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Lean manufacturing principles: Are Venezuelan firms applying them?

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Abstract

Lean manufacturing principles are being applied by many successful enterprises all around the world. This paper, based on a sample of 30 Venezuelan manufacturing firms, analyzes the lean manufacturing practices currently used by these firms. Data has been gathered thanks to the questionnaire prepared for the fourth edition of the International Manufacturing Strategy Survey (IMSS), a tool that periodically surveys manufacturing firms about their manufacturing and supply chain strategies, practices and performance. This IMSS edition has focused on industrial firms manufacturing machinery, electric and electronic devices, medical and optical equipment, all kinds of vehicles and, in general, metal parts and components. We have chosen the answers related to lean aspects in order to see how far these subjects have been adopted by Venezuelan firms. Results show that, even if there is room to improvement opportunities, Venezuelan firms are adapting lean practices to an environment characterized by constraints in international merchandising exchange.

Venezuela

Fourth economy (behind Mexico, Brazil & Argentina) in Latin America, Venezuela continues to be highly dependent on the petroleum sector, accounting for roughly one-third of GDP, around 80% of export earnings, and over half of government operating revenues. However, manufacturing and oil refining industry represent about 25% of GDP, a figure rather stable for the last 20 years in spite of political and economic turbulences experimented by the country.

Venezuela lays in the northern part of South America representing a key location for merchandising flow in the continent and very well placed as a pivot point vis-à-vis of commercial exchange with Europe. In order to transform these comparative advantages into competitive ones, logistics activities in Venezuela must improve a lot to match regional and international standards. However a country with huge oil resources, its road network has deteriorated in the past years, railroads and maritime transport

are well below regional standards (CAF) and trucks and lorries are insufficient and highly depreciated making deliveries rather slow and unreliable.

Moreover, Venezuelan economic and social variables do not favour an adequate environment for global and even local competitiveness. Rankings from IMD (2006) and WEF (2006) place Venezuela in the last places between the surveyed countries.

IMSS characteristics

The International Manufacturing Strategy Survey (IMSS) is an initiative promoted by a group of business schools around the globe in order to build a collective database to study and compare manufacturing strategies. The IMSS fourth edition took place in the second semester of year 2005 and it allowed to gather results from 711 firms in 23 countries (see table 1).

Table 1 – Number of firms per country participating in the IMSS (fourth edition)

Argentina	44	Israel	20
Australia	14	Italy	45
Belgium	32	New Zealand	30
Brazil	16	Netherlands	63
Canada	25	Norway	17
China	38	Portugal	10
Danmark	36	Sweden	82
Estonia	21	Turkey	35
Germany	18	UK	17
Greece	13	USA	36
Hungary	54	Venezuela	30
Ireland	15		
		Total >	711

Venezuelan sample and firms profile

Information analyzed in this paper was collected between March and October of year 2005 and includes 30 Venezuelan industrial firms ranging from small electrical transformers manufacturers to

automotive assemblers. Respondents employ 450 persons in average with annual revenues of about US \$ 15 million.

Results and comments

In this section, we will show the main results from the survey in those subjects related to lean manufacturing strategies.

Suppliers and customers characterization

From the competitiveness point of view, sourcing has become a very important issue. Our respondents consider that almost half of their suppliers are strategic ones. In average, these firms work with 58 suppliers and for each of their purchases they use six providers in average. Figure 1 shows the geographical distribution of suppliers and customers. More than half of the suppliers are based outside the country. As regional economical integration is not yet well developed, this fact implies that nationalization processes are necessary very often generating a delay source which impacts on safety stocks, lean processes and delivery times.

