Supplier Development applied to the Space Industry

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Abstract:

If Supplier Development (SD) is at the heart of strategies of most industrial companies, it is because its scope allows to meet universal needs by focusing on the cost, the quality and the delivery performance. It is also the result of acceptation from companies that suppliers were an essential stakeholder of the whole industrial scheme. In this context, the world's largest corporations assign specific teams to lead projects which aim to improve the performance of these partners. This is the case of the aerospace industry and particularly Airbus Group which implements corporate policies within each entity to avoid logistic risks. This study aims to analyze the applicability of the Supplier Development to the Space Industry which is characterized by constrained purchases, a unit production and in some cases, a power asymmetry favorable to the suppliers. However, thanks to academic researches and two interviews of Supplier Relationship Managers (SRM), we will try to understand to what extent the Supplier Development can be applied to the Space Industry.

Key words: Supplier Development, cost-quality-delivery performance, space industry, industrial scheme, defense, constrained purchases, power asymmetry, dependence, unit production, civil oriented strategy, innovation.

Résumé:

Si le Supplier Development est au cœur de la stratégie de la plupart des entreprises industrielles, c'est parce qu'il permet de répondre à des besoins universels tels que les coûts, la qualité et le délai. Il est également le fruit d'une prise de conscience de la part du maître d'œuvre qui considère que les fournisseurs sont un maillon essentiel du schéma industriel. Des équipes dédiées sont ainsi établies par les grandes entreprises pour améliorer la performance de ces partenaires. C'est le cas d'Airbus Group qui met en place une politique générale déclinée dans chaque entité pour éviter les risques logistiques. Cette étude vise donc à analyser l'applicabilité du SD à l'industrie spatiale caractérisée par des achats contraints, une production unitaire and un pouvoir asymétrique au profit des fournisseurs. Grâce à des recherches académiques et l'interview de deux SRM, nous tenterons de comprendre dans quelle mesure le SD peut-il être appliqué à l'industrie spatiale.

Mots-clés : Supplier Development, coûts-qualité-délais, industrie spatiale, schéma industriel, défense, achats contraints, pouvoir asymétrique, dépendance, production unitaire, stratégie civile, innovation.

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Introduction

Growing competition among companies has forced them to reduce their costs to maintain a high level of profitability and traditional approaches encourage decreasing costs within the company. However, new practices have been developed in this regard such as outsourcing and subcontracting.

However, those tools are not always optimal. Despite a decrease in short-term costs, poor management of the performance of the supplier may lead ultimately to higher costs. This is why companies, through their purchasing department, set up suppliers control policies. These programs are widely suitable for mass production industries; indeed, it is easier to invest in order to further benefit from economies of scales. But what about the performance monitoring and unitary production? In order to answer to that question, we choose to focus on one specific business: the space industry.

The space industry is a high value-added industry where rocket or satellite production is unitary. Today, space projects are all different. From scientific satellite like Rosetta to GPS satellite like Galileo, how can we satisfy the customer's needs regarding the capabilities of the final assembler and its suppliers? One of the key success factors is the cooperation between the prime contractor and its suppliers through the Supplier Development.

Throughout this analysis, we will try to respond to the following problematic:

How can Supplier Development fits with the industrial scheme of the space industry characterized by constrained purchases and unit production?

In this regard, we will first focus on the concepts of Supplier Relationship Management and Supplier Development from an analytic point of view. Then, we will explain our research methodology to finally apply all these concepts to the space industry.

PART 1: Analytic study of the Supplier Development

I] Focus on Supply Chain concepts

The company environment is composed by different stakeholders such as clients, law enforcement, competitors and suppliers. The importance of managing suppliers in order to fit firms' operations is strongly acknowledged across the Supply Chain (SC) literature. The company not only adopts a promotion position with respect to its environment but also develops structural relationships with customers and suppliers. How not to create dedicated services to its suppliers when they can represent 70% of the total costs of the company? (Ford, 2003) Developing relationships may even lead to value creation or even competitive advantage (Wisner, 2003) so that the term "win-win relationship" or "mutual value delivery" comes to illustrate the benefits that can be drawn.

Here, we will focus on the Supplier Relationship Management (SRM) and one of its components: The Supplier Development (SD).

