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Relações entre as dimensões da cultura nacional e a integração do fornecedor na
tríade produto-processo-cadeia de suprimentos:
estudo de caso do consórcio modular

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To my parents for never letting me give up hope

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“Effort only fully releases its reward after a person refuses to quit”

(Napoleon Hill)

RESUMO

RODRIGUES, F. P. Relações Entre Dimensões da Cultura Nacional e a Integração do Fornecedor na tríade Produto-Processo-Cadeia de Suprimentos: Estudo de caso do Consórcio Modular. 2014. 118f. Dissertation (Master) – São Carlos School of Engineering, University of São Paulo, São Carlos, 2015.

No ritmo acelerado da globalização e nova concorrência no mercado, Desenvolvimento de Novos Produtos (NPD) e *Supply Chain Management* (SCM) representam hoje uma fronteira para obter vantagens competitivas para as empresas. Uma interface entre o NPD e o SCM, a Integração do Fornecedor (SI) provou ser eficaz como vantagem competitiva. No entanto, há uma falta de investigação sobre como variáveis humanas, tais como cultura nacional, pode moderar a eficácia da integração do fornecedor (SI) nesses campos do conhecimento. Portanto, este estudo investiga as relações entre fornecedor Integração da Cadeia na tríade Produto-Processo-Cadeia de Suprimentos e as Dimensões da Cultura Nacional. Para tal foi realizado um estudo de caso exploratório em três empresas do setor automobilístico que operam no Consórcio Modular (MC) no Sudeste do Brasil e usaram-se as dimensões culturais de Hofstede's (2001) para modelar fatores humanos. Os resultados mostram uma evidente relação entre a integração do fornecedor com a baixa Distância do Poder, baixo Individualismo e elevada Aversão à Incerteza, no entanto não foram obtidas relações evidentes para as dimensões Masculinidade e Orientação a Longo Prazo para a Integração do Fornecedor no estudo de caso. A principal colaboração deste trabalho é o fornecimento de uma melhor compreensão do potencial impacto do fator humano para a integração do fornecedor em empresas que possuem operações no Brasil.

Keywords: INTEGRAÇÃO DA CADEIA DE SUPRIMENTOS; CULTURA NACIONAL; INTEGRAÇÃO DO FORNECEDOR; CONSORCIO MODULAR.

ABSTRACT

RODRIGUES, F. P. Relations Between National Culture Dimensions The Supplier Integration in the Product-Process-Supply Chain Triad: Case Study Of The Modular Consortium. 2014. 118f. Dissertation (Master) – São Carlos School of Engineering, University of São Paulo, São Carlos, 2015.

In the rapid pace of globalization and new market competition, the New Product Development (NPD) and the Supply Chain Management (SCM) represent today a frontier to obtain competitive advantages to companies. One interface between NPD and the SCM, the Supplier Integration (SI) has proved to be effective as competitive advantage. However, there is a lack of research on how human variables, such as national culture, can moderate the effectiveness of Supplier Integration on those fields. Therefore, this study investigates the relationships between Supplier Integration from the Product-Process-Supply Chain triad and the National Culture Dimensions. I conducted an exploratory case study in 3 companies in the automobilist industry that operates as a Modular Consortium (MC) in Southern Brazil and used the Hofstede's (2001) national culture dimensions to model national cultural factors. The findings show an evident relation between Supplier Integration with the Low Power Distance, Low Individualism and High Uncertainty Avoidance poles, while no Masculinity and Long-term Orientation pole was distinct for the Supplier Integration in the case study. The managerial implications of this study is to provide a better understanding of the potential impact of human factor to the Supplier Integration in companies that will have operations in Brazil.

Keywords: SUPPLY CHAIN INTEGRATION; NATIONAL CULTURE; SUPPLIER INTEGRATION; MODULAR CONSORTIUM.

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1 INTRODUCTION

This Chapter aims at contextualizing the research topics and then will be presented the theoretical background and context. From this discussion are presented some gaps found in the literature and followed by the delimitation of this research project along the objectives to be pursued.

Today's economy is characterized by the globalization and increased competition. In the light of a fast globalization process, the New Product Development (NPD) gains even more importance as to establish competitive advantages (KLEINSCHMIDT; DE BRENTANI; SALOMO, 2007; WIENGARTEN et al., 2011). Companies increasingly develop products for international markets, and often in abroad facilities, in order to stay competitive (CRAWFORD; DI BENEDETTO, 2008; ULRICH; EPPINGER, 2004). For instance, companies often invest overseas by initiating start-ups, forming joint ventures, or acquiring existing organizations (PRASAD; BABBAR, 2000).

The New Product Development comprehends the value creation process to the customer, where a new product is design, alongside its process and supply chain (CLARK; WHEELWRIGHT, 1993). The NPD is a process usually divided in phases, the early phases the NPD contain the main strategic planning and product still is very conceptual and abstract (COOPER, 2011). On the NPD effort it is expected that the external environment, combined with internal competencies, offer crucial clues about innovative new product and market opportunities that facilitate firms to thrive and to achieve a competitive advantage (KNIGHT; CAVUSGIL, 2004).

After studies in the Japanese industry that showed novel forms to interact with suppliers (CLARK; FUJIMOTO, 1991), several Western firms started to pursue such Japanese practices, such as develop and rely on a hierarchical network of suppliers as showed by Dyer and Ouchi (1993) at Chrysler. In the 1980s, Chrysler was the weakest and smallest of the three big US automakers, lagging behind GM and Ford, and because of that it had complicated relationships with its suppliers, who preferred to work with the other two larger

US automakers. At the time, US automakers kept their component and subsystems development internally, using suppliers only on the low-end production of very detailed parts.

At the point of collapse and bankruptcy, Chrysler changed drastically its relationships with suppliers. In place of uttering detailed specifications to its suppliers, pitting them constantly against each other and keeping them just for short period contracts, Chrysler would commit to long-term relationship with its suppliers who would responsible for developing and building entire subsystems (DYER; OUCHI, 1993). Together, Chrysler dramatically reduced its internal technology and component development activities, focusing on design, assembly and marketing. The supplier and partners were soon favoring Chrysler's vehicles with the latest technical innovations, and Chrysler entered a renaissance (FINE; GOLANY; NASERALDIN, 2005).

As observed on the Chrysler case, the Supplier Integration (SI) in the NPD may not contribute to operational performance directly, but can help manufacturing companies to overcome launch problems and capabilities issues, facilitate component innovation, improving quality, reducing costs, time-to-market and create a different bond between the firms (CLARK; FUJIMOTO, 1991; VAN HOEK; CHAPMAN, 2007).

Under the same increasing competitive perspective, the Supply Chain Management (SCM) became a frontier and focal point to many companies in search to beat the competition and thrive in the markets where there is great pressure for cost reduction, shorter time-to-market, quality improvement, best customer support and technological innovation (PIRES, 2009). In this context, the Supply Chain Integration (SCI) of internal business functions and external business partners has received increasing attention of practitioners and academics in recent years (ZHAO et al., 2011). The SCI can be viewed as the level to which a firm collaborates with its supply chain partners and collaboratively manages internal and inter-organization processes. The goal in SCI is to reach: "effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer at low cost and high speed" (FLYNN; HUO; ZHAO, 2010).

Internally, customer's orders flow usually go through several functions, activities and even departments in an organization. In addition, if a delay happens, the customer does not care which activity generated the delay, for he sees a company as a whole. This requires a

very integrated process and information sharing, planning and working together and cross-functional teams are important elements in this process (FLYNN; HUO; ZHAO, 2010).

From the external perspective, companies are pressed to cooperate with their suppliers and customers to overcome various challenges, such as demands for low cost, high quality, best delivery, flexibility, customer service, innovation and respond to a rapidly changing environment (PIRES, 2009; ZHAO et al., 2011).

Only recently has there been a consensus that a more systematic approach to SCI research is needed, as increasingly worldwide competition has caused organizations to rethink the need for cooperative, mutually beneficial supply chain partnerships (LAMBERT; COOPER, 2000) and the joint improvement of inter-organizational processes has become a high priority (ZHAO et al., 2008).

Recent researches showed that Supplier Integration (SI) is closely related to product performance and NPD success (KOUFTEROS; EDWIN CHENG; LAI, 2007; PETERSEN; HANDFIELD; RAGATZ, 2003, 2005) while is not that clear its relationship to operational performance (KOUFTEROS; VONDEREMBSE; JAYARAM, 2005). Once unique parts have been selected, the firm may rely on a supplier for engineering work, thus, reducing, to some extent, internal engineering efforts in the this part of the project and releasing staff for other key activities as well.

The Supplier Involvement can be understood as the participation of a supplier or partner during the NPD process (RAGATZ, 1997) and such involves joint design, process engineering and production operation collaboration (LAU, 2011). While the supplier involvement may range several levels, the Early Supplier Involvement (ESI) stress the supplier participation should take place in the initial phases in the NPD. Such involvement can smooth efficiency improvements, reduce development costs and lead times, reduce product costs and improve product value (WYNSTRA et al., 2012)

To better comprehend the nuances that involve the NPD and SCM scopes was proposed a framework that encompasses both constructs, as well the process development – inherent in the Supplier Integration in the NPD effort – known as Three-dimensional Concurrent Engineering (3DCE). The 3DCE complements the traditional Concurrent Engineering (CE), that states that process and product developments should be taken in parallel in order to avoid rework and reduce costs (FINE, 2008). The adoption of CE has

become an ordinary effort and longer provided competitive edge to the firms. Therefore, organizations looked to the next step of innovation to breakthrough and according to Fine (2008) that step is to look together at product, process and supply chain going beyond concurrent engineering, 3DCE is defined by the author as: "... the simultaneous development of products, processes and supply chains". Several recent researchers have used the 3DCE framework to better comprehend the complex reality of New Product Development where focus on product and process is strengthened by an additional consideration of supply chain (i.e. ELLRAM; TATE; CARTER, 2008, 2007; FINE; GOLANY; NASERALDIN, 2005; FIXSON, 2005; HUANG; ZHANG; LIANG, 2005) But Ellram, Tate and Carter (2007) points: "The simultaneous design of product, process and supply chain (3DCE) links internal functions while calling for participation from customers and suppliers. There has been limited work in the field of SCM that explicitly links product-process-supply chain design".

By evaluating in an integrative perspective of 3DCE, it is clear that ESI is a social process and, by that, is filled with behavioral factors (CLARK, 1989; MORGAN; LIKER, 2006; PETERSEN; HANDFIELD; RAGATZ, 2005; PIRES, 1998), such as culture (be that organizational or national) (HOFSTEDE, 1980; SANTOS et al., 2010). On the same line, Pagell, Katz and Sheu (2005) question: "why might resident managers based in different countries pursue significantly different approaches when faced with the same set of decisional factors?" For instance when firms internationalize, their culture must couple with globalization. This means being open varied customer needs and preferences, and different national cultures and competitive scenarios (KLEINSCHMIDT; DE BRENTANI; SALOMO, 2007)

Prior studies show that there may be an impact of national culture on several activities and techniques associated with the New Product Development and the Supply Chain Integration. For instance, Griffin (1992) reports that Quality Function Deployment (QFD), a originally Japanese technique, when applied without customization often failed in the U.S., possibly because of a less-than-optimal fit with the American culture.

To Hofstede (2001) culture is a collective mental programming that distinguishes a group of people from another group and the national culture may be more observed through values and the organizational culture resides in practices and attitudes, therefore, the national

culture is somewhat less tangible than the organizational culture. In his seminal work, (HOFSTEDE, 1980) identified four major dimensions: Power Distance, Uncertainty Avoidance, Individualism *versus* Collectivism and Masculinity *versus* Femininity and later, when studying oriental countries found a fifth dimension: Long-term *versus* Short-term Orientation.

Some studies have examined international issues between regions or different country situations, however often overlooked the importance of national culture as a way to explain and predict management decisions in a global context (GOVINDARAJAN; GUPTA, 2001; WIENGARTEN et al., 2011). It is still uncertain how cultural differences the relationship in SCI and with performance, as well there is a lack of studies in developing economies. (FLYNN; HUO; ZHAO, 2010)

Regarding the studies between national culture and the NPD, Nakata and Sivakumar (1996) point: "Surprisingly, academic researchers' examination of the link between national culture and new product development has been indirect at best". The authors also proposed a series of propositions relating the NPD phases and the Hofstede's national culture dimensions. The scarcity of studies on contextual factors that influences the supplier involvement efforts is also pointed by Petersen, Handfield and Ragatz (2005): "it would be of interest to examine how various practices buying firms might employ in managing the relationship with the supplier might influence the process". In the same line, Pagell, Katz and Sheu (2005) affirm: "Finally and most importantly, future studies need to move beyond the macro level theory that focuses on whether culture matters, to the more micro level question focusing on how culture matters."

Recently, Barczak (2012) upholds that national culture and new product development (NPD) is an important area for research and the majority of this research is based on U.S., Japan and Western European contexts and such lack of studies in emerging economies should be examined in a culture as follows:

With the rise of emerging economies such as Brazil, Russia, India, and China (BRIC nations), there is a need to examine what we know about NPD and innovation and see whether these same principles and best practices work effectively in non-Western and emerging market contexts.

While some studies have tested the contingency role of national culture on diverse marketing, manufacturing practices models, and in management in general, there is evidently

much that is not acknowledged Metters (2008). Considering the previous discuss and gaps found in literature, this work aims at answering the question:

- Does the Supplier Integration, from a New Product Development and Supply Chain Management perspective, relate to the human variable (modeled as national culture dimensions) as a contingency factor?

Therefore, the purpose of this work can be divided in following objectives:

1. Investigating the Supplier Integration as a phenomena related to National Culture Dimensions; and
2. Finding how local and original cultures on Multinational Enterprises plants in Brazil influence the relations found in (1);

2 SUPPLIER INTEGRATION IN PRODUCT-PROCESS-SUPPLY CHAIN

This Chapter aims at presenting the main concepts to be used in this research project concerning the Supplier Integration in New Product Development (NPD), focusing on the Early Supplier Involvement (ESI) as part of Concurrent Engineering. Secondly, presents a discussion on Supply Chain Integration (SCI), again focused on the Supplier Integration. Lastly, there is a section to put in context culture as a contingency factor in NPD and SCI literatures.

2.1 New Product Development

Based on the seminal New Product Development literature (CLARK; WHEELWRIGHT, 1993; CRAWFORD; DI BENEDETTO, 2008; ROZENFELD et al., 2007; ULRICH; EPPINGER, 2004), NPD is defined as the process of conceiving and creating a new product, or service, and all the results of that process. This process and outcomes may be assessed subjectively, objectively or both. The main objective of the NPD is to create, add and deliver value to the customer through a sequence of phases and processes.

Previous studies show that new product is responsible for one-quarter to one-third of companies' financial growth and, therefore, is one of the most important factors to companies thriving in the market and has gained managerial attention worldwide (BOOZ; ALLEN; HAMILTON, 1982)

On the last third of the previous century, spurred by new technologies and global markets, the NPD became the center of attention of competition and mean to achieve competitive advantage in many industries (CLARK, 1989). According to Pagell, Katz and Sheu (2005), one of the most important trends facing managers is the continuous and increasing attention to the globalization. In Brazil, the change is also greatly perceived in the 1990s and after, by the intensification and continuously search for new forms to deal in the organization and the production systems (CENTELHAS; GIFALLI; PERES, 2013).

The concept of NPD as a process in stages or phases is not recent and it has long been studied and applied in the industry (BOOZ; ALLEN; HAMILTON, 1982; COOPER, 2011).

Despite differences on number of stages (usually ranging from 2 to 10), there is clear that a new product starts by from being abstractly conceived, developed, and finally produced and marketed.

As pointed out before, the NPD is often considerate a process and is divided in many phases or stages, and by that some refer to the NPD as a stage-gate process. The gates refers to evaluation tasks in NPD process and they are responsible for steering the project as well halt it if the product development project loses its merits or is no longer viable (COOPER, 2011). The process can be analyzed in phases, but it is not clear how much the phases overlap, since only the fixed point – the gate – marks the ending of the phase, as points Crawford and di Benedetto (2008):

One should note that the neat, linear sequencing (...) is just not typical. The reality is that activities [in the NPD] are note sequential, overlapping. (...) There is much pressure for firms to accelerate time to market for new products, and this overlapping of phases is an important tool in speeding new products to market.

The NPD process formality can be beheld as an organizational resource the provides ground to the firm to retain superior performance. This formality guarantees that the NPD project team know the key tasks and activities are taken in an timely fashion, from the appropriate sources and regarding a standard, in the form all the right parties in the NPD effort gets involved in the coordination and implementation (COOPER; EDGETT; KLEINSCHMIDT, 2002; COOPER, 2011). To illustrate the phases in a generic NPD process model, the phases identified by Crawford and di Benedetto (2008) are five and are presented in Figure 1 – Generic New Product Development process in phases
Source: Crawford and di Benedetto (2008).

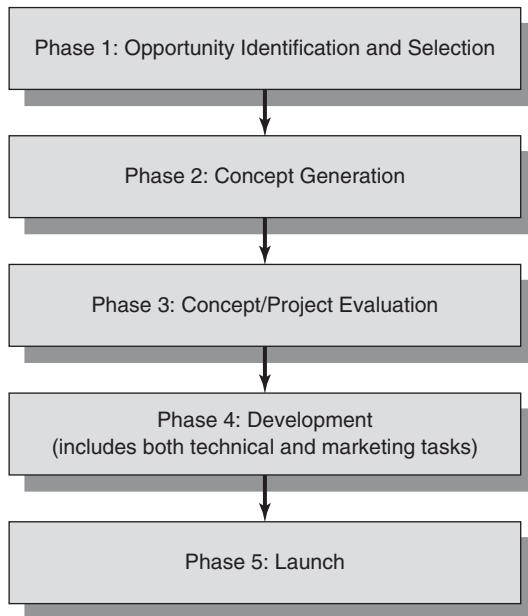


Figure 1 – Generic New Product Development process in phases

Source: Crawford and di Benedetto (2008)

In this model, the first phase is labeled Opportunity Identification and Selection and is considered strategic in its nature, and while are hardly the same for different companies the main activities involve market planning, corporate planning and opportunity analysis – here the opportunity is a very abstract product idea. The second and third phases are Concept Generation and Concept Evaluation, where these abstract product ideas grow and are evaluated according some screening or pre-technical evaluation. The fourth phase is the Development and the last is Launch, where the product concept becomes real rather than abstract (CRAWFORD; DI BENEDETTO, 2008).