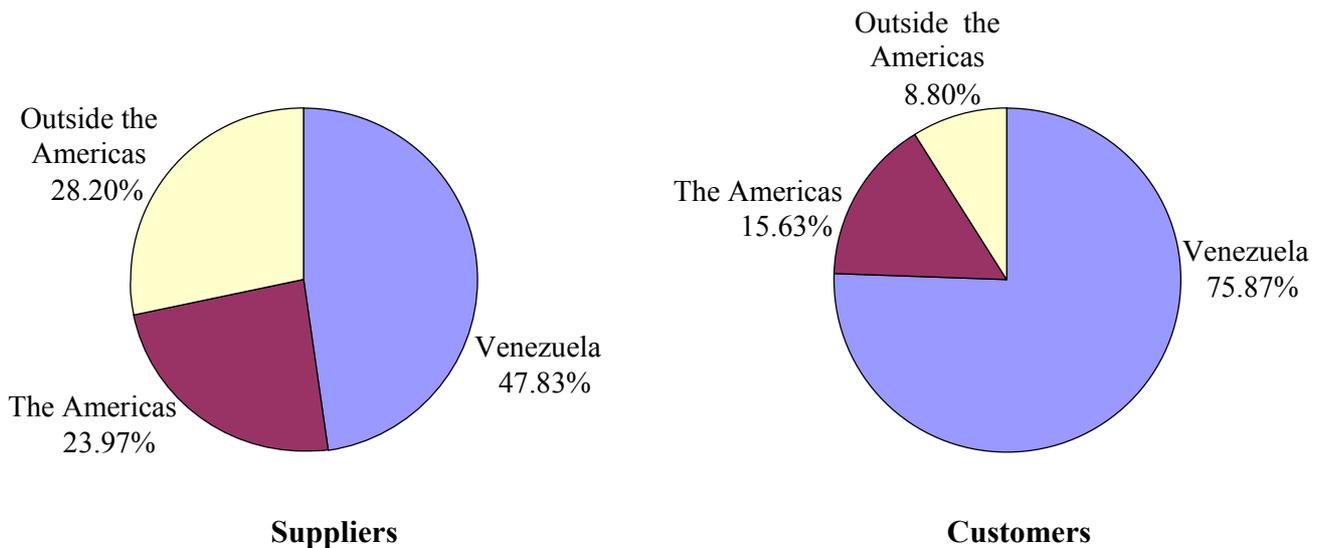


Figure 1 – Suppliers and customers geographical distribution

For customers, as it is usual in many manufacturing firms, the average number of clients (105) of our respondents exceeds the average number of their providers (58). About 30% of these customers are considered strategic. It is clear from figure 1 that Venezuelan exports are rare and most of them are addressed to the Andean countries, where a free trade agreement is in place.

Criteria to select strategic suppliers

Figure 2 shows scores obtained for different criteria to select strategic suppliers. Venezuelan firms are compared with other countries' firms participating in the study. Originally, respondents evaluated these criteria in a Lickert scale from 1 (non important) to 5 (very important). Obtained values were then averaged and normalized with respect to the average value of all criteria. This normalization allows us to compare results obtained from different firms and different countries.

As it can be seen in Figure 2, *quality* and *delivery performance* obtained a score considerably greater than average. Other criteria associated with lean manufacturing issues as *willingness to disclose information* obtain, in both cases (Venezuela and Other countries) a rather low score. Trust -a key element in modern and effective supply chains- is not a common characteristic between respondents. *Local sourcing* is much more appreciated in the Venezuelan case than in other countries showing the difficulties associated with import processes.