1.1) Supplier Relationship Management

A company shares relationships with one or more other companies, but from when we talk about SRM? Begin our remarks with a definition of SRM. “Actions taken by an organization (namely, by people in that organization, in particular senior management) to create an environment (through policies, management systems, business processes) that reliably leads people in that organization to exhibit collaborative attitudes and behaviors in their interactions with suppliers.”[1]

The main goal of the SRM is to optimize the procurement process through different tools like improving communication thanks to a common Enterprise Resource Planning. Sharing information allow better comprehension of each other’s will and compulsion. Thus, the SRM is characterized by the willingness of the company to be proactive and by the human and material resources engaged to develop relations with its environment. But relationship does not necessarily mean sharing and goodwill.

[1] Vantagepartner.com, what is supplier relationship management and why does it matter? Available:http://www.vantagepartners.com/uploadedFiles/Consulting/Research_And_Publications/Smart_Form_Content/Publications/Articles/What_is_SRM_DILForientering.pdf, (04/01/2015)

As D.M. Lambert suggested in his article « The eight supply chain management processes », relations depend on the provider status: there are relationships that will be defined as contractual relationships and other as strategic ones. This is why the relationship between companies cannot be studied in the same way.

We must see the SRM as a way for the company to achieve its primary goal which is to generate profitable turnover. In fine, the SRM reveals two types of benefits: cost savings (lower costs for materials, result in better quality control, and / or reductions in generation times) and earnings (improvements in technology and innovation, better product / services quality, better reputation). Krause, in his article *The relationships between supplier development, commitment, social capital accumulation and performance improvement*, confirms this connection: "When organizations invest in relation-specific assets, engage in knowledge exchange, and combine resources through governance mechanisms, a supernormal profit can be derived on the part of both exchange parties". However, the concrete savings and benefits obtained depend on the length, size, and type of a development project.

SRM approach results in a long internal process in which we can distinguish five main steps:

1) Make a segmentation of its portfolio by classifying suppliers according to specific criteria,
2) Define an improvement plan according to the position in the supplier panel, carried out an application,
3) Provide a performance monitoring
4) Exchange EDI,
5) Analyze the results with KPI (as an index of productivity or generated operating cash) and scorecard.

Managing the performance of its suppliers thanks to dashboards is an undeniable asset for the company. However, beyond monitoring performance, it's sometimes necessary to contribute to this performance. The purchasing company is going to set up a process to help improving the performance of its supplier: we are talking about Supplier Development. We will now focus on defining this concept and demonstrate in which context we can talk about Supplier Development.

1.2) Supplier Development (SD)

Actually, what do we know about Supplier Development? Watts and Hahn (1993) note that supplier development "involves a long term co-operative effort between the buying firm and its suppliers to upgrade the suppliers' technical, quality, delivery and cost capabilities and to foster ongoing improvements".

Supplier Development is an approach that aims to secure the supply chain and maintain the fulfillment of the promise made to the payer's clients, despite the problems and incidents related to the production process. The SD is not limited to performance monitoring and regular information taken on the economic dynamics of the supplier. Triggering a SD procedure means investing time and money in order to obtain a more or less long-term result. There is a real collaboration with a limited number of key strategic suppliers (Nagatia, Rebolledob, 2003): “SD activities such as onsite visits, training, assistance, and work teams are mostly reserved to key suppliers. These activities provide selected suppliers with opportunities to reinforce and improve their capabilities.”

According to the organizational theory, those initiative are relative to complex industries where there is a high degree of interdependence between the component manufacturer and final assembler (e.g. automotive, electronics) (Pfeffer, Salanciks, 1978).The theorists of relational school further this idea. The investments realized by companies are made to achieve tangible results like better quality or reduced delivery time (Madhok, Tallman, 1998). On the one hand the principal must allocate resources *in situ* at the supplier, provide methodological support and ensure that the dysfunctions of the company detected are included in the internal improvement plans. On the other hand, the supplier must be ready to share internal information, allocate employee to the improvement effort and also be ready to invest in new equipment. Clearly, if the appropriate tools are not in place, both parts won’t perceive the benefits associated with the investments. That’s why if a buyer ask a supplier to invest in a specific relation, the buyer must be ready to make some effort. A new current enriches the literature by applying the theory of social capital (Nahapiet, Ghoshal, 1998): “The sum of the actual and potential resources embedded within, available though, and derived from the network of relationships possessed by an individual or social unit.”
In addition, because they create material or intellectual value, relationships are considered as capital. This capital is derived from the relationships developed between partners through their past and actual interactions witch lead to the establishment of a new asset. Sharing social and humans values lead to a better collaboration “To score big with suppliers, you have to win their hearts.”[2] .