In the second half of the twentieth century most of companies kept this early phase activities of NPD in-house, with minimal involvement of third parties and suppliers. This division between the activities and parts developed in-house and the parts to be developed outside constitute the new product project scope (CLARK, 1989). According to Clark (1989), the new product project scope has two components: the choice between unique *versus* off-the-shelf parts and the choice of the supplier involvement.

Clark and Fujimoto (1991) and Clark and Wheelwright (1993) also presented evidences that the project scopes vary greatly from industry to industry, as well from country to country. In the automobile industry, the authors have found that the different scopes explained the differences in performance, as they point:

In particular, it appears that a distinctive approach to scope among Japanese firms — high levels of unique parts and intensive supplier involvement in engineering — accounts for a significant fraction of their advantage in lead time and cost. (CLARK, 1989)

Since the 1990's worldwide firms have started to move from traditional purchasing, outsourcing following some of the Japanese practices, which one of them if that Japanese firms rely on closely formed stable hierarchic networks of suppliers, as showed by Dyer and Ouchi (1993).

2.1.1 Concurrent Engineering

Companies that face a changing environment will have to battle the uncertainty that comes along, they will have to adopt an organizational design that is efficient in acquiring and processing additional and rich information, that is information of different fields. Wheelwright and Clark (1992) propose such an organizational design as an “integrated problem solving” method that includes an early involvement of members who will be part to a cross-functional team that works on different phases of product development simultaneously. This process links the upstream and downstream groups involved in product development in time and in the pattern of communication, therefore it forces a standardization in the flow of information. Others have called this approach ‘concurrent engineering’. (KOUFTEROS; VONDEREMBSE; DOLL, 2001)

Concurrent Engineering differentiates from other approaches to NPD in that it presumes that products and processes should be designed simultaneously, and depends upon the early involvement of cross-functional teams, often including suppliers (BLACKBURN; HOEDEMAKER; VAN WASSENHOVE, 1996; KOUFTEROS; VONDEREMBSE; DOLL, 2002; SWINK, 1998). The use of Concurrent Engineer also works as a strategy for reducing lead-time in which there is an overlapping of the nominally sequential development activities (CLARK; FUJIMOTO, 1991). Overlapping coupled development activities, involves the use of early and preliminary design information and is considered challenging to manage because of its ability to lead to development rework (KRISHNAN; EPPINGER; WHITNEY, 1997). Other benefits of the deployment of Concurrent Engineering include the supporting a product innovation or quality focus (O'LEARY-KELLY; FLORES, 2002), cost reduction, quality

improvement, improvement of customer satisfaction overall (ELLRAM; TATE; CARTER, 2007)

According to (KOUFTEROS; VONDEREMBSE; DOLL, 2001), the three basic elements of CE are: the early involvement of participants, the cross-functional team approach to the tasks and the simultaneous work on different phases of product development. Those elements allow additional information to flow across constituents while constituents can engage in direct communication and debates for the adoption of solutions compared to the traditional sequential approach.

Early involvement of many areas (e.g. manufacturing, purchasing, marketing, designers) has become essential for cycle time reduction and improvements in product innovation. As pointed by (KOUFTEROS; VONDEREMBSE; DOLL, 2001): “In fact, the most cited reason for delays in product development projects in manufacturing systems is engineering change orders”. Product designers may find out early that manufacturing capabilities cannot meet the customer and marketing.

Early involvement empowers downstream members; they have “a say” before decisions are final. Simultaneous planning of process and product allows issues of manufacturability to be evaluated and incorporated in the final product design. Therefore, Concurrent Engineering can be refined as early involvement of a cross-functional team to simultaneously plan product, process, and manufacturing activities (Hartley, 1992 *apud* KOUFTEROS; VONDEREMBSE; DOLL, 2001).

Cross-functional teams provide an channel for participants to express their concerns and also presents a mechanism for tacit learning. With concurrent work activities and flow, simultaneous activities are encouraged. With early publication of information, engineers can start working on distinctive stages of the project while final designs are also evolving. Time-consuming rework is also avoided because the early release of information promotes early detection that the product design is veering off target. Time is wasted when physically separate functions need to communicate. (KOUFTEROS; VONDEREMBSE; DOLL, 2002; ROZENFELD et al., 2007)

The works on Concurrent Engineering also shows that product design aspects such as complexity and design for quality can be enhanced over greater cross-functional involvement,

leading to shorter manufacturing lead times later in the product life-cycle, premium pricing, and better quality (FLEISCHER; LIKER, 1992).

2.1.2 Early Supplier Involvement

Because ultimately the customer evaluates the value of a product, the customer integration into new product development has been extensively researched (GRIFFIN; HAUSER, 1996), and it was only relatively recently that Supplier Integration in NPD has received scholars attention (PETERSEN; HANDFIELD; RAGATZ, 2005).

The relationship between the supplier and buyer companies bases itself on reciprocity. Not only the suppliers are desirable by their know-how and capabilities, but also the buyer firm has to manage so that capability plays a central role in the NPD effort. To be successful in this venture both companies are involved in joint investments, knowledge sharing, space providing for “guest engineers”, mutual helping to solve problems in the design or even organizational matters (CLARK; WHEELWRIGHT, 1993). As pointed out by Clark (1989): “This is far different than simply meeting specified requirements with minimum effort”.

In this study, the Supplier Involvement in NPD is defined as the direct participation of the supplier during the product development processes (RAGATZ, 1997). It involves joint product design, process engineering and production operations with key suppliers (LAU, 2011). Considering such process, it may vary from a simple consultation on design to improve manufacturability to letting the suppliers become fully responsible for the design and manufacturing of parts, components and/or systems. In other words, the supplier can be integrated in distinct phases of the NPD as presented in Figure 2 (PETERSEN; HANDFIELD; RAGATZ, 2005).

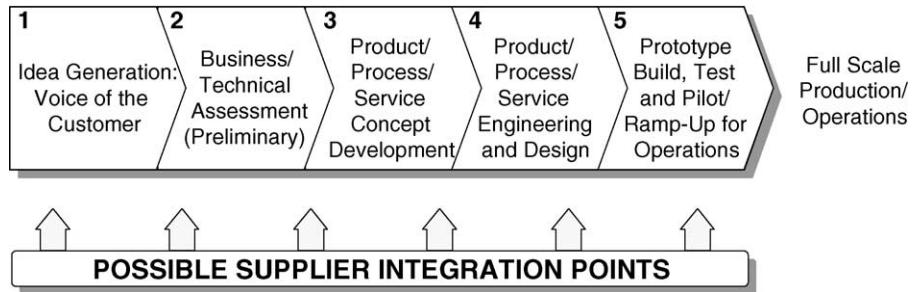


Figure 2 - Possible points for supplier integration in the New Product Development process.

Source: Petersen, Handfield and Ragatz (2005).

Prior research on ESI maintains that earlier involvement is often better (i.e. (GRIFFIN; HAUSER, 1996). Also there is evidence that technology uncertainty is mitigated when there is openly sharing of cost and technology information with suppliers (TATIKONDA; STOCK, 2003).

The ESI focuses on supplier participation in the initial stages of the NPD effort, such as the product concept and product design phases. The supplier involvement may be aimed at efficiency improvements, such as focusing on reduced development costs and lead times, or effectiveness goals, including the reduction of product costs and improvement in product value (WYNSTRA; VAN WEELE; WEGGEMANN, 2001)

Early Supplier Involvement started in the Japanese automobile industry and was soon adopted worldwide by other firms in the automobile industry as well other industries (CLARK; FUJIMOTO, 1991; PIRES, 2009). Most firms in the automobile industry find great incentive to adopt the ESI practice, especially the automakers, that are facing great pressure to minimize costs, lead-time, quality and implement new technologies – in the product as in the processes (PIRES, 2009). Ragatz, Handfield and Petersen (2002) some of the advantages for this integration:

- The ESI adds expertise and information regarding new technologies and new idea input, ensuring a better quality;
- It possibly reduces internal complexity on projects and provides extra personnel on critical tasks in the NPD effort;
- It reduce delays, through better communication and coordination between the parties;

- It reduce rework and eliminate costs associated with manufacturing capabilities and accessibility of parts; and
- It creates an improved relation with the supplier leading suppliers to internalize project concerns and allows a creation of a long term relationship for future projects.

For the most beneficial use of the ESI, it is very important to choose the correct of the components or systems that the supplier will be involved do develop. The ESI shows better results when applied to systems that have to show a greater interaction between the buying firm and the supplier (PIRES, 2009). Therefore, align the New Product Development effort and the Supply Chain Integration, can, for instance, help the firms to overcome problems before the product launching and improve the overall supply chain performance (VAN HOEK; CHAPMAN, 2007). In the same line, Lau (2011) found that the supplier involvement in the product development project is positively related to modular design and product innovation, both usually related to the product quality perceived by the customer.

According to Morgan and Liker (2006), the relation between Toyota and its suppliers – one of the most prominent companies to make use of ESI – is the closest possible, the Toyota make the supplier an extension of the Toyota product development and lean systems. In the case of Toyota, the suppliers are ranked and separated in tiers, whereas the in first one there are the suppliers that the automaker deals with, and these first-tier suppliers deal with the second tier, and so on. This first tier is composed by a small number of suppliers, thus, the firm has a reduced number of suppliers to deal, but in those there is a very close. The Toyota selects such suppliers in very beginning of a new product project and guarantees the business, incorporates them as part of the NPD team (MORGAN; LIKER, 2006). This tier structure is also observed in other firms in the automobile industry as show by Sacomano Neto and Truzzi (2009) in a truck plant of the Volkswagen Group, but in this case the Volkswagen has the first tier incorporated in the plant labeled a Modular Consortium – the Modular Consortium will be discussed in Chapter 4 – and the automaker deals also with the second tier suppliers, to gain from scale.

Several issues arise when placing the supplier in the NPD involving: tier structure (supply chain design), level of responsibility for design, specific responsibilities in the

requirement setting process, when to involve suppliers in the process, inter-organizational communication, intellectual property agreements, supplier membership and ownership on the project team and alignment of organizational objectives (DYER; SINGH, 1998; PETERSEN; HANDFIELD; RAGATZ, 2005). Citing Littler, Leverick and Bruce (1995) *apud* Koufteros, Vonderembse and Jayaram (2005): “over 40% of the respondents expressed the view that collaboration makes product development more costly, more complicated, less efficient, more time consuming, and more difficult to control and manage”.

Therefore, the implication is that the critical managerial issue in product development is not only securing effective collaboration within the firm, but in managing the supplier network to achieve integration of engineering effort (CLARK, 1989).

Moreover, Supply Chain Design is effectively determined during the early phases of the NPD – when product, process and information systems decisions are specified. The type of relations in the supply chain – customers, manufacturers and suppliers – are often established early in the new product development process as well (HANDFIELD; BECHTEL, 2002; RAGATZ; HANDFIELD; PETERSEN, 2002).

When the Supplier Integration takes place in the early phases – also known as Early Supplier Involvement (ESI) –, it becomes a vital managing process in supply chain design, product design and process design, as stated by Petersen, Handfield and Ragatz (2005):

In the words of a senior purchasing executive at a major automotive company interviewed during this research: ‘unless you can impact the sourcing early in product development, you have almost no impact on the resulting design of the supply chain’.

2.2 Supply Chain Integration

The Council of Supply Chain Management Professionals (CSCMP), the main organization of Supply Chain professionals and academic community defines the Supply Chain Management as the planning and management of all activities in sourcing, purchasing and all logistics management tasks (PIRES, 2009).

To provide a higher aggregated value product to the customer it is crucial that the supply chain operates properly, thus, all the processes in the supply chain must work jointly and smoothly. Supply chains that are poorly managed will be unbalanced and some process in

that chain will affect negatively the other process. A well-managed supply chain is labeled a Integrated Supply Chain and the process to achieve it is the Supply Chain Integration (SCI) (PAGELL, 2004). According to Stock, Greis and Kasarda (1998), this relies on the assumption that the more integrated the supply chain becomes the better performance at the operational and the business levels it will present, and it has been found support on several recent empirical studies (FLYNN; HUO; ZHAO, 2010; HUO, 2012).

On this Supply Chain Integration (SCI) context (FROHLICH; WESTBROOK, 2001; PAGELL, 2004; PIRES, 2009), we follow the definition of Supplier Integration as the supplier part on the SCI definition provided by Flynn, Huo and Zhao (2010):

(...) we define SCI as the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra and inter-organization processes. The goal is to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer at low cost and high speed.

Prajogo and Olhager (2012) found the greater the supplier integration in the supply chain leads to that greater value is delivered to the customer, by improving the competitive capacities of the chain, as quality, flexibility, delivery time and costs.

Several models have been developed and studied to better capture the complex realities in supply chains and provide insight to the different stages in the Supply Chain Integration, such as the ones proposed by Bowersox and Closs (1996), Frohlich and Westbrook (2001) and Stevens (1989). While the models proposed by Bowersox and Closs (1996) and Stevens (1989) show a greater focus on the internal integration in the organization. The model proposed by Frohlich and Westbrook (2001) shows greater focus on the external integration, to the Supplier and the Customer Integration. The following section will discuss the (STEVENS, 1989) and Frohlich and Westbrook (2001) models in more detail.

2.2.1 Stevens' SCI model

Stevens' (1989) is one of the oldest models to approach the Supply Chain Integration and according to the author's model, the SCI takes four distinct and sequential stages. This

model is still largely used in the academic community such as in the work of (FLYNN; HUO; ZHAO, 2010; MENTZER et al., 2001; PAGELL, 2004).

The first stage (baseline) is the point where the company takes responsibility for all different activities in the Supply Chain in different departments, working almost independently. Usually the operations are fragmented and characterized by: (a) several inventory resulting from unsynchronized activities, (b) different, and usually incompatible, systems for sales, manufacturing and stock control and (c) very specific organizational boundaries between the departments and the Supply Chain.

In this first stage, the company usually plans the Supply Chain only in a reactive form focusing only on the short-term projection. This situation, not only foster inefficiency in the Supply Chain Operations (SCO), but put in jeopardy the global success of the Supply Chain because it is very vulnerable to shifts in supply and demand.

The second stage comprehends the functional integration and usually emphasis on the inbound. At this point the company focuses on reducing costs while improving performance on the Supply Chain, trade-offs points (e.g. discount in purchasing), investment on inventory.

On the functional integration the customer service and relationship tend to be reactive. Companies in this stage still find issues when, for planning purposes, the distribution channels planning and the manufacturing planning are separated and there is a risk to low transparency of the real consumer demand, which leads to a compromised performance.

The third stage is called the internal integration and at this point the company takes control of the material flow and focus that for its customer service. This stage involves mainly the integration of the processes and aspects of the supply chain that the company already controls. Usually, the internal integration, is portrayed by a very comprehensive planning system, and may include MRP, MRP-II and Inventory control. Once a company achieves internal integration, it can start to work and think about a synchronized customer demand management.

Companies with supply Chain internally integrated shows: (a) comprehensive systems with transparency in distribution and purchasing, (b) mid-term orientation in planning, (c) focusing on tactical and strategic matters an (d) focus on managing customer's demand and not directly the customer.

The forth stage (external integration) is a full integration of the Supply Chain in achieved when the company extends the Supply Chain scope out of its boundaries, including the suppliers and customers. The most interesting aspect of this stage is that it changes the focus from the product/material flow to customer satisfaction and demand management. Therefore, a company that achieves external integration should be in sync with customer needs and demand.

While in the internal integration the company had integrated the material flow management, it did not necessarily bring the supplier closer as it has when the supplier is integrated in the supply chain. Once the supplier is integrated, the relationship start to depends on mutual support and collaboration. This collaboration can start in early stages in NPD and can achieve full involvement in sourcing, logistic processes, on-time delivery to the assembly line, information and processes sharing and long-term commitment (usually means the ceasing of multiple supplier sourcing).

The Stevens' (1989) model has a focus on material flow, and therefore it approximates the Supply Chain Integration to its Logistics Integration. Only on the forth stage the model takes a more broad aspect of the Supply Chain Management where the relationships between suppliers and buyers become more visible and the Supply Chain is seen as one concept. According to (FOGAÇA, 2014), the Stevens' (1989) SCI model also shows a sequential and linear aspect, where a company must follow the prior stage to advance, that does not contemplate more complex situations and radical endeavors.

2.2.2 Frohlich and Westbrook Arcs of Integration

According to Frohlich and Westbrook (2001) the SCI stages can be modeled as an series of arcs. The authors` arcs can assume five positions: inward-facing (the narrowest arc), periphery-facing (extends minimally to the other parties in the supply chain), supplier-facing, customer-facing and outward-facing (the broadest arc, which encompasses the supplier and the customer) as showed in the Figure 3.

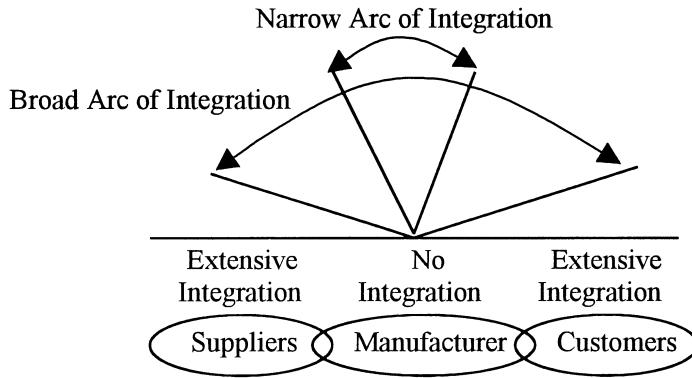


Figure 3 - The arcs of integrations model in the supply chain

Source: Frohlich and Westbrook (2001).