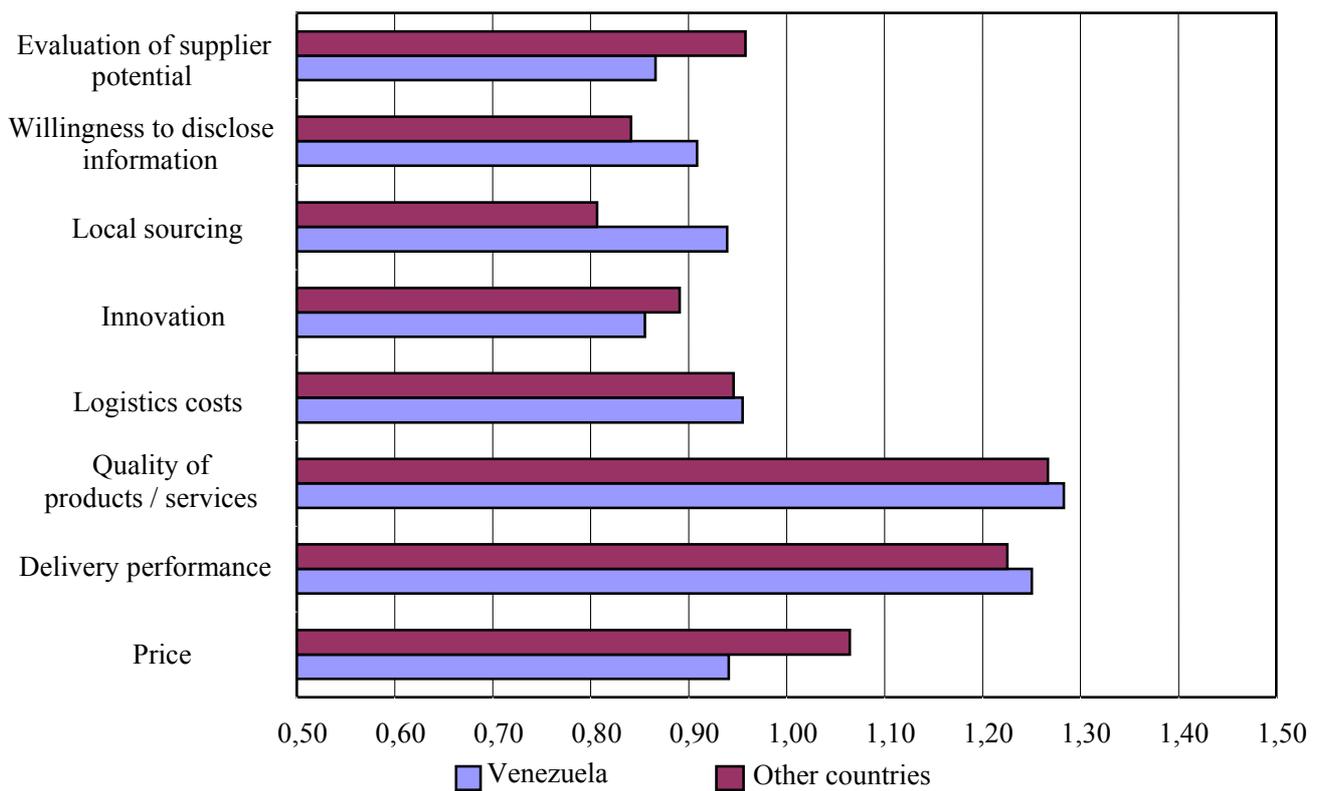


Figure 2 – Criteria for selecting strategic suppliers

Coordination & planning with suppliers and customers

Figure 3 shows how our respondents coordinate planning decisions and flow of goods with their strategic suppliers. These results confirm the low level of integration between Venezuelan suppliers and customers among the surveyed firms. Although some issues (*agreements on delivery frequency, order tracking, ...*) obtain a good score, *physical integration* and *vendor managed inventory* receive a very low value. A technique as *CPFR* (Collaborative Planning Forecasting and Replenishment), which is playing a key role in successful supply chains, obtains also a score below average.

