Applicability of Sourcing on Product Development: A case study in agricultural sector

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Abstract
This paper aims to demonstrate through a case study in agricultural sector that the supplier development, also known as sourcing, has a direct influence on the product development success and has been affecting qualitative and quantitatively on the final outcome of the product.

Keywords Sourcing, Supply Chain, Product Development

Introduction
Within the spheres of Production Engineering, perhaps the most eclectic of engineering, one of the current issues that has been providing great materials for analysis is what we know as Supply Chain, which is basically the process responsible for handling the information and materials flow from the supplier to the company and from the company to the customer in a standardized, interconnected way.

In the current world production chain, the involvement between company and suppliers has been getting force. In consequence for this fact it is developed, in a natural form, an approach between both parts, giving this relation a big importance, creating an extreme influence to the successes of the business (MAZZALI et al., 2011).

Following this tendency, well none companies created/developed huge production centers, where, beyond of the own space for the factory, house the major and crucial suppliers, in order to make a narrow contact with the partners and form a complete supply chain that, according to Feldmann and Muller (2003), is set as area of strategic coordination in the deal between commercial partners and companies, with a macro face about the processes involved with the propose to optimize the performance as all. Being so, the objective of these centers it to integrate perfectly as much as information and material to the chain.
For the successes of those chains there is a need of a mutual development of all parts involved for company to be able to attend the nuances and inconstant that the mobility of the market demand, in the case of Brazil pushed up mainly for the economy increase of the BRIC (Brazil, Russia, India and China).

In the scope of the supply chain, Su et al. (2010) quote that the supplier development, perhaps known as sourcing, present consisting in: set strategy, according to the commercial goals, integrated to create value, both by choosing and selecting the suppliers and business partners.

In this perspective, sourcing is shown as an essential tool for the companies. Know how its suppliers are involved and mainly, and give all the support for its development are tasks held to the supplier development, aggregating value to the process of production development, described by Mundin et al (2002) as: guarantee update production lines and with characteristics of performance, expense and distribution according to the level of consumers demand through its own capacity to pull out new products in the market.

As mentioned, there is a big movement to house the company/supplier in the same space and the supplier work effect directly in the business. To know when and until where you can trust the supplier is a step that cannot be treated with less importance in relation to any other product development.

Therefore, the goal for this case studied is to make clear the concepts, as described by Rozenfeld et al (2006), where the involvement of the supplier in the product development is determinant factor for the process improvement in terms of the product productivity, velocity and quality, that reflect in the reality of the company.

The possibility of fusion between one or more departments in the company, as well the real imminence in this interaction add value to the group as a whole it is what motivate and engagement the study, mainly considering the fact the supply chain and product development are departments culturally distant.

Thus, this survey has the objective to prove that the concepts reported are applicable and influence qualitatively and quantitatively in the process as a whole.

**Bibliographic review**

With the current market leveling, any improvement, regardless of the department or area within companies, it shows the great value, lower is the complexity and impact. In this context, areas that have tradition relation with external departments, as supply chain reflect the concepts of small actions bringing huge results.

It is known that, according to Pires (2009) and Simon (2005), the competition is not between the companies isolated and also between supply chains. Chains formed by companies, suppliers and clients in all levels, that is supplier of the supplier and also client of the client.

As it was said by Lambert et al (1998) and Pires (2009), supply chain is composed by a group of companies that work directly since the acquisition of raw material transforming in intermediary and finished products until its distribution. The supply chain represent, however, integration of business process of consumer through the product suppliers, service and information, with the goal to aggregate value to the client.

Another definition is found in Christoper (2009), said that supply chain is a web of organizations connected and interdependent, working together under mutual cooperation, to control, manage, and improve the raw material flow and information of the suppliers to the final clients.
As in other areas in the organization, and in the supply chain, the products development is not restricted only in the survey and development area, but the sum of information fed by internal and external department, like clients and supplier (LYU; CHANG, 2007).