Only a few firms were categorized in the outward-facing arc, but those presented a consistently higher performance in the supply chain, especially when compared to the firms categorized as in the inward-facing or periphery-facing arcs. This model provides insight that there are different levels of integration in the supply chain, but not which factors impact such effort (FROHLICH; WESTBROOK, 2001).

McCarter, Fawcett and Magnan (2005), in their research on the human resource effect on supply chains, point the declaration of senior manager regarding the supply chain: "You cannot have a hierarchy control if you want to be working in a supply chain environment". This previous declaration shows the great impact of the management policies and the environment impact on the perceived performance and success in the Supply Chain Integration.

2.2.3 Supplier Relationship in the SCI

To develop an integrated Supply Chain that performs efficiently there is need for more than just internal processes, but also an inter-organizational coordination (organizational boundaries and interfaces). In this complex environment, companies look for partners to strengthen its Supply Chain and provide a more productive and create competitive advantage. This cooperation can take place in several areas (e.g. customer support, product development, manufacturing) and this partnership is usually involves combined activities (e.g. information sharing, activities and task sync and sharing risks and investments) (COOPER; LAMBERT; PAGH, 1997; LAMBERT; EMMELHAINZ; GARDNER, 1996).

Through a series of case studies, Lambert, Emmelhainz and Gardner (1996) proposed that the relationship with suppliers can be divided in six types, as pointed in Figure 4, in which three of them are considerate partnerships. The only relationship that does not achieve some kind of partnership is the arm's length relationship. The arm's length is characterized by very few information sharing, organizational investment, low trusting and commitment and short-term orientation. Is very easy for companies to change suppliers, or have multiple suppliers, on the arm's length relationship (MING; GRABOT; HOUÉ, 2014).

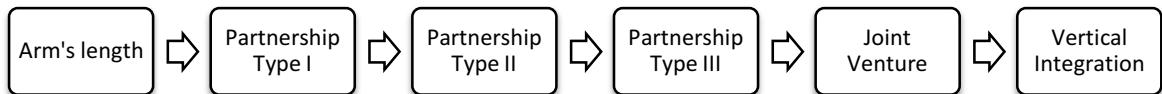


Figure 4 - Relationships in the Supply Chain

source: Lambert, Emmelhainz and Gardner (1996).

The next three kinds of relationship are partnerships and can be divided into types I, II and III. In the Type I Partnership the companies start to recognize themselves as partners, however still have limited sharing of information and coordination, usually that happen in a specific department. Type II Partnership improve the Supply Chain activities integration, and usually start to involve several areas and departments in the organization. The last kind considerate as a partnership is the Type III Partnership in which there is a substantial improvement in operational and organizational integration, where one company recognize the other as an out of the border extension of itself and at this point the relationship typically focus on long-term perspectives.

The next type of relationship is the Joint venture, where there is a conjoint investment and business participation. The Joint venture also relies on long-term focus and demands a sharing of strategic views and organizational effort. The authors consider the vertical integration as the last possible point in the supplier integration, where a company acquires the partner and becomes the owner of its supply chain (PIRES, 2009).

The authors point to three main elements that affect the partnership relationship: components, facilitators and drivers, and their interaction is presented on Figure 5. Drivers are

the reasons on why should a company partner with another company, the facilitators are factor that support such partnership (like cultural compatibility, organizational interfaces) and components are the activities that will supply the partnership, such as communication channel, risk management and sharing mechanisms.

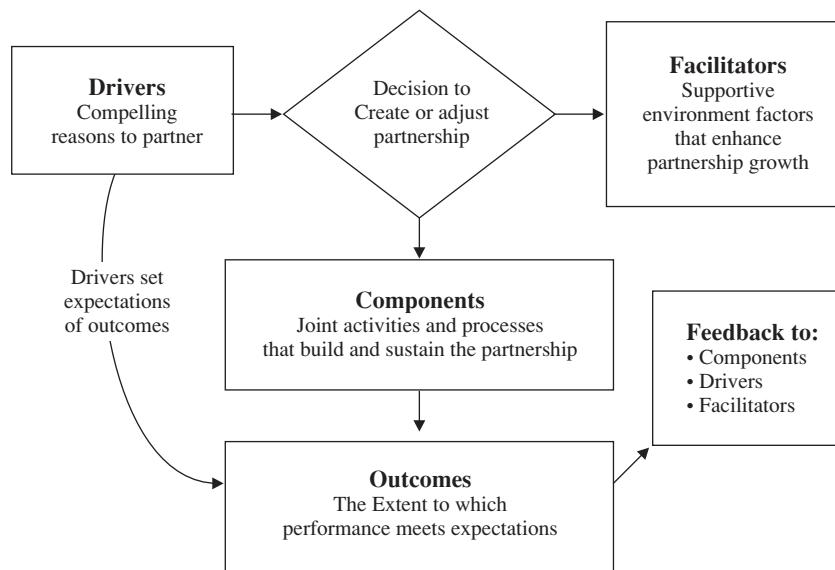


Figure 5 - The Supply Chain partnership model

source: : Lambert, Emmelhainz and Gardner (1996)

A main component element is how contracts take place in a partnership, the authors point that the stronger the partnership the less specific the contract tends to be. Lee and Cavusgil (2006) have found that governance by relationship is more effective than the governance by contract and strengthen the partnership, stabilizes and foster knowledge transfer among partners. Detailed contracts can be costly and hard to maintain and keep measures, therefore when the trust between companies grows they tend to trust the partner and reduce the details in contracts. The cooperation and organizational alignment express a complementary relation between the several mechanisms and components for the partnership.

One important form of creating relationship capital is the deployment of informal socialization processes (such as communication protocols and visiting the suppliers). Cousins et al. (2006) affirm that improving the relationship capital through informal processes improves the overall of the partnership results more than formal processes, such as workshops and general meetings. Therefore, the socialization process in the Supply Chain is where one company acquires knowledge and intensify the bonds with another company and the

Relationship capital can be defined as the social structure where the resources can be accessed (COUSINS et al., 2006).

The socialization process also enables partners to learn about each other culture (each is can be facilitator in the relationship) and find focal points to align and or to adjust and achieve better results. While Lambert, Emmelhainz and Gardner (1996) points that the companies do not have to be culturally identical, the authors affirm that it can not be conflicting. However, recent research has shown that Supply Chain partnership with a complementary cultural configuration has shown better performance than supply chains with identical cultural profiles (CADDEN; MARSHALL; CAO, 2013).

Cooper, Lambert and Pagh (1997) argument that culture can not be underestimated in SCM and while it is expensive to create mechanisms to interface supplier and buyer cultures it is fundamental for the Supply Chain to operate in higher levels of integration. Lambert and Cooper (2000) point the success in Supply Chain endeavors requires great change in the managerial aspect, where the companies stop to handle individual functions and begin to manage a very complex, integrated and cross-functional set of activities. It is important to note that the NPD activities become a joint effort to the supply chain configuration and management. Therefore, the notion that working in parallel in the NPD activities, including the process development itself and the supply chain will show greater performance is appealing (ELLRAM; TATE; CARTER, 2008, 2007; FINE, 2008).

2.3 Culture as a contingency factor

Several researchers have studied the impacts of environmental variables in organizations. Lawrence and Lorsch (1967) have debated that environmental uncertainty and ambiguity, associated with risk, have a crucial influence in structuring an organization. (Daft and Lengel (1986) propose that organizations should process more information (and more effectively) in order to reduce environmental uncertainty because information flow often involves people from different functional who share information and converge on a shared interpretation of what the project team ought to do.

Contingency theory is built on the presumption that no theory, method or practice can be applied in all situations, therefore, that there is no one “best way” to design or manage an

organization (LAWRENCE; LORSCH, 1967). Thus, there is evidence that in order to improve performance the firms should look for a optimal fit between organizational structure and processes to their environment, such as customers and suppliers (FLYNN; HUO; ZHAO, 2010).

Using contingency theory it is possible to debate if contextual variables in management moderate the failure or success in an organizational effort. Koufteros, Vonderembse and Jayram (2005) use a contingency approach on Concurrent Engineering to determine that equivocality – different interpretations that lead to misinterpretations – plays a moderate role in the relation between integration process and performance.

Likewise, in this research that is the assumption that the supplier relationship and the ESI is a social process and, by that, is affected by several inter-personal and behavioral factors (CLARK; WHEELWRIGHT, 1993; DYER; SINGH, 1998; PETERSEN; HANDFIELD; RAGATZ, 2005; PIRES, 2009), such as culture (be that organizational or national) (HOFSTEDE, 1980; SANTOS *et al.*, 2010). As put by Petersen, Handfield and Ragatz (2005):

(...) the majority of engineers we interviewed expressed their initial and acute discomfort at having an external supplier participate on a new product development team, where sensitive technical information is being discussed.

Cross-cultural researches usually follow the Contingency Theory and look if national culture matters on some object (FLYNN; SALADIN, 2006). Hofstede (1980) highlight the consensus that no universally applicable management solution exists and that disparities in the National Culture moderates the relationship between managerial practices and organizational performance and effectiveness. Following the contingency theory, such authors point that success in managerial practices depend on the external fit between assumptions, values and beliefs, both from organizational and national cultures. For instance, the relationship built between the buyer and supplier is different from the kind of involvement of the supplier, and Pagell, Katz and Sheu (2005) affirms that culture play a key role in defining a firm's willingness to move to a more strategic supply chain situation. As pointed:

(...) the right decision, up front, about which supplier to work with. Not only are the supplier's capabilities important in this decisions, but so is finding a supplier with a culture compatible with that of the buying firm. (PETERSEN; HANDFIELD; RAGATZ, 2005).

Early studies on the supplier involvement and integration on the automotive industry showed that different countries – European, Japan and U.S. – showed rather different structures and relationships in the supply chain as well different NPD processes are practised (CLARK, 1989; CLARK; FUJIMOTO, 1991). Recent studies such as Zhao *et al.* (2011) find similar results as the authors put:

We also examine the model for companies with different ownerships, and the results indicate that for Chinese controlled companies where there is a strong collectivism culture and more reliance on “Guanxi” (relationship), relationship commitment has a significant impact on external integration with suppliers and customers. This is in stark contrast to foreign controlled companies, characterized by a more individualistic culture and more reliance on technological capabilities, where no significant relationship between relationship commitment and external integration could be found

Today's Supply Chains are more complex and can be formed by several companies from different countries and areas and, therefore, cultures. Recent studies point that the considered “best practices” can result in poor performance under certain contexts, including classic processes, such as information processing for planning (MING; GRABOT; HOUÉ, 2014). On the same line, Pagell, Katz and Sheu (2005) comment that differences in international operations management behavior are found amid similar manufacturing plants, when they are in different countries, and that can be explained by the national culture differences.

To wrap up this Chapter, the NPD perform a crucial form to achieve competitive advantages and have been evolving constantly. One of the main practices to that link the SCM and the NPD is the Supplier Integration, where many scholars and practitioners highlight the Early Supplier Involvement practice to be associated with enhancement quality, reduced costs, reduced time-to-market, smoother transition to production and improvement of customer's satisfaction. The ESI is a practice where the supplier gets involved in the early phases of the new product project, and provides insights as well becomes responsible for product and processes design. Fine (2008) coined the Three-dimensional Concurrent Engineering, a framework that extends the product-process Concurrent Engineering to contain the Supply Chain as well in an combining approach.

The ESI is a social process, where two or more organizations have to relate and communicate in order to coordinate and align product, process and supply chain requirements. Therefore great efforts of management in order to effectively adapt strategies and organizational, hence, the ESI practice is influenced by a number of behavioral factors. Before companies apply generic processes and theories, there is a need to evaluate the impacts of these behavioral factors, such as the national culture as a contingency factor that may moderate success and failure in the NPD venture.

From the previous discussion, it is clear the evidences that culture plays a role in the Supplier Involvement and the Three-dimensional Concurrent Engineering. Therefore, the next Chapter will discuss in depth culture and its implications on organizations.

3 CULTURE

This Chapter presents the Culture construct and discusses the most accepted ways to model National Culture as a form to differentiate cultures in the world. Later, are presented the Hofstede's (2001) National Culture dimensions: Power Distance, Uncertainty Avoidance, Individualism, Masculinity and Long-term Orientation as well their relations and aspect towards the organizations and managerial implications. Later in this Chapter, there is an brief contextualization of the Brazilian Culture Dimensions.

3.1 Globalization and Culture Study

Since the globalization process, that took place in the 1990's and continues to sharpen, companies in developing markets as the countries that known as the group BRICS face greater competition to thrive in internal as external markets (DE MOOIJ, 2013; PIRES, 1998, *passim*). Under this intensified competition banner, and consequent increasing complexity, firms search for new forms to achieve and maintain competitive advantage in their markets, and among several other factors, culture plays an important role (on both national and organizational levels) (BARRETO *et al.*, 2013; WIENGARTEN *et al.*, 2011).

Culture and the globalization process develop an interesting relation to the Multinational Enterprises (MNEs). According to Veniak and Brewer (2013), the populations around the world receive influences that are common to most, like movies for example and extend to management and manufacturing theories and practices, and therefore, on one hand MNEs are presented to set of "best practices" to manage their resources and these practices are adopted and shared globally, even most of them fail to consider the different cultural aspects.

At the same time, several MNEs face challenges to leverage, and coordinate, their resources which may be scattered geographically and culturally (DE BRENTANI; KLEINSCHMIDT, 2004) and recent studies point that a cultural divergence between organization and national culture may impact deeply the company performance on distinct markets (NAOR; LINDERMANN; SCHROEDER, 2010).

Prior studies also show that culture becomes an explanation, or a factor that has a moderating role, to the different results in different societies and organizations. When

Harrison (1992) *apud* Javidan *et al.* (2006), after working for a long period at the US Agency for International Development, was questioned about why some nations thrive while others do not answered: “The overriding significance of culture is the paramount lesson I have learned in my thirty years of work on political, economic, and social development”. On the same subject Porter (2000, p.14) agrees:

Attitudes, values, and beliefs that are sometimes collectively referred to as ‘culture’ play an unquestioned role in human behavior and progress. This is evident to me from working in nations, states, regions, inner cities, and companies at widely varying stages of development.

Analogously, Flynn and Saladin (2006) found that the national culture plays a strong part in construct of Baldrige-like Quality Awards around the world. These findings are really important to determine whether different countries should develop and management initiatives tailored to their specific cultures.

Culture itself is not an easy subject, and scholars do not achieve a consensus on a definition, or either a way to study it. To Hofstede (2001) culture can be understood as a collective mental programming that distinguishes a group of people from another group and the national culture may be more observed through values and the organizational culture resides in practices and attitudes. Therefore, the national culture is somewhat less tangible than the organizational culture. According to the author, one national culture should not be used as an example or stereotype of a population, for its values have a working logic that can not be perceived from an individual perspective or one’s personality.

Trompenaars, Trompenaars and Hampden-Turner (2012) portray culture as the manner in which the people in a group answer to problems and resolves dilemmas. Thus, it is the shared way a society understands the world, rather than a more tangible manner, as their attitudes for example.

From a more objective viewpoint, Inkeles and Levinson (1969) *apud* Nakata and Sivakumar (1996) refer to culture as some, relatively, more enduring personality traits that are “common or standardized in a given society”. Consequently, agreeing with Hofstede, Pedersen and Hofstede (2002) perspective, culture endures through time a shift slowly. Schein (1993) consider another perspective of culture, where it shows the culture function to a certain

population, the author defines as a collective and shared product to solve two set of problems: internal integration and external adjustment. Internal integration concerns as how to manage the group's individual and subgroup relationships and the external adjustment, or adaptation, refers to how the group of people will behave facing external challenges and threats.

Therefore, culture may be analyzed from several perspectives, especially when studied regarding its interfaces to others areas, as management, labor, politics, economy, psychology and many others. Prior studies show two forms to ascertain a population culture impact, relations and influence to other areas of interest. The first one is an indirect form, where the research base their population values and cultural traits on a previous quantitative research and assigns country scores to the studied populations, such as Hofstede's (2001) and GLOBE's scores (HOUSE, 2004). According to Engelen and Brettel (2011), 80% of the studies on national culture and marketing interface use such indirect method of assessing culture, and Hofstede's (2001)cultural dimension models is the one most relied on.

On the other hand, the direct method to assess a population culture relies on the researcher comprehension of the studied culture, as in the anthropologic work in a indigenous tribe. Thus, it is possible that a study approach the culture study using the direct method using some other researcher work, as long it is studied as whole, not quantitatively compared to other cultures (VENAIK; BREWER, 2013; METTERS, 2008).

3.2 National Culture

Since it is a difficult and complex task to determine a population culture, prior research uses the national culture as a model for a country's population, while there are scholars who disagree on using political or geographic boundaries to different cultures (MAGNUSSON *et al.*, 2008; MCSWEENEY, 2002; SMITH, 1992).

National culture here is defined as the values, beliefs and assumptions made and perceived by people, those are passed to the people during their early childhood and later serve to distinguish one group of people from another (HOFSTEDE, 2001). It has its roots in the daily life decisions and endures to change (NEWMAN; NOLLEN, 1996). Considering managerial aspects, national culture is considered to play influence on uncertainty perception and adaptation, motivation, leadership as well the outcomes – as a matter of interpretation – and response of strategic actions and issues (HOFSTEDE, 1980). Ergo, the understanding of

different national cultures is vital to a Multinational Enterprise to fully achieve high performance results (NEWMAN; NOLLEN, 1996).

The Hofstede's (2001) research presents an enduring study and has been used in the past decades in studying distinct national results in a great array of areas. Hofstede's (1980) conducted a wide survey in the IBM world offices over than 50 countries in the 60's and 70's. Already in his first publications, Hofstede (1984) alerts that there are no global or universal solutions to organizational problems, but for several decades management and administration theories have been exported and applied to different countries out of the initial context from where were developed and without considering the cultural aspects of which are being applied to (METTERS, 2008; HOFSTEDE, 1980).