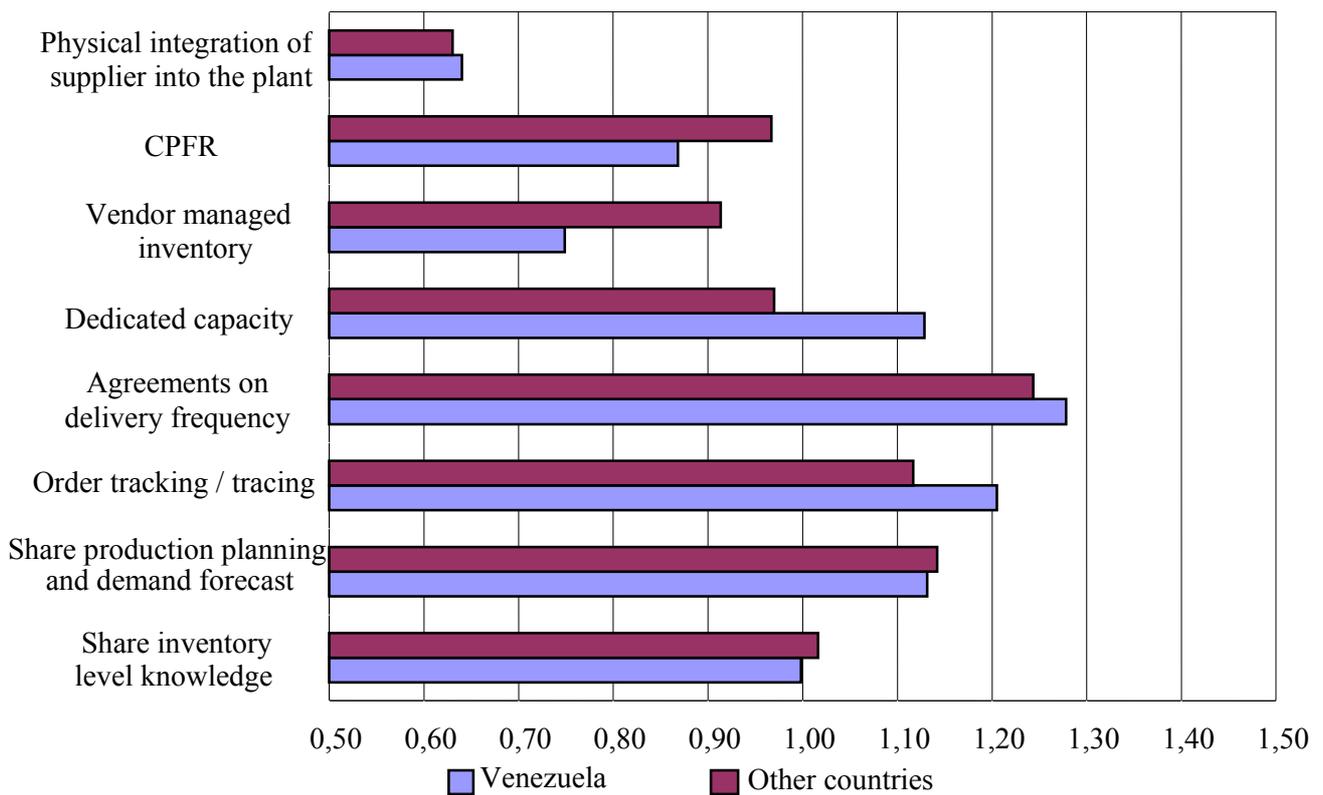


Figure 3 - Coordination & planning with strategic suppliers

In the “downstream” case, there is an interesting coincidence between the Venezuelan and other countries’ results. On the other hand, we observe the same three criteria preferred in the suppliers’ case apply for the customers relationship. It is interesting to observe that CPFR and integration practices with the customer are more used in Venezuela than in other countries. The fact that many of the Venezuelan firms clients are in the country can explain this behaviour.