It is important to notice that SD's practice can also be done in a social and environmental perspective, for example by using the ISO 14001 label. Corporate Social Responsibility of the supplier can be a new choice factor during call for bids. For instance it must be appropriate for the supplier to check their environmental footprint. When a strategic supplier do not respect those criteria and a long term relation is expected, an important work must be done.

[2] Dave Nelson, former vice president of purchasing, Honda of America.

Small businesses are not equipped to face this engagement that is why major enterprises help them through Supplier Development. Companies are deploying SD methods when both parties really want to work together at all perspectives (financial, material, and human); this is why SD involves collaboration or even more integration. Concerning the analytical view, we can say that theories complement each other, the field of study is not yet mature enough for creates real differences between research currents.

After presenting Supplier Development in a general view, we will focus on three main objectives of this practice: product/service quality, delivery performance and cost savings.

II] A focus on three items

As explained before, many industries rely on component suppliers, and as a consequence the buyer performance depends on that of the supplier. When the suppliers do not perform, the buyer and finally the end customer will be impacted. Commonly, buyers use SD in order to improve supplier's performance on three items: product/service quality, delays and delivery performance and innovation. Now, we will detail how to improve each of these points.

2.1) Product or Service Quality

Quality is one of the main focuses of final assemblers. An organization who wants to improve the quality of their own goods or services must implement a program of continuous improvement and also must control the quality of their own suppliers. Improving quality cannot be done in isolation. When the product is made up of few parts, a focus on a certain numbers of suppliers may be required. How companies trace their quality problems? They mainly focus on three items: weakness due to poor design, defects due to internal manufacturing errors, defects in parts or components supplied by vendors. Concerning the third items, this problem can be solve thank to Supplier Development program.
There are several tools to improve quality. Generally, process improvement leads consequently improving the quality of products. For example, the Six Sigma (Youssaf et al, 2013) method developed by Motorola is a continuous improvement tool to target the highest quality. The method is based on five steps that can be found in the acronym "DMAIC": Define Measure, Analyze, Improve, and Control. One of the ultimate goals of a quality improvement approach is the ISO 9001 certification. Better quality has a "win-win" consequence: the buyer gets a quality assurance from its supplier, and the supplier gets opening doors for new bids.

Product Quality are primarily measured through an indicator: the PPM (Parts per Million). This indicator measures the ratio: number of non-quality parts delivered to the customer multiplied by 1 million and divided by the total volume of delivered parts. This is equivalent to the percentage indicator (1% = 10,000 PPM), but more suited to mass production. The buyer must set a goal with his supplier that he will commit to respect and thanks to dashboards the buyer can monitor the performance of its supplier. Quality is one of the main challenges for industries with very high added values such as aeronautics and space industry. A quality defect will have a detrimental impact, while in mass industries the rate of non-quality is already quantified in the award of contracts.

2.2) Delays and delivery performance

Deadlines are also important for the SD. One of the main changes is to adopt a pull production instead of a Push production. Tools like Kanban promoting production pull system can be set up as part of the SD. The Supplier Development allows increasing the reliability of delivery and delivery speed. How to improve these delays? Using lean management techniques can be an answer. This involves working on several points: reduced transit time in workshops and stocks, online transactions, reducing start / launch control time, procurement planning, increased rates by controlling the parameters, etc …
The buyer can analyze supplier performance with "On Time Delivery" indicator. We distinguish the command rate delivered on the date requested by the customer (OTD-R: On Time Delivery to Request) and the order rate delivered by the promised date (OTD-C: On Time Delivery to Commit).
We can connect this need to meet deadlines with the flexibility capacity. The environment is increasingly unpredictable, and needs are changing rapidly. This need for flexibility exists particularly for mass product production. When projects are evolving over several years, starting components can be obsolete if the technology has evolved. This is why purchasing service are generally linked to the Product Life Cycle Management.

2.3) Innovation

SD methods are generally used for two essential points: the minimization of logistical risks and/or collaborative creation. Here we will focus on the second point. Integrating its suppliers in the development of a product or process allows the company to innovate by taking into account all constraints. Embed the supplier is taken into account limitations and habits but also enjoy its expertise. Plus, collaborative innovation allows both parts to find new methods, knowledge or technologies (explicit and tacit knowledge). This collaboration is not only about new product, but also process.