Initially, Hofstede's (2001) identified four cultural dimensions, and set scores to each country in his study. The four dimensions found were Power Distance (PDI), Uncertainty Avoidance (UAI), Individualism *versus* Collectivism (IDV) and Masculinity *versus* Femininity (MAS). In later studies in the early 1990s, Hofstede (1997) inserted other countries to survey including several Asian countries that were not in the first work, and found a fifth dimension. This dimension was first labeled Confucian Dynamism and later labeled Long Term Orientation (LTO) (CHINESE CULTURE CONNECTION, 1987; MINKOV; HOFSTEDE, 2011).

Before Hofstede's (2001) work, cross-cultural research treated culture as an independent variable of a single dimension. Thus, several researchers assigned results that were not as expected as a function of the culture (MINKOV; HOFSTEDE, 2011). Therefore, the multi-dimensional model developed by Hofstede (2001) was important breakthrough and allowed several cross-cultural studies to take place (ENGELEN; BRETEL, 2011; KIRKMAN; LOWE; GIBSON, 2006). While there are scholars who defend that such study can not be used on different levels other than the national (HOFSTEDE, 2006; MINKOV; HOFSTEDE, 2011; VENAIK; BREWER, 2013). Several researchers use the model or its results toward a group or organization level, despite the limitations in the process of adapting the model, studies that focus on how cultural values and traits may permeate organizations show promising results and prospects (KIRKMAN; LOWE; GIBSON, 2006).

During the 1990's appeared several other models were developed as a result of more recent data and different approaches to cross-cultural studies, like the *Global Leadership and Organizational Behavior Effectiveness Research (GLOBE) Project* (HOUSE *et al.*, 2002; JAVIDAN; HOUSE, 2001). The GLOBE project start by relating the cultural traits and leadership across 61 countries, and – unlike Hofstede's work – included a great number of researchers and scholars in the countries studied. As result, the GLOBE project indentified nine groups of cultural aspects, each group contained a pair of dimensions one for values and another for practices (HOUSE, 2004; WIENGARTEN *et al.*, 2011).

The GLOBE project's model and Hofstede's (2001) model have great similarities, but even more differences, despite many of the terminology are the identical. Those differences can be found on how they obtained the survey questionnaire, to whom they applied them, how they interpreted the results – including the statistical methods used. For example, a simple, but nevertheless an important one, difference is found on the type of question presented, for instance, on Hofstede's (2001) work questions were directly asking a certain individual value or perception as observed in one of the VSM 08 questions: "In your private life, how important is each of the following to you keeping time free for fun". The GLOBE project used questions that begin either with "In this society (...)" or "In this organization (...)" and, by doing so, there is a presumption that an individual can assess and interpret how the society, or organization, behaves, as well compare it to others (even when he is not part of the former) (HOFSTEDE, 2006; HOUSE, 2004).

Several cross-cultural studies as well studies on cultural influences suffer to establish reliable results – independently from the model used – because they fail to understand all the implications of the model applied. For instance, which a certain value assessed represent in reality, how can be of use and what theory may be behind such value, in which level of analysis can be applied and how to study a phenomenon based upon a cultural model (DE MOOIJ, 2013; KIRKMAN; LOWE; GIBSON, 2006).

Regardless of the process and the model application, most of the research efforts find close conclusions. Firstly, culture is a multi-dimensional phenomenon, in which the dimensions may vary according to how they are proposed and the data gathered and analyzed. The second is that culture may explain some of the variance in managerial behaviors and decision-making making process on different environments (PAGELL; KATZ; SHEU, 2005).

As pointed before, the Hofstede's (2001) five-dimension model is the most used in culture related studies on several areas of management and has a great number analysis and discussion based on it (e.g. (KIRKMAN; LOWE; GIBSON, 2006; MINKOV; HOFSTEDE, 2011; SIVAKUMAR; NAKATA, 2001). Therefore, on the next subsection presents further detail on this model.

3.3 Hofstede's (2001) cultural dimensions

The concept of dimensions to be used in culture cannot be defined in physical terms, neither can be observed directly, The dimensions are inference products, based on verbal and non-verbal expressions and, by that, are intangible constructs created to aid the comprehension of complex reality (LEVITIN, 1973 *apud* HOFSTEDE, 2006).

A dimension by itself does not aid much in the process of understanding a social phenomenon, but instead depends on the coherence of the group of dimensions as a whole (MINKOV; HOFSTEDE, 2011). Understand a specific dimension means to understand the context and analysis used to arrive in that dimensions, therefore, the interpretation of the group of dimensions by the author is quite expressive, according to Hofstede (2006):

My 1980 book introduced the ‘dimensions’ paradigm, showing that cultural differences between modern nations could be meaningfully measured and ordered along a discrete set of dimensions, representing different answers to universal problems of human societies.

To find those answers, Hofstede's (2001) published in his first book in 1980 his research results with data acquired over the decades of 1960 and 1970, creating a – as the author presents – paradigm with four cultural dimensions. Each dimension represents a facet of the society reality namely: Truth, Identity, Hierarchy and Gender (HOFSTEDE, 1980; HOFSTEDE; PEDERSEN; HOFSTEDE, 2002); and later in the 1990's , the fifth dimension was related to the Virtue facet. Thus, Hofstede's (2001) work provided to researchers the first large collection of data binding culture to management philosophies and organizational behavior. This collection not only improved the research in sociology and anthropology, but in several other areas as marketing, management, engineering, international relations,

economics, psychology. For instance Santos *et al.* (2010), showed that characteristics from the Hofstede's (2001) dimensions were possible to relate to different organizational structures.

Nevertheless, as within any model, there are limitations and restrictions to Hofstede's model. The model suffers from the lack of generalizability, the eco-logic analysis used, the use of political boundaries as a cultural barrier and the sampling method (JAVIDAN *et al.*, 2006; MAGNUSSON *et al.*, 2008; MCSWEENEY, 2002).

3.3.1 Power Distance (PDI)

The term power distance was introduced by the psychologist Mulder (1977) apud Hofstede's (2001) in which power can be understood as the ability of one party to control or change (at some level) the behaviors, needs and objectives of another party more than in the opposite direction. Therefore, power distance represents the inequity between the parties on the same social system, as in an organization.

At the work place, the different level of power between employers becomes functional, creating the organizational hierarchy and the simplest unbalance in power in the organization is observed in the boss-employee relation. Therefore, in the organization – using the Mulder's power distance definition – power distance relates to the power relation between boss and employee (HOFSTEDE, 2001).

Hofstede (2001) defines the Power Distance dimension (PDI) – related to the Hierarchy aspect of society – as the perceived power distance observed from the weakest party in the power relation, in this case the employee's viewpoint, and how that power distance is accepted and expected by the weakest party. To achieve such, the author surveyed seven different job levels on IBM, of those only two were top management. According to Hofstede (2006): "Early in the IBM survey experience (Sadler and Hofstede, 1972) we had found dramatic differences between bosses' and subordinates' statements about the former's leadership".

The scores on Hofstede's (2001) Power Distance dimension (PDI) refers to the different levels of acceptance in the power distance. A low score in PDI means that the society sees the power distance as unavoidable and should be minimized as possible. On the other hand, societies with a high score on PDI the unbalanced power is expected and

represents an existential inequality between people (HOFSTEDE, 2001). Further differences observed in the organization are presented in Exhibit 1.

Low Power Distance	High Power Distance
Decentralized decision-making structures; less concentration of authority	Centralized decision-making structures; more concentration of authority
Hierarchy in organizations means inequality of roles, established for convenience	Hierarchy in organizations means existential inequality between higher-ups and lower-downs
Information sharing, also for the lower hierarchical levels	Information constrained by hierarchy
The ideal boss is a resourceful democrat	The ideal boss is a powerful aristocrat
There should be, and there is to some extent, interdependence between less and more powerful people	Less powerful people should be dependent on the more powerful; in practice, less powerful people are polarized between dependence and counterdependence
Narrow salary range between top and bottom of organization	Wide salary range between top and bottom of organization
Flat pyramid organization	Tall pyramid organization
Subordinates expected to be consulted	Subordinate expect to be told what to do
Leadership consults and guides employees leads to greater satisfaction, performance and productivity	Leadership closes and rigorous supervision leads to greater satisfaction, performance and productivity

Exhibit 1 – Main differences in the organization considering the two poles in PDI.

Source: Hofstede (2001, p.107-108).

When considering the NPD, prior studies shows that the levels of stratification and centralization have different consequences towards the NPD. According to Johne and Snelson (1988), a more centralized structure are not as efficient as decentralized ones to the NPD activities, due to the necessity of dynamism. On another trait related to PDI, Booz, Allen and Hamilton (1982) argue that a centralized authority figure contributes positively to NPD by influencing institutionalization, coordination and creation of a risk-taking posture incentive.

Nakata and Sivakumar (1996) point that there may be phases on the NPD that are more related to a certain pole of PDI while on another phase may relate positively to the other pole of PDI. The authors also propose that a lower PDI culture may positively related to earlier phases of NPD, where there is need for greater contribution despite their position in hierarchy, while a higher PDI culture may facilitate NPD efforts on later phases through a centralized figure who ensures coordination.

3.3.2 Uncertainty Avoidance (UAI)

The second dimension present by Hofstede (2001) relates to the Truth facet of society reality, namely Uncertainty Avoidance (UAI). Uncertainty regarding the future is indeed intrinsic to the human life and society tries to cope through legislation, dogmas and technology to minimize this uncertainty.

The UAI score shows relatively how a social group displays stress on ambiguous, unstructured situations. In societies with higher UAI are found rigorous codes of conduct and is widespread the belief in absolute in absolute truths, these social groups have an emotional need rules and institutions that minimize risk. In opposition, lower UAI societies tend to be relatively more tolerant with ambiguities (HOFSTEDE, 2001).

As a reflect in organizations, as stated by Hofstede (2001), uncertainty can be managed by rules and organizational rites. Therefore, rules lean to a more detailed, rigorous and stern permitting only usual interpretations in a context of higher UAI. As a reflex of that teamwork in higher UAI presents a very structured discussion, well defined agenda and clear and tangible objectives definition while in lower UAI context may prefer informality in communication and discussion (HOFSTEDE, 2001).

Prior work shows that the higher UAI correlates to more precise process instructions in manufacturing organizations, more detailed job description, formalization, bureaucracy and higher preponderance of factual information as decision-making (MATHEWS *et al.*, 2001; SWAN; NEWELL; ROBERTSON, 2000). Aycan, Kanungo and Sinha (1999) observe that high UAI, sided with high PDI, creates an organizational environment that suppresses employee autonomy.

Some traits of higher UAI may facilitate the NPD. Considering high UAI characteristics Cooper and Kleindschmidt (1986) found on their study in over 200 new product projects that the greater weight on planning the greater improvement outcomes, especially if such planning contains a standardized activity plan and/or NPD model in development phases and activities. Likewise, Rozenfeld *et al.* (2007) proposed a formal checklist to NPD success, which includes great focus on planning activities (i.e. resource allocation, specification on business and market objectives, long-term strategy definition).

Other studies show that features of a lower UAI may also contribute to NPD. (JOHNE, 1984) noted that a certain level of looseness on the early phases of the NPD – presented as informal and non-standardized procedures to make full use of creative problem solving techniques – is beneficial to the NPD itself. There is also evidence of a negative relation between nation's patents volume and the national UAI level, which may be consistent with a more risk-taking policy and more tolerance on unpredictable situations (SHANE, 1992). On Exhibit 2 are featured the main differences on organizations in the contexts of high *versus* low UAI.

Low Uncertainty Avoidance	High Uncertainty Avoidance
Uncertainty is a normal feature of life and each day is accepted as it comes	The uncertainty inherent in life is felt as a continuous threat which must be fought
Low stress; subjective feeling of wellbeing	High stress; subjective feeling of anxiety
Aggression and emotions should not be shown	Aggression and emotions may at proper times and places be ventilated
Comfortable in ambiguous situations and with unfamiliar risks	Acceptance of familiar risks; fear of ambiguous situations and of unfamiliar risks
Lenient rules for children on what is dirty and taboo	Tight rules for children on what is dirty and taboo
What is different, is curious	What is different, is dangerous
Students comfortable with open- ended learning situations and concerned with good discussions	Students comfortable in structured learning situations and concerned with the right answers
Teachers may say 'I don't know'	Teachers supposed to have all the answers
There should not be more rules than is strictly necessary	Emotional need for rules, even if these will never work
Time is a framework for orientation	Time is money
Comfortable feeling when lazy; hard- working only when needed	Emotional need to be busy; inner urge to work hard
Precision and punctuality have to be learned	Precision and punctuality come naturally
Tolerance of deviant and innovative ideas and behavior	Suppression of deviant ideas and behavior; resistance to innovation
Motivation by achievement and esteem or belongingness	Motivation by security and esteem or belongingness

Exhibit 2 - Main differences in the organization considering the two poles in UAI

Source: Hofstede (2001, p. 169-170)

3.3.3 Individualism *versus* Collectivism (IDV)

The Individualism dimension proposed by Hofstede (2001) describes a level of the relation of an individual and the collective that he belongs to, thus, this dimension is also referred as Collectivism – depending on the viewpoint. The relation between the individual

and the collective implies on the moral perspective on the individual's actions and attitudes. For instance, according to Riesman *et al.* (1953) *apud* Hofstede (2001) in a society as the United States, individualism is considered one of the main factors to the North American success, while in China individualism was fought by Mao's ideology that consider the group success present the best chance to the individual success Ho (1979) *apud* Hofstede (2001).

In high IDV societies, the individual needs tend to be prioritized over the collective needs. Hence, organization and teams describe success, ideal motivation and leadership differently in the different contexts of individualism. On higher IDV societies, results and success can be measured by the individual success or the leader success, while on low IDV societies the individual appreciation depends on the group's results (HOFSTEDE, 1980).

Like the previous dimensions, traits of both IDV seem to relate to differences in performances in organizations. Guirdham's (2005) study indicates that in individualist environments there is a proneness to focus on tasks over personal relationships, which leads to a more competitive environment, while a collective culture is associated with a more collaborative environment. Donnellon (1993) speculates that higher IDV can be accounted for a less successful teamwork performance of U.S. new product teams when compared to Asian teams. However, research on product champions speculates that higher degrees of individualism facilitate the NPD, where product champions are "persons who put themselves on the line for ideas of doubtful success, nurturing them beyond the requirements of their jobs" (SCHON, 1963). Exhibit 3 shows the main differences in organizations in the contexts of cultures with high and low Individualism.

Low Individualism	High Individualism
People are born into extended families or other ingroups which continue to protect them in exchange for loyalty	Everyone grows up to look after him/ herself and his/her immediate (nuclear) family only
Identity is based in the social network to which one belongs	Identity is based in the individual
Children learn to think in terms of 'we'	Children learn to think in terms of 'I'
Harmony should always be maintained and direct confrontations avoided	Speaking one's mind is a characteristic of an honest person
High-context communication	Low-context communication
Trespassing leads to shame and loss of face for self and group	Trespassing leads to guilt and loss of self-respect
Purpose of education is learning how to do	Purpose of education is learning how to learn
Diplomas provide entry to higher status groups	Diplomas increase economic worth and/or self-respect

Relationship employer-employee is perceived in moral terms, like a family link	Relationship employer-employee is a contract supposed to be based on mutual advantage
Hiring and promotion decisions take employees' ingroup into account	Hiring and promotion decisions are supposed to be based on skills and rules only
Management is management of groups	Management is management of individuals
Relationship prevails over task	Task prevails over relationship

Exhibit 3 - Main differences in the organization considering the two poles in IDV.

Source: Hofstede (2001, p. 244-245).

3.3.4 Masculinity versus Femininity (MAS)

The fourth dimension proposed by Hofstede (2001) was labeled first ego-orientation and later Masculinity (MAS) as referring to one pole and Femininity as to the other (HOFSTEDE, 2006). The author found that in most societies there are values associated to the woman figure – i.e. preservation, nurturing, harmony seeking, relationship focus – and other values associated to the man's figure – i.e. assertiveness, competition orientation, ego and reputation building.

The Masculinity dimension impacts the definition of success, as well the motivation in the organization (HOFSTEDE, 1980). For example, job opportunities as careers are perceived differently as observed by Hofstede (2001, p. 315): “In a masculine culture a humanized job should give opportunities for recognition, advancement, and challenge. In a feminine culture the stress will lie on cooperation and the working atmosphere”.

The study of the Masculinity dimension is crucial to understand motivation inside and outside the organization in many areas as for example marketing (DE MOOIJ; HOFSTEDE, 2011). In similar vein, product leaders who sets clear goals to the NPD endeavor were found as a key feature to success (BARCZAK; WILEMON, 1992; THAMHAIN, 1990).

While presenting substantiation for the high MAS, Barczak and Wilemon (1992) also found evidence that leaders of NPD teams with a combination of focus on human relations as well technical skills outperforms technical skills alone, which can be related to the low MAS pole. Similarly, people and people-related aspects have great importance on the superior performance NPD, such as trust, good communications, team spirit, and low conflict (THWAITES, 1992). Other differences between high and low level in the Masculinity dimensions are presented on Exhibit 4.

Low Masculinity	High Masculinity
Dominant values in society are caring for others and preservation	Dominant values in society are material success and progress
People and warm relationships are important	Money and things are important
Everybody is supposed to be modest	Men are supposed to be assertive, ambitious, and tough
Both men and women are allowed to be tender and to be concerned with relationships	Women are supposed to be tender and to take care of relationships
In the family, both fathers and mothers deal with facts and feelings	In the family, fathers deal with facts and mothers with feelings
Both boys and girls are allowed to cry but neither should fight	Girls cry, boys don't; boys should fight back when attacked, girls shouldn't fight
Sympathy for the weak	Sympathy for the strong
Average student is the norm	Best student is the norm
Failing in school is a minor accident	Failing in school is a disaster
Friendliness in teachers appreciated	Brilliance in teachers appreciated
Boys and girls study same subjects	Boys and girls study different subjects
Work in order to live	Live in order to work
Managers use intuition and strive for consensus	Managers expected to be decisive and assertive
Stress on equality, solidarity, and quality of work life	Stress on equity, competition among colleagues, and performance
Resolution of conflicts by compromise and negotiation	Resolution of conflicts by fighting them out

Exhibit 4 - Main differences in the organization considering the two poles in MAS.