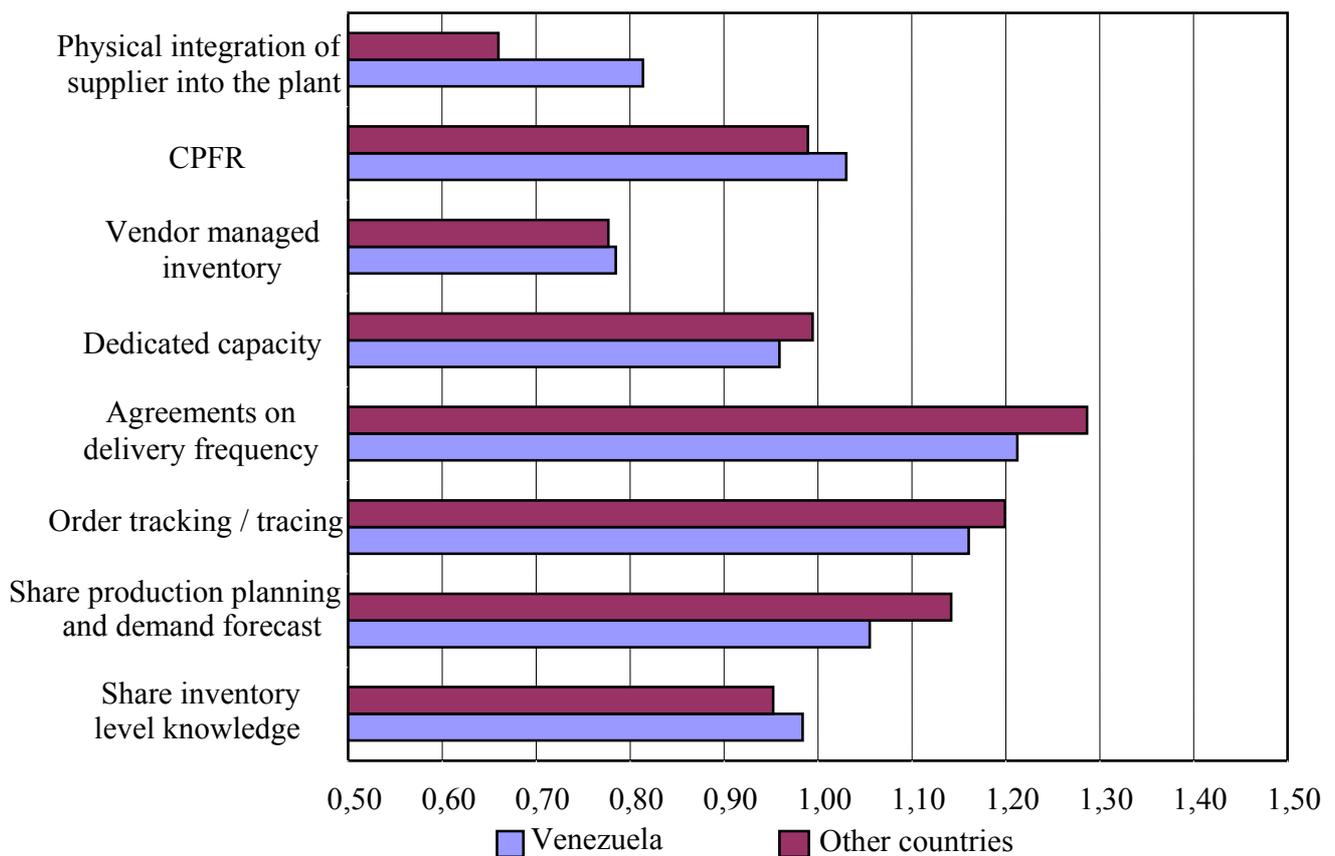


Figure 4 - Coordination & planning with customers

Raw materials, work-in-process and finished goods inventories

Figure 5 shows, for each of the IMSS countries, the raw materials average inventories (expressed in days) reported by the respondent firms. Venezuela and UK are the two countries with the highest raw materials inventory level. Even if we would need a lot more detail in order to arrive to final conclusions, in the Venezuelan case this fact could explain the high costs related to the raw materials handling. This fact reduces the competitiveness of Venezuelan products when compared with other countries in the Andean and South American region.