As more than one company is involved with the same purpose, the synergy becomes crucial for the god running of the whole chain. Synergy is defined by Silva and Zawislak (2007) as:

“The combination of internal organization – the formation of development teams and the adoption of communication ways that rush the information trade and make feasible the conduction of current activity – and external organization – the effective and proactive participation of clients and suppliers, with a goal such to prove the company product, as optimize the development process.”

It is consensus in the literature that the supply chain turns around the efficient integration between suppliers, manufacturers and distributors. It is expected then, effective production and distribution, reducing process costs at all (SIMCHI-LEVI et al., 2003).

The sum of all the factors said let the company manufacture more, with low cost to attend all its client’s expectation, obtain high profits and consequently develop a link with the same results described by Christopher (2001).

Yet in relation to the products development, the literature show that, develop products is to achieve the project specification of the product and its production process using the necessity of the market and technology restrictions (ROZENFELD et al., 2006).

In this aspect, the suppliers development, sourcing, in the view of Silva et al (2005) is one of the area with direct influence in the process, can be cited as example follow sourcing, concept adopted by companies that implies in the installation of partners around the manufacturing plant, developing a new form of relation between them, as well product development and production process.

One of the great virtue to involve suppliers since the beginning of the products development is the fact to be able to transfer them part of the responsibility of innovating and production of components, releasing more attention in relation to essential competence (Silva et al., 2005).

For the effective and full performance of one supplier in the product development, it is necessary to include the same logo in the beginning of the project, impacting the cost reduction and time to be developed. Moreover according to Quiescenti et al. (2006) and Assumpção (2003) the degree of involvement in the process and the level of responsibility attributed to it reflect in the final result.

Lambert (2004) makes it clear that not all the suppliers practice the same influence in the supply chain, and, therefore, define exactly this importance is a task that is in the scope of the suppliers development. Some factors impact more in the choice, such as technology incorporated in the product or the volume of the supplying.

Once defining the partner with great impact, the work consists in manage in a close manner the relation with these suppliers, segregating concepts the only deal with suppliers through quotes and shopping. As the contact must be narrower, the entail turns to be more powerful not only in relation to the deal of products, but also with documents, process and terms of the contract (LAMBERT et al., 1998).
According to Simon (2005) and Lambert (2004) the suppliers receive different attention that vary in the according with the degree of importance into the process. Seen it, define that the process of sourcing can be divided into two parts for the suppliers considered critic:

- **Strategic** – corporate review of manufacture, identify the criterion to classify suppliers, guidelines the degree of customization and structure development;
- **Operational** – Distinction of the key supplier, constant review of the range of key suppliers or not, identify the opportunities along the partners, development and implantation according to the product and service and quantification of the performance and development of reports comparing the costs versus profitable of the supplier.

As quoted by Lambert (2004), it is crucial to have solid base of documents and contracts with the partners aiming to protect in a consistence form the intellectual patrimony of your own company. Due to the large flow of information that the supplier development process involves, privileged information are exchanged. That is, the formal commitment of the high administration is crucial, whether or not to protect the intellectual patrimony or to guarantee present success and the future of the company.

Even with the real necessity to exchange the privileged information, the company must worry with the content not to feed in an involuntary way a supplier that could be a future competitor (LAKEMOND et al., 2006), the reciprocal is true, that is, worries exist in the supplier part too in relation a trade information, rightly looking not to provide data that make possible you client develop its own product.

Independently regardless of the precaution that must be taken, the reliable relation between partners, as well the capacity of the supplier to attend the clients requisition, are indispensable facts for the relation between companies.

Considering the fact that all topics lean to the same point, strengthen the relation between suppliers and companies, it is evident the necessity of a team work among Product Development and Supply Chain.

**Methodology**

The analyzed process here is the order of gearboxes (imported component) applied in an agricultural equipment to harvest forage, named in this case as EQ1, toward to the cattle segment in a company “x” in country side in the state of São Paulo.

The transmission box is developed since its conception by the company to fill the market niche, since now unexplored. With that, the necessity of the acquisition and development of new materials has been crucial.

