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Improvements in automotive company external logistics

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Abstract (English) This paper purpose is to contribute in the continuous improvement development of automotive company external logistics, adapting current processes and supplying materials methods to new stage of the plant. Within this broad objective, the study is focused on the specific case of new model B299, and the attempt to achieve a target figure in order to reducing its components transport cost from European suppliers which are located more than 2.500 kilometers from the plant, in a rate of around 5%. The main objective of this paper is to study the possibilities of obtaining cost savings in logistics (procure parts). Thus, it will be necessary to establish an analysis methodology in oder to identifying opportunities for reduction transport costs through duplication of equipment and dies. Published data have been modified by privacy & confidential commercial reasons.

Keywords: External logistics, continuous improvement, automotive, supply chain.

1.1 External Logistics

Over 10.000 possible different combinations for each car model is estimated, forcing large manufacturers to work with as little inventory as possible. Similarly, stringent policies to reduce outsourcing raise prices as a need to adapt to market. Thus, provider market is positioned as an important resource in production strategy (Pinilla 2005).

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Currently, in any production environment, logistics has become an essential piece in the company structure. From a logistical point of view, we can define a map of activities or roles within the logistics, as part of the business (procurement, storage and commodity, production and distribution management).

(Stadtler 2005) considers that supply management must be based on two pillars: integration and coordination. Mainly because of competitive environments we evolved in, this map should include different external factors to the actual activity of the company and determine its internal management. See Figure 1.1.

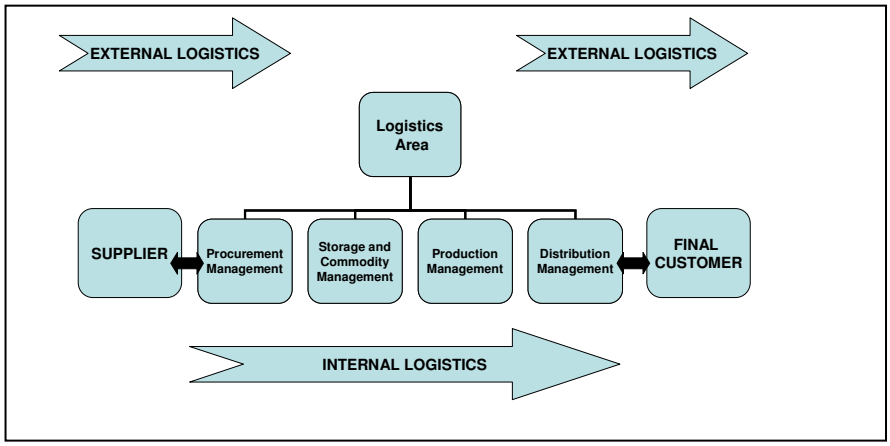

Fig. 1.1. Global Logistics Activity Map. Source: Own.

To be able to coordinate the supply chain efficiently, the literature contemplates two phases at the strategic level: supply chain design (Mohammadi Bidhandi et al. 2009) or redesign (Nagurney 2010) and configuration. (Graves and Willems 2003) were the first to introduce the supply chain configuration problem.

From the company point of view dedicated to large-scale production and international distribution, the first step that has to be controlled is precisely processes-procurement management.

Not only doing well from execution point of view, but especially in economic terms and pre-established scales is needed to carry out the process properly, therefore must find a balance between quality and process cost. This cost adjustment causes production relocation to places where costs are lower. While this position is logical, the evolution of markets has led to relocation, in some cases can generate a significant disadvantages such as management control loss or provisioning opportunities to establish collaborative relationships with proximity suppliers that will finally bring a number of benefits that offshoring has not.

The main objective of this paper is to obtain cost savings in procurement logistics parts so it will be necessary to establish an analysis methodology for identifying opportunities of reduction in transport costs though duplication of equipment. This methodology will apply to current providers that are located in a remote geo-

graphical point. If these suppliers also have production facilities near their customers, cost reduction opportunities for company are highly increased. It is also interesting to note, as stated by (González-Rodríguez 2007), sometimes the existence of transport logistics centers, which act as fluxes responsible for delivery of parts delivered by suppliers to automotive plants.

According to (Hahn et al.2000), the Hyundai supply chain has approximately 400 direct suppliers, 2.500 second-rate, and unknown number of suppliers of third range, or higher. It is also possible that a single provider covering several levels.

1.2 Reducing Transport Costs Analysis Methodology.

1.2.1 Analysis of the Current Situation

Performed the following steps:

1. Data Collection and Initial Analysis.
2. Identify Potential Suppliers.
3. Determination Shipping Costs and Identification of Business Opportunities.

1.2.1.1 Operational Aspects

For which we have considered the following variables:

- Product Features
- Transportation Features
- Mode of Transport used
- Unit cost of shipping (to the assembly point)
- Type of protection.
- Dimensions.
- Weight.

As this phase results, we have discriminated between multiple parts to be supplying to the plant, selecting those whose characteristics (density, volume, shipping cost, etc), present a greater potential for cost optimization at the end.

1.2.1.2 Data extraction

We have collected data on components. Initially it has handled information on:

- Code of the piece and description.
- Forecasting demand (daily allowances, and vehicle production horizon).

- Supplier planned
- Location
- Transport cost
- Physical characteristics packaging.
- Dimensions
- Weight

To ensure the reliability of the conclusions of the study, it is vital that the systems of measurement and data collection reflect data integrity.

1.2.1.3 Establish selection criteria

Aim at this stage was establish those criteria, to identify parts that are susceptible to analysis (define pieces that will be the definitive study and prioritize them).