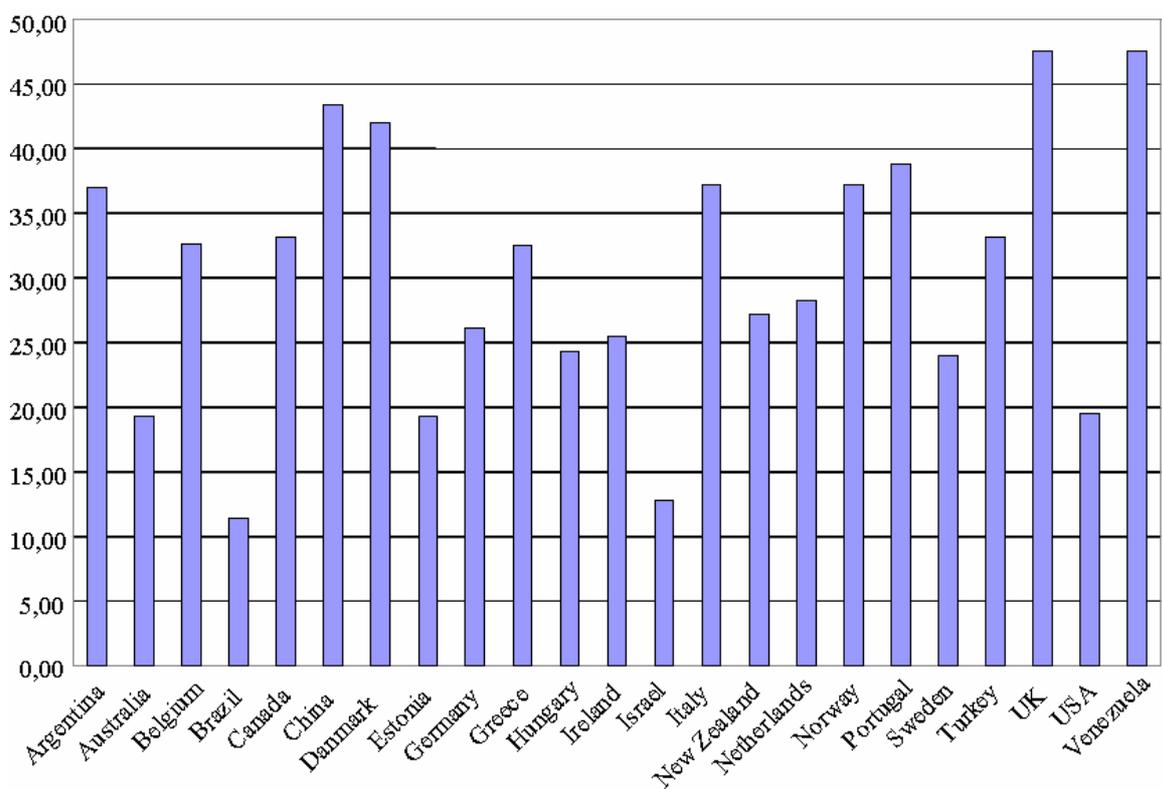


Figure 5 – Raw materials inventory (expressed in days)

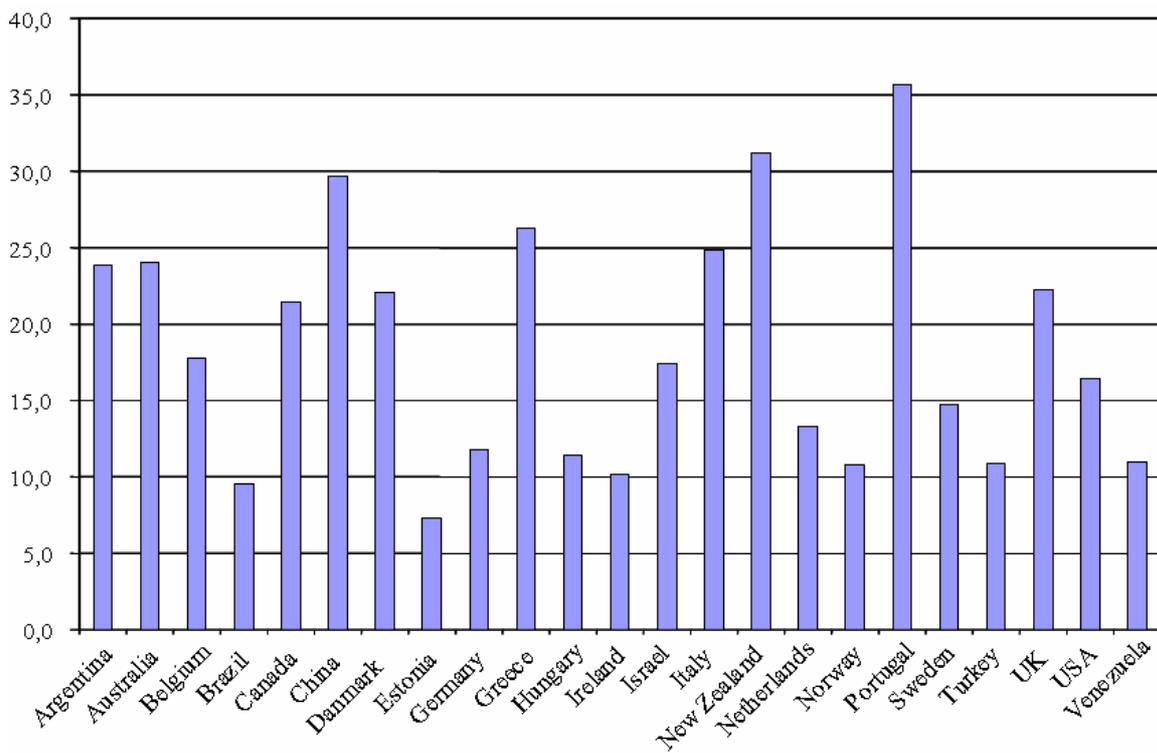


Figure 6 – Work-in-process inventory (expressed in days)