Source: Hofstede (2001, p.318).

3.3.5 Long-term Orientation (LTO)

The Long-term Orientation (LTO) dimension was not found in Hofstede's (2001) initial work and first publications, but later on a separated study with 23 countries using the Chinese Value Survey and most of the theoretical construct were built on the Confucianism and Western theories. This dimension contrasts how objectives set relate either to the future or to past and present. In societies with a higher level in the LTO dimension, values like thrift and perseverance flourish and societies with a lower score on LTO show values as tradition respect, stability orientation and the reciprocity of favors (HOFSTEDE, 2006).

On organizations, the different aspects of the Log-term Orientation dimension show a moderating role on various points. Naor, Linderman and Schroeder (2010) find that organizations on cultures with a higher LTO inclination tend to incentivize risk-taking by its employees. Similarly, cultures on the high pole of Long-term Orientation are more tolerance to errors in innovative process development (NAVEH; EREZ, 2004). For instance, product

managers from Honk Kong and the United States are found to be more willing to abandon a project if it appears to be no long promising, as observed in literature by Nakata and Sivakumar (1996), while others seem to hold to a project even when there are doubts in its merits.

The main differences in the organization concerning the two poles on the Long-term Orientation dimension are gathered on Exhibit 5

Low Long-term Orientation	High Long-term Orientation
Rapid results are expected	Persistence and perseverance
Status is not a major issue in their relations	Relationships are prioritized by status and the observed importance
Shame is not a common feeling	Shame is a common sense
Respect for traditions	Adaptation of traditions to new circumstances
Leisure time is important	Leisure time is not as important
Valuation of meritocracy: economic and social life should be ordered by the skills	People should be able to live more equally
Most important events in life occur happened in the past or in the present	Most important events in life happened in the past or will occur in the future
Living with the laws is a problem	Living with the laws is no problem
In business, the most important are the results of short-term operating line	In business, the most important is to build relationships and market position
Analytical thinking	Synthetic thinking
Probabilistic thinking	Total or no confidence in the result

Exhibit 5 - Main differences in the organization considering the two poles in LTO.

Source: Hofstede (2001, p. 360)

3.3.6 Brazilian National Culture

This section presents the Brazilian culture indexes on the Hofstede's dimensions. The Figure 6 shows how Brazil scores on the five dimensions in comparison with the American, German and Japanese scores.

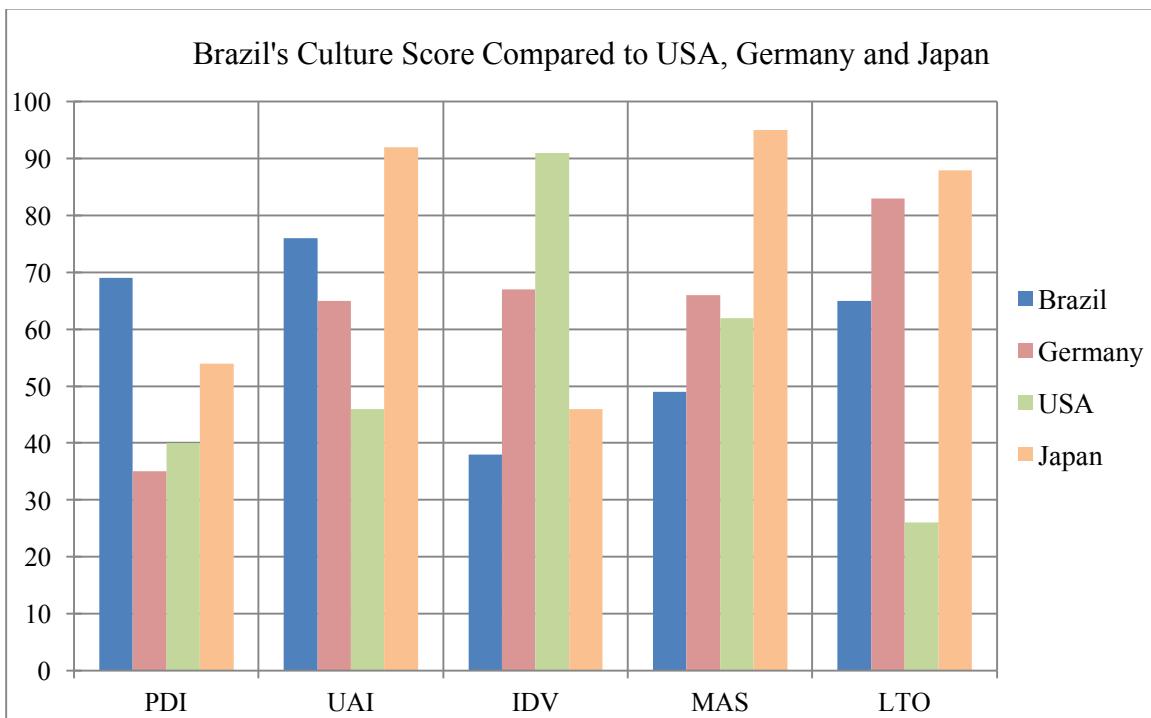


Figure 6 - Brazilian Hofstede's score against German, American and Japanese

data source: (HOFSTEDE, 2015)

With a score of 69, Brazil reflects a society that believes hierarchy should be valued and inequalities amongst people are acceptable. The different distribution of power justifies the fact that power holders have more benefits than the less powerful in society. Another implication of high PDI countries, such as Brazil, is that it is important to show respect to the elderly (and children take care for their elderly parents). In organizations there is one boss who takes complete responsibility for those below him. Status symbols of power are very important in order to indicate social position and “communicate” the respect that could be shown.

At 76 Brazil scores on UAI and societies that score high on UAI show a strong need for rules and elaborate legal systems in order to structure life (however individual's need to follow these laws can be weak and if those rules however cannot be kept, additional rules are dictated). In Brazil, bureaucracy and rules are extremely important to make the world a safer place.

On IDV Brazil scores 38, which means that tends to integrate in a cohesive group, specially the family. On the working environment this family characteristic shows where an senior family member should help a young member to get his first job if possible. In business

it is important to build up trustworthy and long lasting relationships: a meeting usually starts with general conversations to get to know each other a little bit better before doing business.

Brazil scores 49 in MAS, a very intermediate score on this dimension. Brazilians need to have good and relaxing moments in their everyday life, chatting with colleagues, enjoying a long meal or dancing with guests and friends. Due to their high score in this dimension Brazilians are very passionate and demonstrative people: emotions are easily shown in their body language. Higher scores indicate that the society will be driven by competition, achievement and success, while in lower MAS scores mean that the dominant values in society are caring for others and quality of life. A Feminine society is one where quality of life is the sign of success.

The LTO dimension shows how a society maintain the link to the past in order to deal with presents and future challenges. Usually, societies that score low on this dimension, prefer for example, to maintain traditions while watching collective alteration with suspicion. On the other hand, societies with a culture which scores high on LTO, typically take a more pragmatic approach: they encourage parsimony and efforts in modern education as a way to prepare for the changes to come.

3.4 Organizations and the National Culture

As stated by Wiengarten *et al.* (2011), many firms set up international distributions and production facilities as well purchasing services and good from international suppliers in order to keep themselves competitive. By that is clear that these firms have to deal with several contrasting culture in order to be globally competitive and, when handling many national cultures, the environment that they face may change from country to country.

By the Contingency Theory (CT), there must be a fit between managerial components and certain contingencies – treated here as the environment – to achieve better performance (LAWRENCE; LORSCH, 1967; RALSTON *et al.*, 2008), as also stated by Scott (2003): "The best way to organize depends on the nature of the environment to which the organization must relate". Hence, the organizational components must take in account the national culture to achieve higher performance, or at least avoid unnecessary conflicts when there are more than one national culture involved.

While there are many empirical studies that successfully shows positive correlations “best practices” and organizational and business performance (GREEN JR; WHITTEN; INMAN, 2008; HANSON; VOSS, 1995; LEWIS, 2000). According Hope and Muhlemann (2001), many other researches – although fragmented – show that those “best practices” do not achieve its previous performance when generically transferred between distinct environments (METTERS, 2008; NAOR; LINDERMAN; SCHROEDER, 2010; RUNGTUSANATHAM *et al.*, 2005).

For example, (METTERS, 2008) claims that national culture impacts where the main component to explain the different results achieved by an American firm when trying to offshore its back office to two different Caribbean countries. While on one country the offshore process went smooth, the second was considered a failure and later shut down. de Mooij, 2005 *apud* de Mooij (2013) points that using a model to study national culture and extracting information and aspects can become important to managerial and organizational decision-making.

A research that approaches organizations with a model as Hofstede's (2001) must take several cautions. According to (MINKOV; HOFSTEDE, 2011), the Hofstede's (2001) work inspired a great number of works based on misunderstandings or misrepresentations of its core aspects, where such model should not – or cannot – be applied on different levels than the national one (HOFSTEDE, 2001). The model can be used to study and build theoretical constructs between cultures and cultural impacts on organizations, by not having the organization submitted to the model (VENAIK; BREWER, 2013).

For example, Pagell, Katz and Sheu (2005) found empirically support that Uncertainty Avoidance and Individualism have significant correlations to the supplier participation suppliers per input. Also the authors found that Power Distance and Masculinity are significant predictors of outsourcing, and, thus, culture does explain some of the variance in the decisions as well results in the organization.

The organizations must be aware that the environment where they are plays a rather important role when observed from a cultural point of view. The more they fit – organization and environment – better results are expected and measures should be taken to take advantage on this coupling. To base such decisions, a model for national culture provides a best option

to characterize different cultures under the same aspects, while being careful to do not misuse the model.

To conclude this Chapter, it is clear that culture plays a crucial role in the different responses to challenges around the world and embrace values, attitudes and practices that are shared by a group of peoples. Using national culture as an approximation to culture, Hofstede (2001) has provided one of the main frameworks to model and evaluate cultural traits among societies and this model possesses five dimensions:

- Power Distance, which encompass how society perceives and accepts the inequality in power distribution;
- Uncertainty Avoidance, which represents the level of stress that a society shows under ambiguous and risky situations;
- Individualism, which shows how a society prioritizes the individual needs before the collective as the best response to challenges;
- Masculinity, which measures the difference in a society that ranges from assertiveness and competition valorization to quality of life, sympathy and compassion valorization; and
- Long-term Orientation, that compares if a society's objectives and actions relate either to the future or to past and present, concerning tradition and status.

Societies in different points along the dimensions have different results from management policies, such as New Product Development and Supply Chain Management practices as theories.

4 METHODS

The purpose of this Chapter is to present the methodological fundamentals that guided the fieldwork in this project. Firstly, it is defined the method used in this research project and is also presented the scope of this research, which includes: hypothesis presentation, research variables, collecting and analysis of the data. The mainstream research on the interface between the Hofstede's National Culture Dimensions and New Product Development and Supply Chain Management take both qualitative and quantitative approaches (FOGAÇA *et al.*, 2012; RODRIGUES; SANTOS, 2013). In order to answer the research questions proposed, the qualitative method is applied and the case study is characterized.

4.1 Research characterization

From the previous Chapters, the main Research Question can be refined as: "Can the National Culture (modeled as proposed by Hofstede (2001) be related and does it impact aspects of the Supplier Integration, when approached in Three-dimensional Concurrent Engineering (New Product Development, Product-Process Development and Supply Chain Design)?".

Considering the study on culture, according to Campbell (1970) *apud* Engelen and Brettel (2011), it is recommended that cross-cultural studies on culture A and culture B have two steps: a researcher from culture A conducts the research first, than another researcher from culture B. From those, the joint interpretation of the independent studies leads to an understanding of the differences between cultures the researchers may trace back to the researchers' ethnocentrism and, hence, find the real differences in the cultures. When considering the study in just one country, as a part of the author's proposed study, the purpose becomes to test a hypothesis or theory on a different or very specific setting, with the presumption that there may be differences to the other countries or cultures (PAGELL; KATZ; SHEU, 2005). Therefore, this project takes place as the a stage to refine a Brazilian culture study related to the Supplier Integration in New Product Development and Supply Chain Management fields od study.

There are many ways of identifying culture and the resulting behavior in individuals, for example the immersion and observation techniques from the anthropology, traditional

qualitative approaches such as interviews and context analysis and a great number of quantitative methods. This research uses a qualitative approach, where is based on the phenomenology and, according to Turato (2005), better fits to the research proposition, since the qualitative methods: (a) usually searches for comprehension and understanding of the human being; (b) has as objective the understanding and interpretation of phenomena; (c) usually takes place on specific settings and (d) commonly used when constructs contain representations, symbolisms, perceptions and metaphors.

It is important to highlight that the qualitative approach was identified as needed in Operations Management research as put by (SINGHAL; SINGHAL, 2012a):

“The O&SCM community generally does not pursue all phases of science, including exploratory and qualitative research, developing theories, (...). Currently, mathematical models and hypothesis testing dominate academic research in O&SCM”.

The object of study is a case study, and, at this point is important to salient the interpretation of case study provided by Stake (1995), in which the main traits are that the case study is a specific, contemporaneous and working environment with limited and functional parts. The case study has an interpretative orientation and has the objective to build knowledge and understanding on an environment where the researcher has not control over the variables. The main difference in Stake's (1995) approach to the fairly used Yin's (2014) case study definition is that, in Stake's (1995), the hypothesis should not be rigid and, hence, permit the researcher to develop theoretical support while executing the fieldwork.

Since this research has an exploratory characteristic, the qualitative methodology chosen is the ethnomethodology. The ethnomethodology consists of the insertion of the researcher in the object of study, being fully immersed in the environment and daily activities. In order to collect data, the processes adopted are direct observation and semi-structured interviews. The implementation of the ethnomethodology in contact with management and administration studies has increased in the last years and provided new insights to several fields of study (MASCARENHAS, 2008). According to Vergara (2005), some of the fundamental features of the ethnomethodology are that ethnomethodology:

- Enables a wide comprehension of how people act inside an organization, providing a notion of the formal and informal reality on the different levels;
- Enables to verify values in a group and the intra-relationship aspects (often unnoticed by managers); and
- Facilitates the identification of the characteristics of the buyer-supplier relation.

Vergara (2005) also proposes a task list or script on how to use the ethnomethodology in business research, and was used in this project, which consists of:

1. Definition of the research question and sub-questions;
2. Literature review;
3. Initial fieldwork;
4. Data collecting through observation and semi-structured interviews;
5. Formalization the data;
6. Comparison the results with theoretical background; and
7. Analysis and Conclusions

Comparing to the quantitative research, the qualitative method shows a greater focus on the interpretation of the study object as well its context, but lacks on generalizability and expose the researcher to the object of study, which bias the study and the results (VERGARA, 2005).

It is possible to minimize the bias in the qualitative research through use of triangulation. The triangulation process is considered the use of multiple perspectives to a research problem (SINGHAL; SINGHAL, 2012b). The triangulation comes when evaluating the outcomes to the different stakeholders and if coherent among the groups provide validity to the qualitative research (PAGELL, 2004). This research uses the data triangulation where different levels of management and different stakeholders in the organization were evaluated individually.

4.2 Research variables

This section will present the main research variables, a refinement of the research questions and estipulate a non-strict hypothesis to the case study. As pointed out by Hofstede *et al.* (1990), organizations are symbolic entities. They operate under mental models, and

those are culturally determined. In organizations relationships, the hierarchy and rules are very relevant, it was expected to find strong relations with the Power Distance (PDI) and Uncertainty Avoidance (UAI) dimensions in this study.

The PDI relates to the hierarchy power, therefore the Power Distance can be evaluated by the effects of *centralization versus decentralization* on New Product Development activities as well on Supply Chain Design and its integration (NAKATA; SIVAKUMAR, 1996). The decentralization can be viewed also as the *empowerment* in the organization as well in the supply chain. Empowerment develops from the cross-functionality and it is intimately related to human resources programs and creates means to share power among different levels in the organization. The empowerment takes form as a more participative management, joint decision-making, self-management, continuously feedback (HOFSTEDE, 2001; RODRIGUES; SANTOS, 2001).

The *empowerment* is also observed as critical to the success of the Supply Chain Integration, as posed by Shub and Stonebraker (2009) along with other cultural strategies as open communication, trust and interdependency, cooperation and collective incentives. These strategies have great relation to some cultural dimensions poles like: low Uncertainty Avoidance, low Individualism, low Masculinity and low Power Distance.

The figure of the manager is also shaped by the PDI. While in organizations in societies with high score in PDI the leadership close and rigorous supervision leads to greater satisfaction, performance and productivity and the leader is supposed to be a different person from those under him. In environments with high PDI, the planning and controlling of tasks is more personal, where there is less trust in employees and systems.

Also relating to New Product Development, the UAI is involved to answer how to ensure things are done as they are supposed and the mechanisms such as contracts are used to achieve such purpose. According to Nakata and Sivakumar (1996), the relation between NPD practices and the Uncertainty Avoidance dimension relies on two aspects: *planning* and *risk aversion*.

Considering the Supply Chain Integration and the aspects of organizations that belong to societies within one pole of IDV, there are components such as collaboration, trust and

commitment, and how to respond to environmental and market changes (DAUGHERTY, 2011).

The literature suggests that greater levels of Masculinity, fundamentally by two traits representing its purposefulness and objective formalization, promote NPD. But also other researches show that lower scores in Masculinity may facilitate other phases of the NPD through *harmony seeking* (NAKATA; SIVAKUMAR, 1996). In SCI, the Masculinity also plays a role in influencing on how to consider the *success and goal definition* in shared endeavors and *collaboration*.

Supply Chain Integration literature points that the relationship and partnership between companies should perform better in an cooperative perspective than on a more traditional, aggressive negotiation and trying to impose their to the other. Therefore, an integrated Supply Chain is expected to relate with aspects of a society with low score on the Masculinity dimension (MAS) (AUTRY; SKINNER; LAMB, 2008).