Many articles agree that working with its suppliers in initial stages of a product development is a factor of differentiation and innovation, allowing a better competitiveness on the market. Moreover, integrating its supplier in an innovation project gives him confidence in his abilities and boosts its capacity for innovation. This point is especially true for high value created industry. By creating a collaborative environment with strategic suppliers, the SD is designed to improve the flexibility of supply, to provide better service levels, control product quality while reducing purchasing costs. In the end, SD techniques involve a repositioning of suppliers in the value chain.

PART 2: Research methodology

We decided to couple different sources to obtain a result that may help future work. In order to gather result, we mainly choose to follow the way of the empirico-inductive method.

Currently the scientific literature on areas such as the space industry and the supplier development is slight. Still, reading academic articles have given us the opportunity to lay the foundations of our reasoning and especially to precisely define the keywords of our analysis. Our precision has been improved by the definition of keywords, and therefore our credibility. In the search of an always more precise thesis, we also used the educational resources and some teaching materials of classes followed at the Toulouse Business School.

After using analytical tools, we have supported our analysis with empirical sources. To complete our academic researches, we performed two different semi-directive interviews with two Supplier Relationship Managers in charge of two products, which are, the platform Eurostar E3000 and the Solar Panels. The differences of these two equipment constitute a strong backbone for our analysis because the first one is a standardized product whereas the second is an unique equipment. The topics are the same for both interviews and are presented in the following table.

	Themes
1	**Function of the Supplier Relationship Manager** *Its main functions, its daily work*
2	**Specificity of the equipment he is in charge of** The technology, its criticality, its potential modifications
3	**The nature of the suppliers he has to deal with** The number of suppliers, their size, their significance in the portfolio
4	**The objectives he has to comply with** The nature of objectives (cost, delivery, quality), their achievement
5	**The difficulties he has to face** Lack of resources/competencies, relationships with suppliers, differences between the objectives and the field
6	**The perceived differences with the Aircraft industry** Free discussion

The choice of the semi-directive interview was motivated by the will to obtain precise data by giving the interviewee the freedom to express themselves on other topics. It is important to precise that these interviews were supported by internal documents like PowerPoint presentations. However, due to confidential issues, we cannot add those documents in annexes and precise the identity of the interviewee.
In the same way, to be really exhaustive in our analysis, we should broaden our researches to other major actors of the space industry like a Prime Contractor and a major supplier.

We then choose to use a benchmarking method. To demonstrate the specificity of SD in the space industry, it seemed important to us to have a benchmark to demonstrate how it is different from standard industry. We made our comparison between the avionic and space industries of Airbus. We want our work to contribute to the "maturation" of this theme. This will eventually allow stepping back and then lead to critical studies. After explaining our methodology, we will introduce you the aircraft industry and then the space industry.

PART 3: The supplier development applied to the aerospace industry

I] The Supplier Development within Airbus Group

1.1) The importance of the SD in this industry

In the article *Airbus s'envole, les PME s'affolent*, Tom Williams, the Head of Programs of Airbus explains "la majeure partie de la valeur ajoutée se situe dans…les éléments produits par nos fournisseurs". We understand here the central role played by the suppliers. Actually, an aircraft is the result of a very complex industrial scheme where suppliers can be associated with the backbone of a programme (James, 2013).

Indeed, the Supply Chain of Airbus gathers more than 20 000 suppliers and any kind of failure from one supplier could have negative effects on the entire Supply Chain. In this regard, the pressure is put on each stakeholder, whatever its size and its criticality to comply with the final objectives as we can see when Michel Dubarry, the Head of Rolls-Roys which provides the engine of the aircraft said "Mon objectif numéro un est d'être prêt pour livrer à temps"[3]. The SC is a key success factor as explained in *Risques et Performance d'un réseau industriel d'approvisionnement, essai d'identification et d'analyse, des secteurs automobile, aéronautique et construction navale*. According to the author, « les sources de la compétitivité se bâtissent sur les métiers de l'entreprise et par le pilotage des productions externalisées et de leurs approvisionnements » (Fassio 2006).

We can also encounter this phenomenon in the industrial schemes of Airbus Helicopters and Airbus Defence & Space. These two entities are assimilated to the high technology industry and the corporate strategy is the same, that is to say, the role of "architecte-intégrateur" as mentioned *in Contrôles et proximités au sein de la Supply Chain aéronautique* by Damien Talbot. This notion refers to the design and assembly of the final product. These companies are thus at the top of the pyramid and use the outsourcing for manufacturing subsystems.

[3] interviewed by Olivier James 2013).