1.2.1.4 Data analysis and identification of parts and components

Once established selection criteria were applied techniques for analysis and filtering under analysis parts data. This classification is extracted from those parts for which a production location may offer greater competitive advantages. We make a classification criterion, taking potential benefit to the plant as an evaluation criterion. Once ordered parts list that meet the criteria set, validate it with organization staff, thereby obtaining all the pieces on which to focus further study.

1.2.2 Identifying Potential Suppliers

This phase defines suppliers providing from the outside and has production facilities in Spain. In this supplier's determination, there will be a progressive approach, initially considering those that are located in industrial suppliers park, then those province located, and so on. Once identified and classified suppliers, evaluating them in order to preselect those which a priori are considered more interesting for project proper development.

1.2.3 Priority Determination and Parts

At this stage of the methodology addresses the following two tasks:

1.2.3.1 Calculation of freight cost

With all information gathered until now determine freight costs associated with each studied part. These parts supply chain is complicated, because they follow different flows, some of them pass though several intermediate consolidation centers, bind to other parts in transport, store a certain time, etc…It is therefore necessary determine the costs that are attributable to each of these pieces, such as inventory, storage and transport cost, for the proper development of the project.

Table 1.1 Transport costs. Source: Automotive company

n	supplier	Part	DPV[1]	Pack[2]	P[3]	L[4]	W[4]	H[4]	Unit/day	T
44	UK_01	PR1	241	A	8	224	145	100	30.125	15,75
45	UK_01	PR2	49	A	8	224	145	100	6.125	16,57

[1]DPV is daily production volume.
[2]Pack is packaging.
[3]P is parts per rack.
[4]L, W and H are rack measures (long, width and high).

1.2.3.2 Scenario Generation. Identifying Business Opportunities

From different indicators, a number of scenarios are obtained, whose analysis will ultimately determine the priorities of study for each of parts under study.

To compare different alternatives properly distinguish between variable and investment component in case of logistical costs are considered variable inventory in transit, transport and storage cost, among others, and considered buying investment dedicated packaging for parts in terms of different investment costs in production machinery, tools and dies were considered separately all else being included in part price.

1.3 Validation of the Methodology Developed

In order to finish developing methodology, and to estimate the impact or benefits of its application, is taken as an example data production of B299 model.

1.3.1 Initial Analysis

We defined the critical variables of an operational, after making large number of interview and data collection:

1. Plant near.
2. Additional freight costs.
3. Demand for different parts.
4. Number of production days/Truck

1.3.2 Selection of Potential Supplier

1.3.2.1 Selection of Supplier with Plant in Spain

It was determined that component suppliers are plant near production center. In multinational automotive companies, the pursuit of information is a daunting task.

1.3.2.2 Comparison of characteristics and uses

In first instance were identified the components of study model and their characteristics (use demand, packaging type, weight, in which versions/variant is used, etc).

1.3.2.3 First approximation

We obtained a list of 2.739 components that come from 306 suppliers (with or without Spain plant), but there was no part demand, that is, although we knew was cars number to produce, there were no defined different variables in terms of color or accessories (different vehicle variants). These variants were not quantified for production. To resolve this problem we calculated the common parts that were used in all vehicles of this model, which ensure taking into account the increased demand for parts. This previous approach was not entirely satisfactory because it does not have the freight costs for these parts and having in mind only parts that were used in all cars of the same model that are discarded to lower demand but high savings potential and possibility of moving production to move the dies and tooling required.

1.3.2.4 Final approach

We obtained information concerning the question product for two production sites in Germany and Spain, information recorded in these two files corresponding to part features such as: piece weight, packaging type, size and weight of packag-

ing, No. pieces per package, supplier code, supplier location (city and country), and freight cost from each supplier to production center piece, demanded by car.

1.4. Location Opportunity

From the three most important criteria defined in above section have been carried out different combinations that are defined by different priorities, number one being the largest opportunity and the lowest 10 as the first three criteria. The fourth criterion will serve as additional information. The top 5 priorities are:

Table 1.2 Priorities with higher demand in Valencia. Source: Own.

Priority	Cost VAL>COL	Supplier in the Supplier park	Demand VAL>=COL	Supplier in Spain	No Supplier in Spain	Cost-COL>VAL
1	**X**	**X**	**X**			
2	**X**		**X**	**X**		
3		**X**	**X**			**X**
4			**X**	**X**		**X**
5	**X**		**X**		**X**	

We studied suppliers providing parts with priority 1 and 2 correspond to 9,4% of all parts that are required in the production center of Valencia, which corresponds to 256 parts supplied by 35 vendors, 8 of which supply part with priority 1. Note that for parts of priority 1, the supplier has a plant in the industrial park adjacent to the production center.

Table 1.3 Frequencies and frequency percentages for each priority. Source: Own

Priority	**Frequency**	**Cumulative Frequency**	**%**
1	56	56	2,04%
2	201	257	7,34%
3	8	265	0,29%
4	2	267	0,07%
5	94	361	3,43%
6	68	429	2,48%
7	217	646	7,92%
8	23	669	0,94%
9	19	688	0,69%
10	179	867	6,54%
n/a	1872	2739	68,35%
TOTAL	2739		100%

1.5. Conclusions

1.5.1. Results

Summarizing and extrapolating the conditions that have allowed the implementation of the proposals, we conclude that it is necessary that a combination:

- Capacities
- Reduced investment in dies and tools
- Volume to be transported and Special Packaging

1.5.2 Conclusions Methodology

This study has established an analysis methodology to prioritize in distribution and parts supply from logistics perspective, implying a better organization in production management and costs reduction. Advantages:

- Increased competitiveness in sector.
- Reduction of production costs.
- Increased control over the processes involved.
- The possibility of collaborative strategies.

Numerically, the number of pieces to which they can relocate their production according to the study, amounting to 257 from 35 different suppliers, of which only 8 are in the adjacent industrial park.

1.6. References

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