The culture where the company is also represents a factor to the Supplier Integration, while the culture can be comprehended by its score on Hofstede's model, it represents a very unambiguous set of values and attitudes that emerge from the combination of those scores. The Brazilian culture can be characterized for its high scores on PDI and UAI, which let power difference to be institutionalized by norms and that has effect in organizations.

The Brazilian culture also has tendency to a more collective perspective on IDV and a below average in MAS, this combination relates to a balanced approach over assertiveness *vs.* quality of life, collaboration *vs.* competition and its identity as between the individual and the group. Brazil preforms a little above average on LTO, that should represent a tendency to parsimony and cordial behavior.

From the previous discussion I observe that on previous research most of relations between National Culture and Supplier Integration in NPD and SCM were indirect at best (PAGELL; KATZ; SHEU, 2005). By this it is possible to identify two main questions:

- Can NPD and SCM practices in a supply chain be related to aspects of national culture?
- And if they can, how to choose or adapt the organizational practices in NPD and SCM, under an integrative framework, to better suit the National Culture

of its employees and the original national culture from the company (in the case of multinational companies)?

From the literature review, the performance of management, leadership and other business areas are influenced by the national culture. Therefore, it is expected that the national culture may also influence the level of performance, or acceptance, of NPD and SCM practices. As pointed before, is this exploratory study, so the hypothesis is not strict and the questions presented suffice the purpose of study.

Bearing in mind the questions presented and the literature review in the Chapters 2 and 3, the broad set of research variables addressed in study are presented in Exhibit 6.

Research phenomena	Conceptual construct	Research variables
Relations between the National Culture dimensions and the Supplier Integration in NPD and SCI	Supplier Integration	Supply Chain Integration
		Product Development
		Process Development
	National Culture	Power Distance
		Uncertainty Avoidance
		Individualism
		Masculinity
		Long-term Orientation

Exhibit 6 – Research variables for the National Culture and the 3DCE.

4.3 Case Study Unit: Modular Consortium

This section presents the context and traits of the case study, a Modular Consortium truck factory located in southeast Brazil. This case study provides a great opportunity to evaluate the implications of a very aggressive Supplier Integration from Supply Chain Integration, Process and New Product Development perspectives. The Modular Consortium was built by Volkswagen and its main suppliers, being the only one-of-the-kind in the world, serves as a model and benchmark for various other adaptations, plants (like the industrial

condominiums) and several academic studies (BUENO; VENDRAMETTO; ALISANCIC, 2007).

The automobile industry always received great attention by scholars in the NPD and SCM fields for the development of a product like the automobile is a complex set of activities involving many people, and many times several companies, over long periods of time (CLARK, 1989; CLARK; FUJIMOTO, 1991; MORGAN; LIKER, 2006; VAN DER VAART; VAN DONK, 2008).

In Brazil, particularly after the 1990's, several new physical layouts and organizational arrangements were implemented in the automobile industry, as the industrial condominium by Audi in São José dos Pinhais/PR and GM in Gravataí/RS and the modular consortium by Volkswagen in Resende/RJ are examples of those new arrangements (SACOMANO NETO; TRUZZI, 2009).

From this scenario, the Volkswagen Brazil (VW) built in 1996 a new production process structure, labeled the Modular Consortium. This new system consists on a very aggressive partnership between the automaker and its suppliers where both shared risk, knowledge and investments (BUENO; VENDRAMETTO; ALISANCIC, 2007).

It is important to emphasize at this point that the Volkswagen was not a main player in the truck and bus assembly market, only after acquiring in the early 1980s part of the Chrysler bus plant did the Volkswagen started in this market. After that, Volkswagen Trucks built a joint venture with Ford Trucks to produce trucks and buses for the Latin America market, called Autolatina and the main objective of the Autolatina was to minimize costs through scale that could be achieved if the companies were to work together (Ford was not also a market leader). (BUENO; VENDRAMETTO; ALISANCIC, 2007).

However, conflicts and divergences of strategic nature alongside the turbulence of the fast process of internationalization process that hit the car production system, did not allow the partnership to thrive and in 1994 began the process of dissolution of Autolatina and Volkswagen started to plan and build its new plant in Resende/RJ, the Modular Consortium, while Ford kept producing Volkswagen trucks during this transition period. (PIRES, 1998).

The Modular Consortium (MC) is a production organization form characterized by the supplier integration from the lean production system, with a reduced number of employees on the plant floor and the supplier working in the same line (CENTELHAS, GIFALLI, PEREZ,

2013). It was formed in 1996 by Volkswagen in Resende (in the Rio de Janeiro state), a Greenfield at the time, and soon become a mark in SCM (PIRES, 2009).

According to (PIRES, 1998), the Modular Consortium model can be viewed as a radical form of outsourcing between the automaker and a small and very select group of first tier suppliers to began a new form of partnership – referred here as modulists – in which the modulists are responsible for the assemble of a certain module in the assembly line. The automaker provides the plant and the assembly line to the modulists – including its coordination and tests setting – as well focus on product design, final quality control, and marketing, sales and distribution. According to a Volkswagen director at the time: “the house is VW’s and the furniture the suppliers” (LUQUET; GRIMBAUM, 1996).

This arrangement also means that they must share some of their traditional competencies and attributions. From the suppliers’ point of view, the model represents an novel opportunity to learn competencies and become a module supplier. The module is defined, not strictly, as a higher value item in the inbound supply chain. For example, a power train module consists of the motor, gears and electrical wiring. The Figure 7 shows the flow model in the assembly line (PIRES, 1998, 2009).

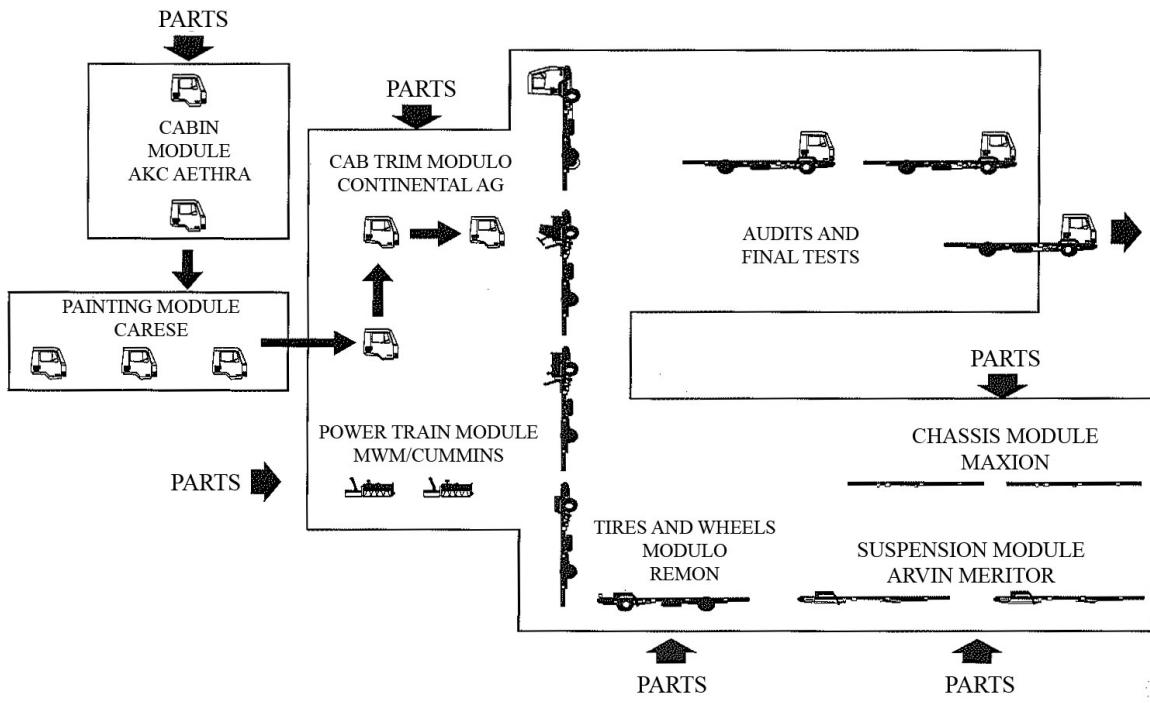


Figure 7 – Modular Consortium flow model in the assembly line.

Adapted from: (PIRES, 2009).

The initial investment came from both modulists and automaker, with confidential contracts that made both parties responsible for a smooth operation in the plant. While the contracts made several companies work together in the VW plant, several of the modulists still were competitors outside the factory, and most have different strategies and policies, this required great effort to manage the interfaces between the modulists and the automaker. For instance, in the early years, Volkswagen also made sure to minimize some conflicts between the different firms, and their different characteristics, by making all employees in the plant to use the same uniform, including the white collar employees. The seven picked suppliers had different nationalities: three Germans, two Americans, three Brazilians and a joint venture between a Brazilian firm and a Japanese firm (CENTELHAS; GIFALLI; PERES, 2013).

When analyzing the possible technical gains from the supply chain integration, be that in physical integration (materials and space) or virtual (information), it is notable that they outweigh the costs and risks involved. Nevertheless, when observing the opportunities generated by this arrangement considering the knowledge transfer between the several parties that the true potential and crucial advantages show up (BUENO; VENDRAMETTO; ALISANCIC, 2007).

According to Sacomano Neto and Truzzi (2009, author translation), “(...) resources, information, knowledge, technologies, control, power and much more flow in this kind of relationship”. The MC also simplifies the product complexity, increases the control over the supply chain, combines product standardization and customization and reduce the lead time (VAN HOEK; CHAPMAN, 2007).

This MC initiative also brought many challenges with this new opportunity, in the SCM, managerial scope, logistics, quality, organizational aspects. As identified by Pires (1998), “the automotive suppliers know that modularization is an irreversible trend in the automotive industry, and that the modular consortium model has drastically accelerated this process”. From the markets perspective, the performance of the MC plant can be considered fairly positive, with a consistent growth and increase in the market share (BUENO; VENDRAMETTO; ALISANCIC, 2007).

Regarding the management of the interfaces between the parties in the MC, literature points a great effort in integrating the different organizational and management cultures and values – and the automaker management policies usually suppress the modulists one, like in the final product quality standard. By defining some directives, the automaker wants to create more than a smooth operation and routine management, it wants to build a unique management culture in the plant (BUENO; VENDRAMETTO; ALISANCIC, 2007).

To be able to achieve such unique culture the automaker created six formal mechanisms to control the supply chain: production program, quality indicators, program's compliance, process and product audits, inventory control and defect control (SACOMANO NETO; TRUZZI, 2009). When considering bargain power, the modulists have larger organizational, financial, technological resources at the plant as a result of the consolidation of the automotive sector in Brazil, this fact enables the suppliers to develop trading strategies and balance the power relation in the supply chain, as pointed by the authors.

As a production manager interviewed by Sacomano Neto and Truzzi (2009) stated:

(...) drawback of the modular consortium is that you do not have the power of decision (...) sometimes you have to sacrifice some of your interest (...) [For example,] to work overtime, I have to request all the managers of the modules so decisions are shared (...) so it is a bit harder to manage because it is a

daily trading with the modulists (...) in this kind of association you lose the power of decision (...)

On the positive side of the change in the negotiation process, as the same production manager of the automaker highlights, “(...) this learning that we had here showed that much was not ideal precisely because the automaker had too much power and too little trading (...) now we have a business with several people involved (...)” (SACOMANO NETO; TRUZZI, 2009).

The main knowledge sharing and learning process in the MC are the learning-by-interacting and cooperating and the learning-by-imitating, as pointed out by Lastres e Cassiolato (2005), as a result for the great social contact and interpersonal relations between the modulists and automaker showing a great level of trust, information exchange and reciprocity as expected.

Sacomano Neto and Truzzi (2009) showed how the aspects of the relationship in the modular consortium and their respective activities, as showed in Exhibit 7. The seven aspects of this relation analysis were: actors interdependency, conflict resolution mechanisms, kind of information between actors, frequency of interactions, emotional intensity, resource commitment, speed and level of formality in the chain relations.

Relational aspects	Modular Consortium
Conflict Resolution	Daily production meetings. Daily audits
Kind of information	Highly related to design, operations and business processes.
Interaction frequency	High frequency. Modulists and the automaker meet at least twice a day
Emotional intensity	High. The parties meet in ceremonial events like dinners frequently. There is a high level of identity.
Resource commitment	High commitment to technological resources and management systems
Speed	Great flexibility in the inventory. Demands less planning
Formality level	Has formal as informal aspects

Exhibit 7 – The main relational aspects in the Modular Consortium.

Source: Sacomano Neto and Truzzi (2009).

To conclude this section, the case study unit provides an interesting object for it exacerbates the interfaces in a complex Supply Chain, the Modular Consortium is a form of very aggressive Supplier Integration in the Supply Chain Management and on New Product Development (as incremental and process developments) and has thrived in the Brazilian (VW has become a truck and bus market leader) as well in external markets. There are companies in the Supply Chain from different countries and all employee's work on the same manufacturing line.

4.4 Data Collection and Analysis

The data collection process started by a first contact with a employee of one of the modulists in order to provide some basic information if the companies from the Modular Consortium would represent a viable case study and what configuration this research should take. This employee was on an engineering team in manufacturing and has previous experience in another Volkswagen plant, a traditional plant in São Paulo state. This employee will be referred as the key-employee.

The participation of this key-employee was fundamental to, give a better understanding of how the Modular Consortium is operating. On this initial contact he gave a general view on the activities, organizational structure and a general dynamic of the Modular Consortium Supply Chain and New Product Development. This contact took form of

informal interviews and has provided insightful information for review purposes on the case study characterization and on the interview script.

The key-employee also advised on how to apply to the Modular Consortium administration and Human Resources departments so this research could be performed there. The research request (Appendix A) held a briefing on the research purposes and methods, as well provided a control to the Modular Consortium to decide on which information to disclosure.

The tools of choice for collecting data were direct observation, files and general material that was conceded by the Modular Consortium companies and semi-structured interviews. The interviews were the main tool for data collection, for it was richest in detail for the research objectives and the other two implemented as a support for creating the organizational model and contextualizing the supply chain and the stakeholders.

The interview is a data collection technique where the research takes a rational and systematic approach on a certain subject. The interviews can follow strictly script or accommodate changes to the script, subtle or not, and through the interviewee answers the researcher aims for getting the most complete information while optimizing time and effort. This research uses semi-structured interviews (it has an script defined, however subtle changes can be made in order to pursue different view with different participants) and of investigation. This approach on the interview enables the verbalization and broad range of possible outcomes about the interviewee thoughts, opinions, facts and values and the, more often than not, the explanation for those (ROSA; ARNOLDI, 2008).

The interview script (Appendix B) creation process took two phases: (a) a literature review on the fields of study (presented on the previous chapters), the MC's institutional material and site, the news and papers about the MC and other academic work that used similar approaches and (b) the key-employee provided information to refine the interview script and also suggest a few changes on order to better suit the interviewees and the organization. The key-employee was not interviewed, for he already was familiar with the research proposition at the time, and therefore his answers would be biased or interview, but because of his familiarity with the research topics he was extremely important on pointing out and arranging the interviews with several stakeholders in different companies while optimizing the possible outcome.

There were arranged nine interviews that were tapped and two more that were not, with eleven interviews I was able to interview three different companies in the Modular Consortium. Of the eleven interviews: three were with modulists employees and eight with the automaker employees, and they represented different management positions on their respective organization (directors, managers, supervisors, engineers and trainees) so we were able to make use of triangulation to minimize bias in the qualitative method (SINGHAL; SINGHAL, 2012a).

Another aspect that improved the triangulation was the time working of each person interviewed on the organization and on the Modular Consortium. The oldest on the organization had more than thirty years in the truck industry and on VW, while the youngest in the Modular Consortium had no more than two years working on the MC. That fact and difference in the interviews become even more important when changes in the modular consortium were put into a longitudinal perspective.

The interviews took place on two days of visiting the Modular Consortium, the invitations were sent by e-mail through the key employee. On the first day there were six interviews, while on the second there were 5. On second day was also possible to take advantage of the direct observation, during the morning period there was a problem in the manufacturing the Supply Chain had to mobilize to tackle the problem.

The interviews took approximately one hour each (the longest took almost two hours, while the shortest one had 24 minutes) and all of them were transcript after all the interviews were done. As provided the right to the MC, the raw transcriptions are not available in this work, while they are available to the companies in the MC. These transcriptions and notes from direct observation were submitted to interpretative and categorical content analysis (GUERRA, 2006).

The content analysis was chosen for the complex environment and dependency between the variables and the phenomenon of study, in other variables could be presented as a cause or an effect of other aspects of the phenomenon. Therefore, for the content analysis, the interviewee was pondered as an sum of the social network that he is, while he may interpret his own actions, values and place in the organization and the social context that he is part of. Consequently, the analysis was categorical in identifying the variables manifestation, from

prior literature review and the key-employee suggestions, that would influence the research phenomena (GUERRA, 2006).

The Figure 8 synthesizes how this research took place.