As such, they have to manage a large set of stakeholders dominated by the “firmes pivots” as Thalès which are involved in the specification process. From a global point of view, all of this channel would be a “entreprise réseau”, that is to say a set of independent entities that work under the authority of a coordinator (Burlaud, Teller, 2004).

To meet the final requirements in terms of quality, cost and delivery time, these companies have to implement tools in order to ensure foster the coordination inter-firms. As Talbot explains, “Les coordinations inter-firmes visent alors à acquérir, conserver, combiner et transmettre des connaissances, des représentations, des savoir-faire, des expériences”.It is now necessary to focus on the way that Airbus manages the suppliers to improve its Supply Chain efficiency.

1.2) How does it be applied within Airbus?

To better understand the importance of the SD in the context of the civil aircraft industry, we have to take a look at what we call the “ramp up”(Olivier James 2013). In this regard, the “ramp up” corresponds to “l’augmentation des cadences de production pour fournir des volumes de commandes en constante augmentation”. As such, ensure subcontractors’ capacity to keep pace with production is the priority for Airbus. Indeed, if only one supplier fails, it can cause delays in the overall project. This issue is relevant because each supplier has to make arbitrations in case of increase in production volumes. Indeed, they can not meet all the requirements of the contractors for all the networks in which they are involved (Fassio 2006).

In this context, Airbus assigns a dedicated team to its suppliers which struggle to follow the rhythm of the production. As Tom Williams explained, the main difficulty is to take into account the smallest suppliers that are also critical in the whole industrial scheme. Beyond the problematics linked to the production volumes; we have to understand that each program has its own specificities. The challenge is thus to foster the suppliers to be flexible in their production and in their processes.

As we explained before, the industrial scheme of a program gathers a large set of stakeholders. As such, each supplier has to ensure the efficiency of its own Supply Chain whatever its rank. The article from Olivier James presents the example of Zodiac which is a major actor of the aerospace industry in the world. The Head of the Directory, Olivier Zarrouati highlighted the importance of the Supplier Development by explaining that it was one of the keys which allow bettering managing the increase in production volumes. In this regard, the company implemented a targeted training plan focused on the Lean Management for the small suppliers.

This project is based on each step of the Supplier Development principles, from the identification of the issues, the implementation of action plans to the monitoring phase. In brief, he resumes the Supplier Development as “un veritable metier”.

1.3) The Supplier Development as a way to mitigate the Logistic Risks for Airbus

In the context of a network, the logistic risks are created by the leading company in so far as it commits to the requirements of the client. Concretely, these logistic risks can be associated with delay or product quality. In this regard, an efficient logistic supposes that the quantities delivered are conform to the quantities ordered as well as the prescribed quality (Fassio 2006).

It is very important here to notice that “Just in Time” stream involves an increase dependency of Airbus (Musson, Maier, 1999). Indeed, this is the order that triggers the production. Now, we could have a look on three logistic Risks that appear as Key Success Factors for Airbus.

1.3.1. The Delivery Time

The Delivery Time constitutes a standard case for Airbus. It is a point of differentiation that can allow a company to win a call for tender. Once the contract signed, any failure from this point of view could jeopardize the possibility to sign other contracts. From a legal point of view, certain clauses added to the contract can foresee financial penalties for delivery delays. As such, the proximity and the coordination appear as strategic way of development between the suppliers and Airbus; two aspects that can be taken into account by Supplier Development Plans.

The efficiency of the network depends on the synchronization of the different activities of purchasing and production. The logistic performance implies the connection of physical and information flows. The geographical aspect is another way to be exploited in order to avoid delays. Facilitating for example the creation of industrial suppliers parks close to assembly sites can be associated to a form a supplier development (Fassio, 2006).

1.3.2. The quality

The quality of the items constitutes also a central issue for Airbus. Certain components can be manufactured at a lower quality than the standard required.

However, the aircraft industry is driven by the durability and the lack of quality associated to delays could cause hidden costs as the dissatisfaction of the clients. The last point constitutes a good transition given that we can assimilate the Cost as another Logistic Risk.

1.3.3. The Cost

Given that the clients are airlines companies (i.e. the customers are the passengers), one order correspond to dozens of aircraft. For Airbus, the unit selling price should be less than the listed initial price. To maintain a high level margin, the objective consists in reducing the costs of production. Any "lean" actions from the suppliers contribute to this target and justify a supplier development plan.

The Supplier Development has fully its place within the aircraft industry to meet the different requirements of cost, quality and delivery time. The question is to know if it is relevant to implement common supplier development policy within the group given the specificities of the space industry.