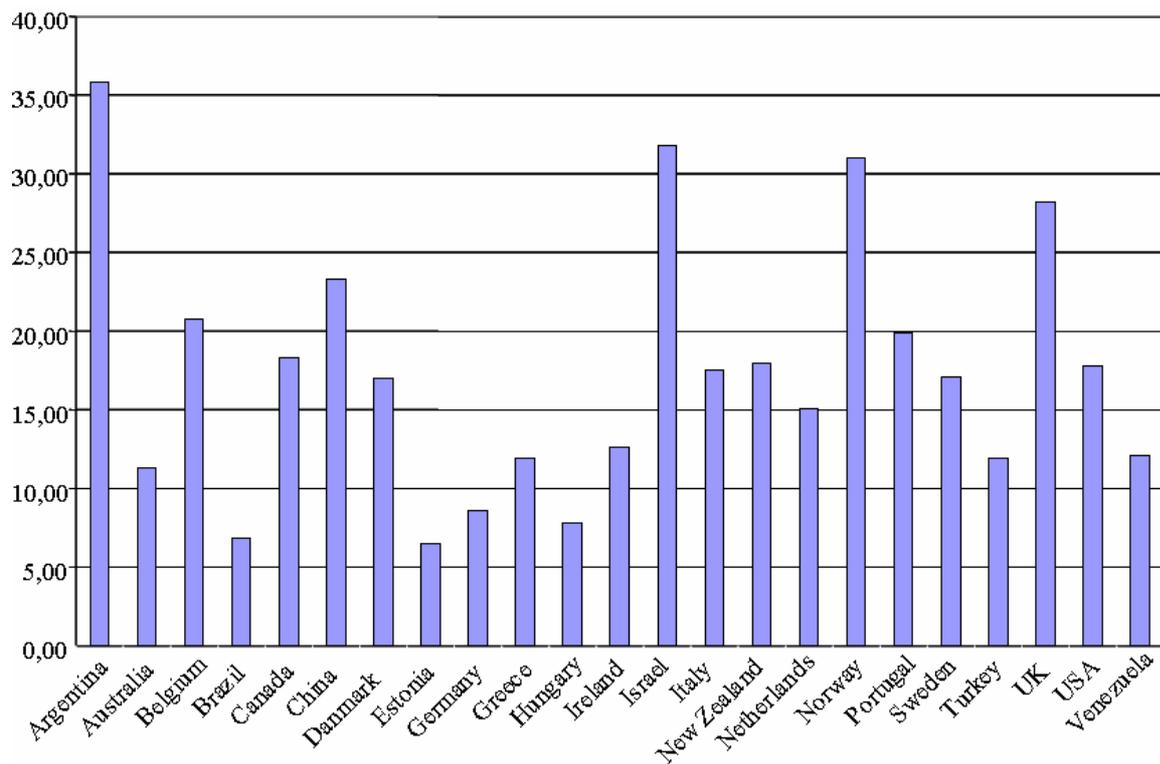


Figure 7 – Finished goods inventory (expressed in days)

Figures 6 and 7 show the inventory days for work-in-process and finished goods. In this case, Venezuelan firms handle inventories relatively low with respect to other countries. Again, the fact that most of the customers of these Venezuelan firms are local can explain this behavior.

Past and future strategies

Figures 8 show for the Venezuelan firms, results obtained from questions related to lean manufacturing strategies. In this figure we have conserved the original scores (1 to 5) in order to compare past and future strategies. Two things are to be highlighted: even if firms have applied in some extent the last three years some of the lean manufacturing strategies, there is room for improvement opportunities; the second aspect to be stressed is that these firms are ready to apply these strategies in the future with a greater intensity. We found this latter behavior in firms from every country participating in the study.