Therefore, were analyzed all the situations preceded the choice of the final supplier: an Italian company with fabric plant in China. The way the technologic and contractual specifications were treated as well the resolution is the study base that is divided into theses process:

- Technical concepts analysis: temperature, noise, mass, torque, live cycle;
- Commercial aspects: cost, payment condition, stock, lead time, know-how, technical assistance;
-Strategic analysis: dealing in an intellectual property exchange and commitment to improving the development of the gear.

**Previous study Scenery**

It was verified that the company “x” already had a range of suppliers the responsible to supply the gearboxes quoted EQ1, however it was noticed that selective analysis were not done about the choice, considering only he cost. In this current work, the supplier will be named as “A”.

With that, the previous study scenery is shown in this way: High number of reposition in guarantee - ~27%; High stock due to the lead time and bad reposition volume --~1.7 months; Obsolescence of the equipment among its competitor; High degree of clients discontentment.

It is clear that the worries with other facts beyond costs were not part of the strategy, neither the company “x” nor the supplier “A”, that’s what shows the mainly problem quoted before.

**Case study**

Once noticed the fragility of the process as a whole, analyzing only one inconstant commercial or strategic, independently what, a supplier study was needed.

Considering the fact that the company “x” did not have a department for supplier development, was organized an internal committee with representatives of supply chain area, engineering, P&D and after sale, where all the points that could cause impact in the productive process of EQ1 were reviewed.

This integration among departments made possible a macro approach of the process, where some gaps left before were filled.

Established all the variables, described in the methodology, were developed four suppliers (A, B, C and D) that feed all the proposal conditions, and that, obviously, each one interacting in a different form with the requirement.

**Technical concept**

From the committee, required topics were raised that must be contemplate in order to chose the ideal supplier, being: temperature, noise, mass, torque, live cycle. Figure 1 shows the integration with suppliers to the defined technological requirements.

![Technical Requirements Graphic](image-url)
It is important to emphasize, as the technological requirements are project crucial premises, other suppliers that do not achieve the satisfactory rate were not quoted in the analysis and consecutive are not in the process.

**Commercial concepts**

As in the technical concepts, for the commercial concepts were also established standards to be followed: cost, payment condition, stock, lead time, know-how, after sale; As said above, the steps are correlated, that is, only the commercial parameter of supplier that performed as the technical requirements were analyzed.

However, the commercial analysis is more complex, all the variables are to be negotiated, that do not occur in the topic before.

On table 1 and figure 2 can be observed the commercial concepts and the relation between suppliers and the clients’ requirement.

**Table 1 – Commercial Concepts**

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<td>4</td>
<td>Until R$ 350,00</td>
<td>Flexible within the needs of the company by any value</td>
<td>Brasilian</td>
<td>Gearboxes</td>
<td>41 to 100 years old</td>
<td>Until 18 days</td>
<td>59 to 54 years</td>
<td>76 to 100 years</td>
<td>Bigger than 450</td>
<td>61 to 80</td>
<td>Return to one week</td>
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<td>3</td>
<td>R$ 350.01 to R$ 400,00</td>
<td>Flexible within the company's need for larger values</td>
<td>Italian</td>
<td>-</td>
<td>61 to 80 years old</td>
<td>18 to 36 days</td>
<td>53 to 38 years</td>
<td>51 to 75 years</td>
<td>201 to 450</td>
<td>41 to 60</td>
<td>Return to two weeks</td>
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<td>2</td>
<td>R$ 400,01 to R$ 450,00</td>
<td>Not flexible but with the possibility of trading</td>
<td>North American</td>
<td>Other Products</td>
<td>41 to 60 years old</td>
<td>18 to 36 days</td>
<td>6 to 22 years</td>
<td>26 to 50 years</td>
<td>51 to 200</td>
<td>21 to 40</td>
<td>Return to 3 or more weeks</td>
</tr>
<tr>
<td>1</td>
<td>R$ 450,01 to R$ 500,00</td>
<td>Not flexible with the impossibility of trading</td>
<td></td>
<td>-</td>
<td>Until 40 years old</td>
<td>Until 5 days</td>
<td>Until 25 years</td>
<td>Less than 50</td>
<td>Until 20</td>
<td>There isn't</td>
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**Figure 2 – Commercial Requirements Graphic**

After an initial analysis of the 2 first aspects, represented by Figure 2, it is possible to notice that supplier “A”, the initial choice, truly attend the aspect of cost, however the other requirement are really poor.
Strategic concepts

From data picked by the committee and shown in the previously items, the supplier “C” was the best option, since it showed to be more prepared, attending the requirements in a concise and linear form. That is what did not happen with the others that attended with excellence some points, but not the other points, or, there were high levels only on topics that were not that impactful in the final result, as an example, mass, described in the technical requirements.