II] The applicability of the Supplier Development to the Space Industry

2.1) The SD as a major challenge

First of all, our study is based on the Business Unit "Space Systems". Indeed, some researches have already been led on the division "Space Transportation" of Airbus Defence & Space SAS. However, we will use the findings of these researches to build our analysis given that Francois Auque, the Head of Space Systems in Airbus Defence & Space said in *La fabuleuse année 2014 d'Airbus Space Sytems* that for Ariane 6, the "time is a key factor". In the same article, the author insisted on the success of the company in 2014 from a commercial point of view. Indeed, Airbus DS record 14 orders of satellites with 10 dedicated to the observation of the earth. The portfolio of orders gathers today 39 satellites, a performance that allow the company to save 600 jobs in a period of social troubles (Cabirol, 2015).

But, this business performance constitutes another challenge for its supply chain. Indeed, Airbus DS must be able to deliver the satellites at the right time and at the required quality standards. This is a relevant precision given that the delivery plan of the A400M has been reviewed for 2015.

The company justified the delay by problems linked to the Supply Chain. Before presenting the different elements which can jeopardize the implementation of Supplier Development in the space industry, we must focus on the Prime Contractor function.

2.2) The role of Prime Contractor in the Space Industry

Actually, the Prime Contractor (or project manager) manages the whole industrial scheme from the design to the provision of the satellite on the launch site (or in orbit). In this context, Airbus Defence & Space manages the design and the assembly chain through the AIT (Assembly, Integration and Test) and commits its responsibility in terms of delivery time, quality and service to the buyer. Concerning the industrial process, the company chooses the stakeholders that will be involved in the program.

As explained in the research article *Exploratory Study of Buyer-Supplier Relationship in a context of constrained (or restricted) purchases* (Barbat, 2011), the role of Airbus DS, as the supply chain manager is characterized by: “The programmes which have a long term industrial development cycles”; “The nature of the space systems which are produced in small series and in-flight testing is impossible, hence, they must be perfectly operational the one time that they will be used”. After explaining the industrial context, we can now focus on the applicability of the Supplier Development within Space Industry.

2.3) A rigid industrial scheme

2.3.1. The issue of constrained purchases

The concept of constrained purchases refers to the reduced panel of suppliers for a need which characterized the Space industry. For certain components, equipment or subsystems, there is only one supplier. To understand this phenomenon, we have to remember that this is a high technology oriented sector. Consequently, it corresponds to standards in terms of technical and quality performance to be part of the suppliers’ network and a fortiori, the human qualified resources and production equipment.

Beyond, these “traditional constraints”, there are others factors which have a real influence of the purchasing policy of Airbus Defence & Space. The Geographical return which refers to the system used by the European Space Agency. The principle is that for a project, the industry of a country has to be served in function of the amount invested. There are also factors due to the nature of the end users of the

programs. Given that most clients are the states for their defence needs, the suppliers have to be approved according to different regulations as the “Confidentiel Defence” for example (Barbat, 2011).

Now, we will see if a context of constraint purchases can be conducive with the Supplier Development. The first finding on which we can base our analysis is the dependence. Indeed, the suppliers of Airbus Defence & Space have a strong bargaining power given that they represent a unique source of purchase. Moreover, we can assert that the company is dependent on its suppliers thanks to three factors (Pfeffer, Salancik, 1978):

1- Such equipment are very significant for the final deliverable
2- As the semi-directives interviews highlighted it, certain suppliers are essential in the industrial scheme
3- These suppliers have the upper hand over those resources

It can be assumed that Airbus dependency is not favourable to the suppliers’ developments which have a strong bargaining power. In this regard, the theory of the resource dependence explained that “rarity undermines organisational cooperation, meaning that actors then have an interest in developing strategies that will allow them to avoid the influence of other organisations possessing the resources that they need to acquire” (Nogatchewsky, 2004).

In this context of constrained purchases, Airbus DS has to rely on governance systems to pilot such relationships. That refers to formal mechanisms such as the contract which implies rigid process during the Supplier Relationship Management. The contract helps the company to keep the control on the whole industrial process. It is also used to prevent the company from any conflicts related to the delays or the quality, thanks for example to the penalties (Barbat, 2011). On the contrary, it is questionable whether a sanction is really possible when the supplier is a monopoly (Georges Fassio 2006).