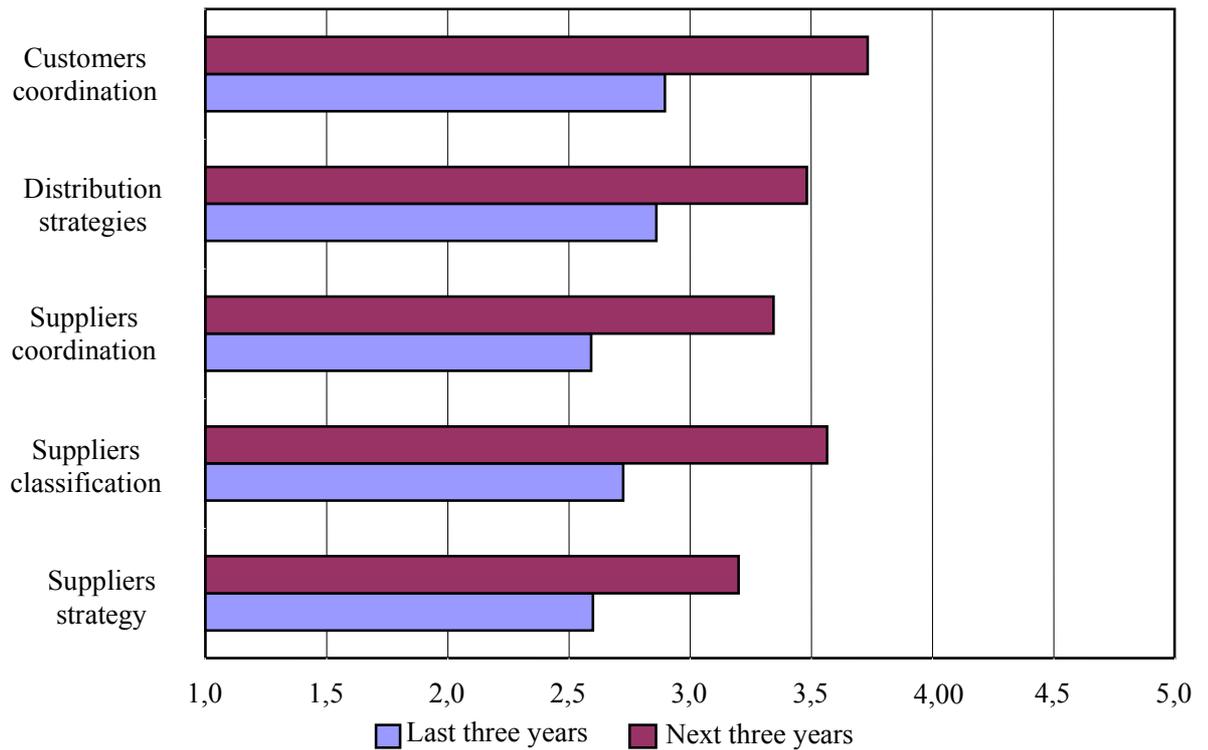


Figure 8 – Finished goods inventory (expressed in days)

Conclusions and prospectives

- Taking the group of firms participating in the IMSS (fourth edition) as a reference, most of the suppliers of the Venezuelan firms are based abroad. This fact introduces some difficulties in those lean manufacturing strategies that are related with the supply chain.
- On the other hand, three quarters of the customers of our sample are based in Venezuela. This fact makes easier the adoption of lean practices related to the customers (WIP and finished goods inventories, closer relationships, CPFR with customers, ...).
- *Quality and delivery performance* are the most important criteria in order to select providers. Other countries show similar behaviours. Other criteria associated with lean manufacturing issues as *willingness to disclose information* obtain, in both cases (Venezuela and Other countries) a rather low score. Trust -a key element in modern and effective supply chains- is not a common characteristic between respondents.

- The use of CPFR practices is still very limited in Venezuela. According to the results of this study, China, Portugal and Israel are the countries with best scores in this aspect.
- Samples per country in the IMSS project are very heterogeneous. It would be desirable to have a segmentation by size and by economic activity in order to extract more accurate conclusions about the application of lean manufacturing practices in these segments.

References

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