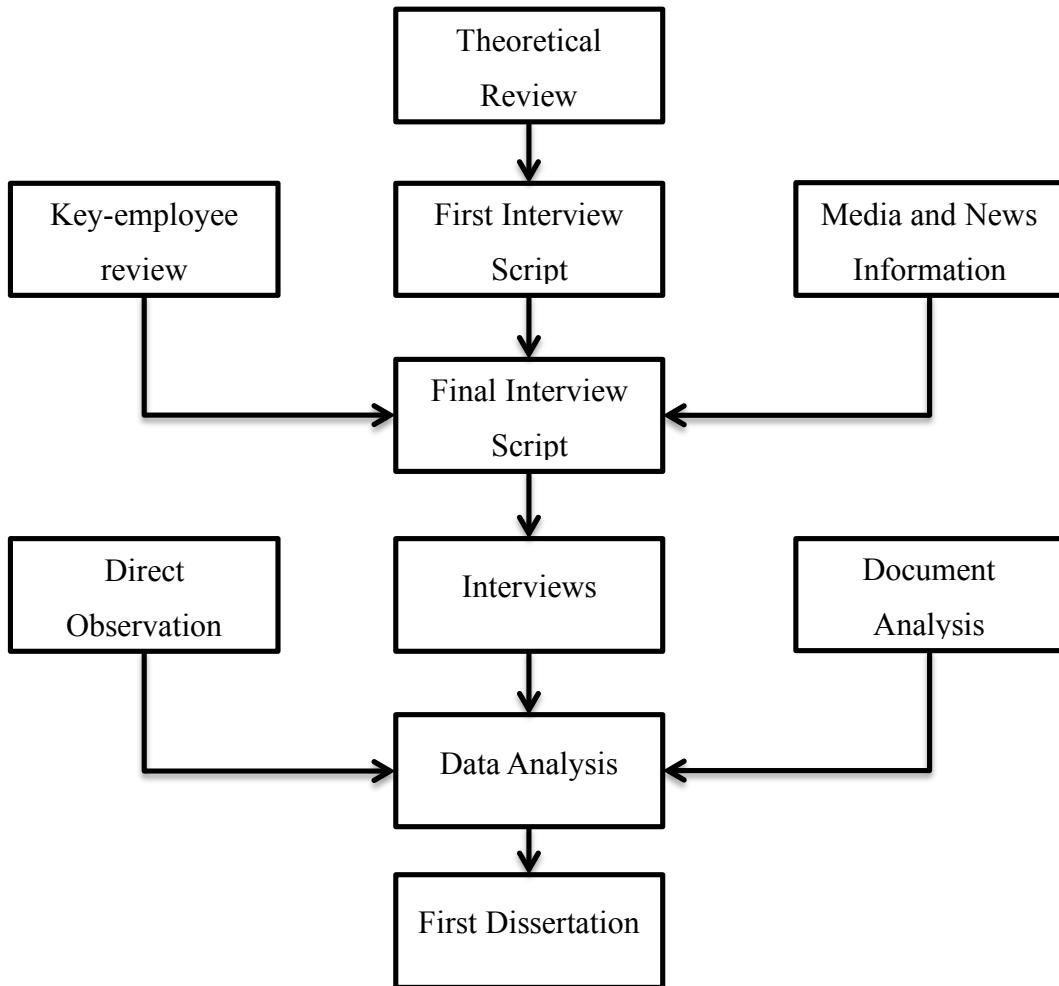


Figure 8 - Synthetic Method view

To conclude this chapter, to better answer the research question a qualitative and exploratory method was chosen with the use of an object of study that could incorporate and personify the research phenomena. The case study of choice was the Modular Consortium, a radical form of Supplier Integration for both the Supply Chain Integration and New Product Development perspectives with companies with different values, from different countries of origin and that had found a way to work harmoniously. Interviews were the main tool to acquire data and a content analysis was performed jointly with direct observation notes, news from the organizations and institutional material supplied by the companies. The results will be discussed on the next chapter.

5 RESULTS AND DISCUSSION

This chapter shows the results found through eleven interviews, direct observation, news and institutional material in the case study unit – the Modular Consortium (the methods can be found in detail in Chapter 4. Firstly a characterization of the case study unit to contextualize the results, as well present the research phenomena on the case study unit. Secondly, the relationships between the research variables are studied in detail. Later a synthetic exhibit shows the main findings.

5.1 Modular Consortium Characterization

From the market point of view, the performance of the Resende model has been very positive, with growth followed its implementation. In the truck market participation of Volkswagen grew significantly (ANFAVEA, 2015). Its valid to remember that in less than 20 years ago the company did not even produce this product So in a market perspective the Modular Consortium was a success as pointed by an executive: “Some milestones that we had were that at the beginning [of the Modular Consortium] we had 15% market share and after a few years we were growing and the 11 last years we reached the point of market leaders.” (Interview 6)

The Volkswagen Modular Consortium in Resende is a one-of-a-kind plant in the world. Today it serves as benchmark for Supplier Chain Integration, Logistics, Product and Process Development and many other disciplines

5.1.1 Timeline and Landmarks of the Modular Consortium

This section will focus on the timeline provided in the interviews, in a way to complement the concepts fetched from literature in Chapter 4. And create a inside view of the changes in the Modular Consortium organization.

A former GM executive, Jorge Ignácio Lopez de Arriortua, idealized the Modular Consortium (the modular consortium concept was described in the Chapter 4) when the Autolatina joint venture between Ford and Volkswagen Trucks came to an end. Ford accepted to produce Volkswagen trucks for more two years while Volkswagen looked for a place and

built its new plant. Resende in the Rio de Janeiro state was chosen among other possible places for this new plant. According to one interviewee:

(...) we were building our factory, we had some location options, such as Resende/RJ and Sao Carlos/SC. At the time we had a director of Volkswagen AG, Mr. Lopez Arriortua, a former GM and he had this idea of modular consortium. With the help of partners' money and the per-unit agreement. The cheapest part of facilities, was acquired by modulists and they then had the amortized value. (Interview 8)

On the first years, the Volkswagen and the Modular Consortium invested in training and technician programs in the Resende area, partnering with a industrial school (SENAI). At the time the Resende city and region was considered a mainly rural, with little (barely any) industrial experience. Today Resende and the south region of Rio de Janeiro State hosts other automobile automakers, such as Peugeot and Citroen, Hyundai, and others. Another interviewee points the initial challenges when initially implementing the Modular Consortium.

Typically, this process to start a plant is complicated for us was a little more complicated for start with the concept that completely new and unknown for both Volkswagen and for companies in the modular consortium. For us handle and these companies work within a ceiling there was not an existing reference book. (Interview 6)

To choose the partners to become modulists, the Volkswagen looked into 53 (national and international) companies were analyzed through an international purchase system of Volkswagen of Brazil. The analysis performed a check of the technical condition of each company, in addition to aspects of best price offered to perform the task.

Once chosen, contracts were tailored and a special attention was given to those contracts and some special regimen were designed with public authorities. Several issues arose from a legal perspective, such as intellectual propriety, propriety transfer, modulists payment and technical assessments. According to one of the senior executives, there was an “umbrella” contract with the concept of the Modular Consortium and other contracts for each perspective (e.g. technical competencies, quality and auditions, propriety transfer). Those contracts suffered punctual modifications while the concepts remain the same.

The new environment also meant a Human Resource policy for every employee in the Modular Consortium. The adaptation to the new working environment was also influenced by the practices previously used by companies: a comparison of benefits, wages, and how the work was organized. One executive points that those adaptations had to be decided between the modulists and the automaker together:

For example, our base date for salary is May 1st, if employees have all the adjustments, the modulist should already adjust the price of the input to the automaker. I.e. is very transparent, the modulist is only in a position to demand what is agreed upon it. Within the MC the negotiation with the modulists is common. Hence, everyone has the same base date and everything goes for everyone from wage and bonuses values, transportation vouchers, etc. (Interview 2)

Once installed the Modular Consortium started to operate and produce the main product a lightweight truck for several purposes. The main concerns on the first years were to make possible for the seven modulists and the automaker to “live together” in a way that all companies respected and followed the automaker standards in the production system. The senior executives point:

We learn together how it would be the MC business. Of course in the beginning we were 7 companies more VW coordination which manufactured trucks and buses, and each company had their culture, peculiarity and this made it difficult at first. From the beginning we had daily meetings with the managerial and many conflicts of interest and results (Interview 6)

In the beginning, the challenge was to live, to make a production and outputs have to follow the Volkswagen standards. And we had to do in a novel production configuration. We had an initial concept that we would not have inventory, it is logical that this is a very difficult concept, when you will talk to suppliers who need a volume and a different point of other suppliers (...) (Interview 8)

Some of those challenges were attributed to cultural differences between the companies, both from an organizational perspective as well the national in which the company was created. Discussions arose from a production planning perspective to quality issues between the audits. The interview 8 explicit points culture as main factor:

The challenge of the first four years was cultural and to maintain the relationship. You have in the Supply Chain an American company such as Meritor, it has strong cost concepts and next to you puts your company, which at the time was the VDO, which is today is Continental, which is German and has more proximity to the Volkswagen favored type of production focused on quality, even if more expensive, implements a refined quality control. (Interview 8)

In the early 2000's the Modular Consortium was consolidated, the companies found how to work on interfaces and change how to behave in the Modular Consortium. A manager at the time points that how they related to each other have developed in the first years:

As in the beginning, they sit the eight companies, and basically we had the seven partner companies fighting for space, to defend each volume point, to avoid stop the line. (...) They realized that it was not a healthy situation, and now the modules came together to strengthen. So now you see a unity between the modules to talk to the automaker. This must have occurred at about the years 2003-2004 and you already could see this difference of the beginning. (Interview 9)

As the MC relationships started to grow the challenges the MC faced changed from a "survival" aspect in the market as to a more aggressive approach, focused on becoming the truck automaker market leader in Brazil. As can be found in this interview excerpt: "After the implementation, we wanted to grow our business. Our Sales Director said: '(...) we compare ourselves with Ford, we have grown, now we compare ourselves with Mercedes (the market leader at the time).' (...) [The question was] How to win the market share, that was our goal, to become market leaders." (Interview 8) [author]

In order to improve its market share, the product design was revisited, and incremental innovations were promoted and called the Series 2000. At the time no other truck automaker was concerned with ergonomics and comfort for the driver (e.g. air conditioning, an easy to use clutch, reduced noise in the cabin). With the Series 2000, the Modular Consortium achieve the market leadership in 2004.

At this point, around the year 2003, the Volkswagen started a New Product Development project for the Brazilian market, the NFB model and later launched as

Constellation. On this endeavor a group of product and process engineers, logistic analysts, finance, purchasing and quality staff formed a multifunctional team and went to Germany to develop along side with Volkswagen AG team. All people on this team that developed the new model were Volkswagen employee.

We started developing a new cabin [the Constellation] and we sent over 50 people to Wolfsburg to develop this project with auto engineers. **All of them were Volkswagen or there were modulists?** The team was only Volkswagen employees. (Interview 8)

In 2003, we participated in the Constellation model project, and Volkswagen sent some people to Germany to develop this project. I went as logistics for Germany, and also a few colleagues of logistics. We were living it for several years, dealing with the logistics part with their team. (Interview 7)

The Constellation implementation brought significant changes and concepts to the Modular Consortium. The modulists had to redesign the processes in the same line to incorporate the new model and also increase capacity with limited resources available. The internal logistic concept in the plant also was revised to incorporate the *just-in-sequence* for the new model, it was created a logistic center that is responsible to receive parts, warehouse, sequence and deliver to the production line. Several interviewees highlighted this changes:

(...) I participated in the development of painting in Brazil. [for the Constellation model](...) Mainly on changes in the painting line to accommodate the new model with the old model. Thus, I worked on the line balancing, supplier development and physical changes of the line (change stations, etc.). (Interview 1)

We structure the whole plant, parts of sequencing for the *just-in-sequence*, and in Germany we have developed a project with the entry of new pieces in the assembly line for this program and we did a project just to meet this new demand. How we use the same line as we produced the Series 2000 we took in the line parts and had to deliver in sequence for each truck produced to take advantage of the space in the stations. In this process, we have created an internal logistic center. (Interview 7)

With the launching of the Constellation and the increasing demand for Volkswagen trucks, the Modular Consortium plant started a capacity increasing initiative. The Modular Consortium started to work with one shift, increased to two working shifts and peaked with

three. Due to macroeconomic factors it reduced again to two shifts. (...) In 2003 we implemented the second working shift I went to this second working shift to train the staff and if I am not mistaken in 2009 we started the third shift." (Interview 1)

The increase in capacity and production were related to a hedge initiative to produce and sell Volkswagen trucks in different markets. Volkswagen already sold to other markets than the Brazilian, but those were just spot sales. To intensify the presence in other markets the Modular Consortium intensified a CKD regime – Complete Knocked Down – facility in Colombia to where they send parts and the CKD regime facility assembled the parts and produce the truck. The MC also built two SKD – Semi Knocked Down – in South Africa and in Mexico where the truck was prebuilt at some point (eg. complete cabin was shipped) and just the final assemble was done in these facilities. Those CKD and SKD already were created before (1998 in Colombia, 2003 in Mexico and 2004 in South Africa) but they became a key part as the capacity increased. As pointed by the interviewees:

In order to take advantage from different markets, we opened a sales office in Argentina, which was within the Volkswagen plant there. We sent the buildup vehicles. We had a strong importer in Chile. We also opened a branch of the modular consortium, in Puebla, Mexico. And there in built the truck on CKD regime and set up a factory in South Africa also in CKD also. And alongside we had some spot sales (Middle East, China, Latin America) (Interview 8)

In 2009 the MAN, a German truck automaker, became publicly part of the Volkswagen. This purchase represented some improvements to the Modular Consortium Supply Chain. The Volkswagen only produced trucks in the Modular Consortium and when the MC became part of MAN it was possible to benchmark practices with a traditional and modern truck plant in Europe, as pointed by the interviewee

(...) Were bought in 2009 by MAN, then the MAN VP who stayed here for 3 years provided to the staff of manufacturing and modulists managers to visit their plant in Munich. Which allowed us to bring an important practice today, the teamwork on the shop floor, the structure of meetings and issues (security, housekeeping, quality, the day and the next day, volume, absenteeism) and this contributed to the growth of employees and process. The indicators showed significant improvement on that system. (Interview 6)

The modular consortium also became a plant to assemble a prebuilt MAN super-heavy truck model, the TGX, and for that it was created a new line in the plant, and in that line as well only the modulists' work directly on the production. This second assembly line only works one shift with a very reduced production rate when compared to the main assembly line.

At the same time, the Modular Consortium unified lean practices that were adopted by some of the companies punctually (for example the AKC had implemented *kaizen* and TPM – Total Productive Maintenance)¹ and some lean logistic disciplines were intrinsic to the Modular consortium, such as *kanban*, *just-in-time* and *just-in-sequence*. Around the years of 2009-2008 the automaker proposed a integrated concept to the modular consortium, in direct participation of the modulists, that would define the lean production concepts to the entire Modular Consortium as well the implementation, in this work hat will be defined as the Modular Consortium Production System (MCPS). That was emphasized by some of the interviewees:

Since the Constellation project and implementation we had some steps to improve processes. In 2008 we started talking about lean manufacturing, *kaizen*, *kanban*, and other logistical tools. (Interview 6)

In 2010 I lived a particularly intense project that was the implementation of lean concept within the modular consortium. The Modular Consortium already has a very strong lean aspect, but we understood that we could use more modern tools and made a mix, which is the Modular Consortium Production System. (Interview 4)

Another executive puts the evolution in the modular consortium as a series of management “waves”:

(...) changes in Modular Consortium. Soon after the launch of the plant had this Quality wave, make the manufacturing process very robust. After the Quality wave came the Cost wave, restructure costs, seeking productivity, Later on there was a Product Launching wave. Then we experienced grow as an organization, we grow in volume, we went from around two thousand employees to six thousand. (Interview 9)

The first one named the quality wave, can be understood as the effort of the automaker to train and to make the modulists to follow the Volkswagen quality directives and standard, later there was an effort to reduce costs, increasing productivity and, therefore, become more

competitive (as discussed before, a few years after the consolidation of the Modular Consortium, the Volkswagen truck became the market leader). Following that, there was a “wave” to develop new products, which resulted in the launching of the Constellation model in 2006. After there was an effort to increase capacity in the plant as well incorporate a second manufacturing line for the MAN TGX model in the same plant.

In 2012, due to a legislation change to regulate emission and consume on urban trucks, the Modular Consortium had to develop a new set of incremental changes to the Series 2000 truck model.

In more recent years, the Volkswagen AG bought the MAN GROUP, and therefore the Modular Consortium (that was part of MAN) became part of the Volkswagen Group again. The MC also planned a capacity increase and flexibility study, but due to macroeconomic factors those were put on hold. According to some interviewees, the challenges that the Modular Consortium face is related on how the assembly line can keep the Modular Consortium premises and still improve in flexibility, capacity and

Today, Other colleagues and I share some of essence of the Modular Consortium has been lost. By that time the plant was built all companies had interest. So it was a favorable contract at all. Today that contract is outdated, not meeting all parties interests. **The structure of the contracts has always maintained?** It was kept, I at least talking about the modulist I interface with, there was very little review on that contract and now we see that it [the contract] does not satisfy everyone. Then disagreements are becoming “dangerous” to the concept of Modular Consortium. (Interview 1)

What I see the challenge, in my understanding of evolution for the MC, is that the MC companies have to invest in equipment, fixed assets, devices. Every investment today is from the automaker, there will come a point when that point would have to equalize the investments. If you see the modules of the automakers, they went to the nutrunners and they had an amortization but it was a very shy division. I think this is a step that the MC will have to give to share the assembly line. (Interview 9)

Another risk factor that we will live as manufacturing is the introduction of new models on the same site, here we already have a very extensive portfolio. (...) the level of complexity in this plant already shows that

this plant is one of the most complex in the world, and if not for the MC we could not dilute this complexity and make it feasible. (Interview 4)

The next section will discuss some key aspects of the Modular Consortium, as the automaker and modules relationship, how the NPD and the SCM processes take place and mechanisms that are key components for the Modular Consortium.

5.1.2 Key points in the Modular Consortium

Considering the general aspects presented on Chapter 4 of the Modular Consortium, the automaker does not work directly on the assembly line is just one of the very particular aspects of Supplier Chain in the Modular Consortium.

5.1.2.1 Supply Chain Integration in the Modular Consortium

Even the layout presented (Figure 7) already shown a pretty bold plan. Apparently "irregular" format seeks to conform to defined processes and clearly marks the redefinition of physical, organizational and business boundaries between the automaker and its suppliers (modulists). There is an emphasis the simplicity of the plant and basic processes. Material flows are well established, and access to the plant is independent for each module. Thus, parts and components are delivered at the closest point possible to the place where they will be assembled. The planning and production scheduling, maintenance of machines and equipment become the joint responsibility of modulists and automaker.