Beyond the context of constrained purchases, the supplier can also asserts its bargaining power through what some authors called the “Slack relationnel” in the article *Fournisseur, sois flexible et tais-toi!* written by Donada and Dostaler . Indeed, we can link the concept of flexibility and the Supplier Development. But, in certain circumstances, the supplier can judge that the measures to be implemented are not very profitable for its company.

The analysis of this balance of power is interesting because the authority is not the result of an asymmetry but “un ensemble d’actifs tangibles supplémentaires (systèmes de gestion intégré bien maîtrisé), organisationnels (équipe de développement qui aide le client à améliorer ses produits) et relationnels (faible transigeance) qui lui donne l’aisance d’exprimer une force de proposition » (Donada & Dostaler). The concept of « slack relationnel » is quite relevant in the Space industry as the intervewes showed. Few critical suppliers, not necessarily in situation of monopoly, could impose their conditions. Now, it is interesting to focus on a specific case.

2.3.2. The Case of Thalès Alenia Space

Thalès Alenia Space (TAS), a franco-italian company, is presented as the second major actor of the European Space Industry. The relationship between the company and Airbus Defence & Space is really atypical and deserves to be analysed. They are both partners and rivals. Indeed, they are rivals when each actor makes a business proposition for tenders. They are also partners according two possible configurations:

1. One company is the Prime Contractor and the other is in charge of the manufacturing of an equipment
2 The companies are both “Co-Prime”, that is to say, they are both the Project Managers (e.g. for the Program Arabsat 5C, Airbus DS supplies the Eurostar E300 platform and TAS designs and builds the communications payload)

Thus, regarding some communication satellites, for those witches Airbus DS is the Prime Contractor, TAS appears as an essential supplier with which the company has to rely on. Naturally, we assume that both actors will base their relationship on the cooperation but it is more complicated.
We could qualify this relationship more as “arm’s length relationships” in which each company considers the other as a rival (Watt et al., 1992). Consequently, given that Airbus DS is in a situation of unilateral dependence, there is a lack of cooperation, not very conducive to supplier development plans. Moreover, we can assume that develop TAS could constitute a risk for Airbus DS regarding future call for tenders.

For the moment, these two players remain confined to this type of relationship even if a hand was stretched by TAS when J-L Galle, the CEO explained “Coopérer pour mieux affronter la menace”. At the contrary, Francois Auque thought that the competition creates added value and maintains a high level of innovation. The question remains open at the highest political level.

2.3.3. A unit production oriented industry

A sales program for Airbus DS implies only one satellite whereas a sales program for Airbus means about fifty aircrafts. Consequently, we can qualify the space sector as a small series industry. However, one of the main objectives of the Supplier Development is related to the costs. We easily understand that the cost reduction for a small series production is a little bit paradoxical. Indeed, a supplier cannot achieve economies of scale if it produces one equipment.

In the same manner, in the article *Supplier development or Supplier Switching?* researches show that the company must develop the incumbent supplier if the variance of its costs is high. However, even by taking into account the price of raw materials, the variance of the costs for a small series production is not very high (Friedl, Wagner 2012).

To be exhaustive, we found in our researches that even in constrained purchases context, it exists relational content-based exchanges that contributes to the reduction of opportunistic behaviour (Heide, John, 1992). Furthermore, the power asymmetry doesn't jeopardize the commitment of the supplier and could facilitate the coordination (Caniëls, Gelderman, 2007). Is it the gateway for the Supplier Development in the Space industry?

III] Application prospects for the Supplier Development in the Space industry

3.1) The conciliation between SD and constraints purchases

To introduce this part, researches showed that an asymmetric interdependence does not necessarily lead to a misuse of power (Provan, Gassenheimer, 1994). At the contrary, this asymmetry of power (favourable to the supplier) could improve the supply chain of a company (Maloni, Benton, 2000).

We explained before that we could associate the relationship between TAS and Airbus DS to "arm's length relationships". But, other suppliers with which it is mandatory to rely on work closely with the company through "close-cooperative" relationships. That implies a daily data exchanges and a high level of commitment from both parties (Watt et al., 1992).

Beyond the scheme of constrained purchases, Airbus DS has to bet on the suppliers with which the company has relationships we could qualify as total interdependence. Concretely, they represent critical equipment or subsystems for Airbus DS but they are also strongly dependent. In this regard, some researchers agree to say that these types of relationships imply a strong cooperation over the long run, based on trust, where both parties invested a lot and fairly (Geyskens et al. 1996). Consequently, it is precisely with these suppliers that Airbus DS has to lead Supplier Development Plans.