Once the supplier was defined, the committee started the action again, in a close manner matters considered strategic and applicable normally related to the final period of the negotiation were treated, as dealing of intellectual property and mutual development.

To make the access to the project of EQ 1 possible as well obtain knowledge of its functionally, the chosen company to supply the transmission box started a long process of sending documents to guarantee the safe trade of the intellectual property form one company to the other.

Obviously, with no access to these documents, the project would take long time and be more costly, that is, theses trades are absolutely necessary. However, as quoted in literature, this trade must be well supervised and studied, preferable by the legal department of the company, in order to inhibit loss.

Other fact talked and analyzed in the part refer to the continue development supplied product in order to fulfill all the market evolution. As said before, when still in use, the equipment supplied by the company “A”, one of the problems was exactly the obsolescence of the product to the competitors.

Maintain the supplier able to be in a sustained evolution make your product up-dated too. That is, the support of Company “x” is crucial, because this company produce a great part of the necessary inputs for the continuous improvement, especially from the clients of the company.

Comparison of results

As predicted, the supplier C is more efficient in all aspects, except in the concept of cost, what cannot be parameter since the wrong choice resulted in high cost for the fail repairs, as shown in Figure 3 that compare commercial and technical performance between two suppliers, A (pre-sourcing) and C (pos-sourcing).

![Comparative Graphic Vendor A versus C](image-url)
To show the Sourcing efficiency was elaborated a performance indicator to measure in numbers all the changes occurred in the transition period. Goal of this indicator was to reflect the previous and posterior scenario to the process to choose a new supplier. 14 periods were analyzed; the supplier change was in the sixth period, what can be seen in the Figures 4, 5 and 6.

Figure 4 shows the reduction allowance of the guarantee after the transmission box supplier was changed. Before the sixth period, the guarantee allowance was around 27% of the volume, after the change, this number was reduced to an average of 4%.

Beyond the high guarantee allowance, the long lead time of the supplier made the stock levels of the company “x” turned around 1.8 months, that is, considered a high level to the market pattern. After the process change this number was reduced to 1.1 months, a number that makes the inventory turn of the company bigger, as shown in the Figure 5.

As a last performance indicator was used a satisfaction survey of the pattern client of the company, with questions related to the process, from sales plan until the product efficiency in the
area. To Figure 6 was considered the grade for “product general efficiency” Grades below 6.9 were considered unsatisfactory and above or equal 7 were considered satisfactory.

![Figure 6 – EQ1 versus Unhappy Customers](image)

The decreasing result of allowance of the guarantee, stock levels and level of dissatisfaction was a significant financial economy to Company “x”. It is good to emphasize that, the allowance in guarantee, was considered an average value of freight of 3% per trip above the invoice, that is, one freight for the client’s refund and analysis in guarantee and other freight to remit, totalized 6%.

Notice the cost with allowance in guarantee as well unnecessary stock were reduced meaningfully, proving the efficiency of the project, where, a product with higher cost at first, brought financial reduction after, turning to be more beneficial in relation to the other choice.

**Conclusion**

From what was presented in this case study it is evident that the sourcing in the company “x” was efficient. The study showed that after the implantation of the new supplier the results were extremely satisfactory, showing that the analyze to chose a supplier must involve more than the issue of cost.

All the factors that impact the products must be treated with total attention, and mainly in the beginning of the product development process, as quoted by Rozenfeld et al (2006). It is worth mentioning that part of the EQ1 success in the after change period was due by continue improvement program executed by the company together with the supplier, that in any moment let the product obsolete in the market, maintaining the client’s satisfaction.

**Bibliographic reference**


