and all over the world) are supplier's involvement, changes in scheduling (produce standardized goods with high and constant demand), changes in layout (group technology cells) and in warehouse, and changes on organization chart and in information flows.

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