3.2) The SD as an obligation

Some simple industrial contexts imply naturally the use of Supplier Development as a logic response to the Logistic Risks, particularly within the Space Industry.

3.2.1. The testing issue

Contrary to the aircraft industry, the space sector is characterized by the impossibility to perform in flight testing. Indeed, we can make a test flight for an aircraft before delivering it to the client. However, it is not possible to put a satellite in orbit just for the testing stage regarding financial and logistic matters. Consequently, the quality of the components and equipment is a major issue for the stakeholders of a project, particularly for critical items as antennas or solar panels whose life expectancy has to be long. In this regard, the Supplier Development appears as really strategic given that one of its main objectives is the quality.

3.2.2. The issue related to the Supplier Switching

The question of supplier switching is natural whether its performance doesn't allow to reach the standards in terms of quality, costs or delivery time. However, the high level of technology which characterized the space industry implies some tangible and intangible resources. Indeed, the costs related to the requalification of another potential supplier are so high in terms of know-how, machines, and competencies that changing suppliers can be very difficult (Barbat 2011). In this context, the Supplier Development appears as the most viable strategy from an economic point of view.

3.3) The impact of a civil oriented strategy

Historically, the end-users of the Space Programs are institutional clients as states (defence) or the European Space Agency (scientific missions). However, little by little, the portfolio of orders of Airbus Defence & Space is composed by private actors which invest in telecommunication programs. In this context, the company developed generic platform which constitute the base several satellites (platform Eurostar E3000). Consequently, the panel of the suppliers has been broadening thanks to less regulation (e.g “confidential defense”). In the same manner, given that the purchases are less constrained, the bargaining power of Airbus DS is higher. We can easily understand that it constitutes a more favourable context for the Supplier Development. From an industrial point of view, standardized equipment is subject to the effects of experience which is related to the objective of costs reduction. Supplier Development plans could be well applied here in order to improve the quality and the delivery time.

3.4) The innovation at the hearth of the SD

Researches highlighted the importance of the cooperation for the innovation. In this optic, the more a company cooperates, the more it increases its ability to innovate (Le Roy,2013). Furthermore, the cooperation with the supplier has a positive impact on the level of novelty in the innovation (Belderbos, 2004). Consequently, we understand here the importance to put the supplier at the heart of the innovation for a company as Airbus Defence & Space. The Supplier Development is really relevant when the project manager require innovative products. Indeed, it implies lot of changes in the whole industrial scheme. An incremental innovation for example, implies to review all the process previously implemented. During the interviews, the SRM explained that, the items to be produced were categorized according to their level of novelty. For example, an item classified A corresponds to a new item or new features. Consequently, it implied more monitoring for the suppliers. So, as we can see, it is mandatory to assist the supplier in this time of change given that, beyond the requirements in terms of quality, the supplier has to comply with the “classic” objectives that are the costs and the delivery time. In this regard, the program called “Comètes” which is an initiative dedicated to the accompaniment of key suppliers situated near from the capital, consisted in communicating the technological dashboard of Airbus to these suppliers in order to make easier their adaptation. Moreover, this program aimed to train them around the concepts of the “Lean Management”, the use of ERP. To be exhaustive, we can precise that the results were positive given that the number of non-compliant units has been halved and the On Time Delivery rate increased by 21% percent in half a year (Parisot, 2012).

Conclusion

As seen during the first part, SD is actually one of the main focuses for prime contractor. The gap between complementary firms decrease so formal processes are created in order to manage those new relations. Nowadays, a good governance of those relations can be a real asset.

We saw that, beyond the context of constrained purchases and small series production, the Supplier Development is quite relevant regarding the testing issues or the cost of supplier switching. The new nature of the end-users of Airbus DS constitute also a good prospects of application of the Supplier Development due to the standardization of the equipment and a bargaining power refocused on the company. Finally, innovation implies also the implementation of the Supplier Development to reach quickly a required level of performance. In this regard, the level of novelty condition the intensity of the actions implemented within Supplier Development plans.

However, the stakeholders have common interests but still struggle to share the added value and this is the base of the line between Supplier Development and partner control. The objective is clear, limit the opportunist behaviour. Consequently, different performance criteria are fixed as the cost, the quality and the delays to make easier the control and reduce the information asymmetry (Talbot, 2011). Thus, in the space industry, does the information sharing aim to help the supplier or to control him and even more; does the SD really aim to balance the ratio of power?

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