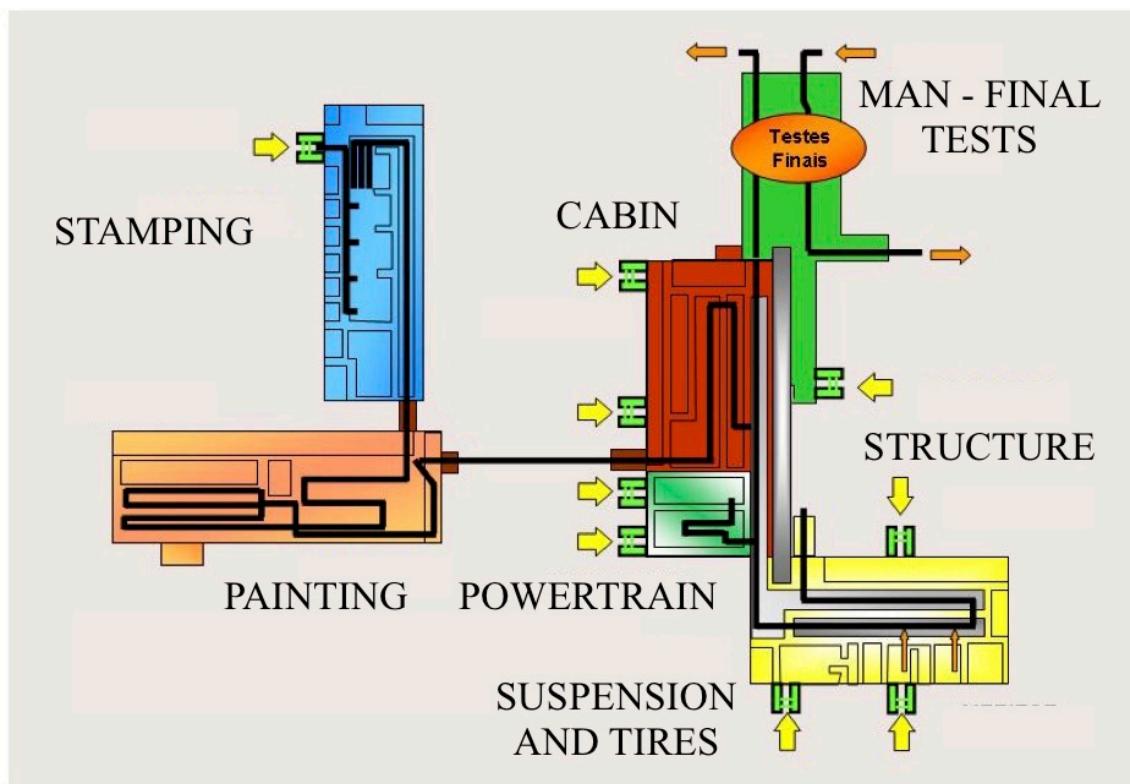


Figure 9 - Modular Consortium assembly line layout

What you notice immediately in the layout of the plant is that, differently from the organization of an industrial condominium where the central plant suppliers are located in relatively close to this region, the modular consortium suppliers are literally a physical part

the assembly line, taking specifically reserved spaces within the building. It is clear, then, that such a configuration greatly strengthens the relationship between the automaker and its key suppliers, to the extent that the flow of material and information is confined to a physical drive accessible at all times for all participants of the Modular Consortium. In the case of Resende, however, this physical presence is more than a closer relationship between the vendors and manufacturers for operational optimization purposes, representing a risk sharing initiative.

On the per-unit deal, the modulists get paid once the truck gets in an specific point in the assembly line. This point is where the truck goes for the final testing (automakers responsibility) and is known as the ZP6.

What are the production gates? The car enters the production line on EM1 and there it starts the assembly (...) it reaches the ZP6, which is where the car is completely built. The ZP6 is the production gate for final quality tests, such as brake tests, headlight aligner, water-proof, we makes the inspection of painting and goes to ZP7 if there are some rework to be done or to ZP8 where the car is released for sales. (Interview 7)

The automaker is also responsible for planning the production and distributing the parts in the assembly line. Another company is responsible to execute the logistic internally in the Modular Consortium, but this company is not a modulist. The only exceptions to logistic automaker control are the AKC and Caresse modulists that incorporate part of the logistic in the module for they have very specific manufacturing processes when compared to the other modulists.

The main activities [of the logistic department] is responsible for getting the pieces on suppliers bring to the site, making the reception, confirmation of the charges, storage (warehouse) and supply line. You begin by picking the supplier and ends supplying the parts on the line. It has two types of transport, which is by the supplier itself where the supplier brings the piece and another where the automaker goes to the supplier and brings the part. For example Cummings parts I will get there and Maxiom brings their parts. (Interview 4)

Each modulist has an unique feature in the Modular Consortium, and the only two companies that have an internal logistics area are the painting modulist, Caresse, and the stamping and frame modulist, AKC. Fort the other

modulists the automaker is responsible for the logistic/. Still, the AKC is partially independent because it makes planning and request parts, but it is the automaker that makes reception, disposition and inventory, and the execution of the distribution is the JSL internal logistics. 2

The quality in the assembly line is determined by the automaker, as it had its own employees on audit points in the assembly line, today the quality and test teams have employee from several modulists in it. On the other hand, is the modulist responsibility to implement quality indicators on the Supply Chain that are aligned with the automaker quality standard, as pointed by a modulist executive: “ (...) For example, we have quality indicators, we take care and take actions according to our autonomy, especially because these indicators are already aligned to determinations by MAN. (...) We do not have an indicator in the assembly line that the modulist define independently.” (Interview 2)

A mechanism that was implemented in the Modular Consortium to facilitate and improve the quality management in the Supply Chain was the Direct Flow. That mechanism assures that every modulist have a concise view of the production flow and have objective production points. The Direct Flow helped to determine which points were critic in the assembly line, where the truck had to leave the production line for repair, for how long it stayed out and what measures will be taken in order to prevent the defect. One of the responsible for this project emphasizes while talking about the control in the production line: **“What happened before?** We did not have a vision of how many cars leave the flow. (...) Today we have this process in a visual way, why he left the station, when is expected his return, why did not return yet and so on (...)” (Interview 7). The Direct Flow is part of a lean-based tool mix developed in the Modular Consortium, the Modular Consortium Production System.

An executive as defines the MCPS as:

[The MCPS] (...) is a philosophy, is a set of thoughts and methodologies which unfolds as operational tools, from managing workgroup cells, training, standardization of tools, 5S, process sheets. We have tools to take care of flow pulled the principle of lean thinking. As problems never go to the next station and continuous improvement (kaizen). (Interview 4)

The process to develop the MCPS had the participation of all modulists since day one and the modulists went to benchmark together the concepts and implementation. The opportunity was visualized within the Modular Consortium, for the modules punctually did certain actions, tools and practices that were considered good, but it only implemented individually among the modulists, such as the interviewees point:

Today the modulist AKC is a reference in *kaizen*, we started in 2008, today we are in 92th *kaizen* week, and they brought a significant improvement and quality, ergonomics, stock control, environment. This is a successful tool which was deployed in the modulist and today is the predominant culture. (Interview 2)

The modulists managers went to Germany to benchmark other plants of the MAN Group searching for lean tools to bring to the Modular Consortium. They were involved from the concept to the implementation. (Interview 4)

These characteristics of the Supply Chain reflect how the Supply Chain is integrated. As expected, the vision presented about the Customer Integration in the Supply Chain in the interviews is convergent in the point where the automaker keeps control of the Customer Integration:

(...) the market intelligence and product engineering, marketing and customer proximity is owned by the automaker and is also the automaker responsibility to announces how it will be the production program. (Interview 4)

[Considering the Customer Integration] (...) This is more Volkswagen, and not so much the consortium, we had recently a change of dealers and dealerships network, and the factory we transform in a business card, we brought customers to view and. Also test trucks with customers. (Interview 8)

As the Modular Consortium itself promotes the Supplier Integration in the Supply Chain, several management practices are adopted in order to achieve the results without generating attrition between the consortium companies. The automaker and modulist relationship is formally defined by the “umbrella” contract that guarantees some decision power to every company. This empowerment of the supplier on the manufacturing line is a key component in this relationship as noted:

Who is responsible for searching and inserting new suppliers? It happens to the approval of both automaker and the modulist. From the moment that MAN has to be part of adding new suppliers, MAN can start the process,

only we do not put anything without the modulist authorization. [Choosing a new supplier] takes form of partnership. The working model in Modular Consortium induces this kind of partnership work and prevents the outsourcing situation because in outsourcing simply the company responds to the contractor. The concept of partnership, is really an idea of walk together, I can not get in the way of production and change supplier. The module has to be willing to work with that new vendor. And the opposite is also true. (Interview 1)

[In the modulist management] there are internal decisions, such as the use of tools, for instance we use TPM, and we made the decision to improve our internal process. But in general the larger decisions are shared in the Modular Consortium, for example the modulist cannot create a recreational area for employees without talking to the other partners. (Interview 2)

The main and most important mechanism in the Modular Consortium are the daily meetings, both production and management, and the cell workgroups organization. The daily production meeting takes place at the beginning of the first shift and discuss the main indicators from the past day and the production planning for the day. The automaker manufacturing, quality and logistic employees and the modulists' managers are present at these meetings and discuss operational matters. There are also a meeting twice a week between the modulists' managers and MAN's vice-president to discuss strategical matters.

The Modular Consortium assembly line is organized in smaller work cells, those cell also meet twice a day to discuss the production and activities, and ask for support (eg. maintenance, quality, logistic). Those meetings are the main channel to transfer information and the decision process takes place. Several interviewees highlight this mechanism:

[Considering operational matters, the production cells meetings] are on the shop floor and they are divided into teams. The production line stops for 10 minutes for them to discuss what happened on the day. They go to the one in charge and report quality information, safety issues and also have the possibility to request support for maintenance, quality, corporative areas. (...) [considering the management matters] the MAN manufacturing department is the area that takes care of the plant. It is also divided into teams, for example, in my area I have a team that is called operating logistic and transport and we meet every day. There is the link to the shop floor that is the daily production meeting,

which is among the module managers and MAN manufacturing and logistics managers. (Interview 4)

All teams get together twice a day in theirs specific cell. In addition to these meetings, **what other mechanisms exist to integrate modulist and the automaker?** The main channel is this. (Interview 6)

At that [daily production] meeting the production supervisor said it was the previous day. Each manager shows their indicators, and says if he had any problems. The Logistic department informs the prediction and sequence of parts for the day. Each modulist responds to each subject as quality, production etc. (Interview 7)

If a problem takes place in manufacturing, the daily meeting is where it gets its first attention. The automaker and the modulists search for a solution together that will reduce the impact of the problem to the Modular Consortium as a whole and discuss changes in the production planning. It has been found to improve the time to take action when compared to a more traditional approach, especially because it does not take way the autonomy inside the modulist. This practice consolidates the power division among the consortium members and collaborative aspect of the Modular Consortium as pointed by interviewees:

[the modulists] (...) cannot raise costs without the approval of the automaker. Let's compare the agility on changing production volumes, for example, with a traditional plant like Volkswagen in Sao Bernardo dos Campos. You will find that when you need to change the volume of production in a traditional plant, you need to get the authorization release to deploy manpower in order to start higher volumes, it involves a lot of areas: the request goes through the HR, the applicant, for finance, and more often than not you lose valuable time. With the current model, the companies can overnight increasing the number of employees and also reduce if necessary. (Interview 2)

[About the meeting after compressor failure during the night] That is a Modular Consortium advantage, discussions and decisions it is already pre evaluated and pre discussed, especially on an atypical situation like the compressor failure, before the daily production meeting. The situation was discussed within the cells and areas of production and the possible solutions that we have, we left with 2 or 3 alternatives, and when the meeting with the modules is performed, we tried to come up with a solution that has the lowest impact in the Supply Chain, or on most companies, and not only less harmful to MAN. (Interview 6)

The Modular Consortium Supplier Integration also promotes a greater independence between the consortium business unit of a modulist in relation to its corporate main office. The consortium business unit is aligned with the main office, the business unit still has to report the results, production indicators to the main office, but suffers less meddling from the on daily and on the MC's strategic matters. For instance, the inclusion of new suppliers to the SC has to be approved by the automaker, but the automaker do not push supplier that a modulist do not approve.

Another interesting aspect of integrating suppliers in the same line is that some of them are competitors outside of the Modular Consortium, for instance the powertrain modulists (MWM and Cummings), and they can benchmark the Modular Consortium practices to its main offices, others plants and business units. These information sharing is also facilitates by the Supplier Integration in the Modular Consortium as pointed:

[competitors working together] There are also mutual benefits, for example we have a lean production well structured. Hence, here can be a benchmarking in this matter. (...), the Cummings can come here and learn a little more detail how we implemented lean here and share with its main office. And occurs on the other way as well. (Interview 6)

Alongside with great benefits of the Supplier Integration, several challenges emerge. Some challenges are common to traditional plant, such as how to reduce costs, develop processes and get greater flexibility. While the Modular Consortium can facilitate those initially, to advance past a threshold can be difficult since you have more organizations and a more democratic decision process. Another aspect relies on how to improve communication and information sharing alongside the interfaces ("when product change hands") represents the frontier in the Modular Consortium, according to most interviewees:

The relationship with suppliers so close is a challenge for process optimization and cost reduction in the Modular Consortium. Production flexibility is a challenge in terms of volume and different production alternatives with the same resources, or less manpower variation. But the hardest part is communication and alignment of process guidelines. (...). When problems go wrong, usually it has to do with communication, and information do not match. (Interview 3)

(...) speaking of Modular Consortium again, the concept in relation to management between the organizations. What we have to be careful in our team are the interfaces with the modulist. It is, for example, "Mary" is an MAN employee responsible for one modulist maintenance budget, then it closes with modulist maintenance coordinator, and she and him closes a budget number for the next year. Sometimes the modulist tries to go over "Mary" head and use another interface with MAN in order to get a bigger budget. (Interview 1)

If confronted with the theoretical models, the Modular Consortium can be characterized on Stevens' (1989) model as on the fourth stage (external integration) for the Modular Consortium extends the Supply Chain scope out of its boundaries, including the mostly the suppliers and somewhat the customers. The Modular Consortium uses lean tools such as the *just-in-sequence* to focus on customer satisfaction and demand surpassing the traditional concentration on product/material flow. Thus, the Modular Consortium is in sync with customer needs and demand and it reflects on its Supply Chain.

As the supplier is fully integrated, the modulists and the automaker relationship depends on mutual support and collaboration. This collaboration achieves full involvement in sourcing, logistic processes, on-time delivery to the assembly line, information and processes sharing and also long-term commitment (drastically reducing multiple supplier sourcing).

The automaker controls Marketing, Sales channels, post-sales and the distribution to the customer, by doing it so I keeps under her control the Customer Integration (CI). CI is not directly integrated in the Supply Chain and presents characteristics of Stevens' (1989) the Stage 3 (internal integration). Thus, to complement the Stevens' (1989) model, the Modular Consortium can be typified on Frohlich and Westbrook' (2001) arcs of integration to differentiate Customer Integration and Supplier Integration. For SI, the Modular Consortium presents a extensive integration and is classified but not that extensive towards the customer side. Therefore, the Modular Consortium has a supplier-facing arc and the customer level somewhere between the broad and the narrow points, the Figure 10 illustrates the Modular Consortium arc of integration.

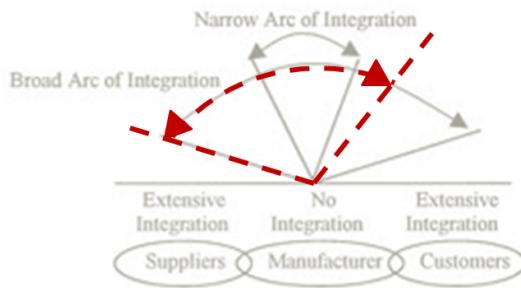


Figure 10 - Modular Consortium's arc of integration

The automaker exerts control of the Supply Chain by controlling the Customer Integration level, as well keeping it internal. While McCarter, Fawcett and Magnan (2005), pointed that hierarchy control would prejudice the work in integrated Supply Chains, our findings provide evidence that the hierarchical control relation to the Supply Chain is not that clear as to the performance of it.

In concordance with Pagell (2004), the daily physical proximity, and the informal communication that derives from it, improves the level of Supplier Integration for they are able to solve problems, anticipate needs and act swiftly. In addition, the workgroup cells and the production daily meetings establish formal communication and alignment between the parties.

The series of interviews shows that the type of relationship between modulist and the automaker as somewhere between a partnership of the type III and a joint venture (LAMBERT; EMMELHAINZ; GARDNER, 1996), as shown in Figure 11. For each company recognize the other as an out of the border extension of itself, the relationship focus on long-term perspectives, conjoint investment and business participation and there is a sharing of strategic views and organizational effort.

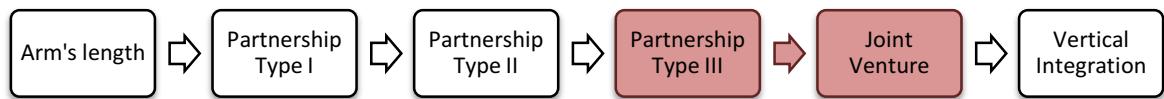


Figure 11 - Modular Consortium supplier relationship type.

5.1.2.2 New Product Development in Modular Consortium

The second key components analysis is the one related to the New Product Development (NPD) and the Early Supplier Involvement on Concurrent Engineering. The data shown in this subsection aims to complement the data presented on the last section, as the timeline discussion heavily discussed product launching. All product concept generation and marketing planning to manage the product portfolio is MAN's responsibility.

The introduction of products in the truck industry takes longer and is less common than on the automobile industry. For instance, the Series 2000 model initial design is on the market since the Autolatina joint venture. Therefore, most product-related development is incremental or related to process development projects.

When the automaker begins a new-to-the-world product development, it uses a formal NPD process that is common to the Volkswagen organization. This formal process follows aspects of the PMBOK with several adaptations to the automobile industry and following the strong quality and manufacturing Volkswagen culture. As pointed by:

There is a product development model that is confidential, which has all product development phases. This has the obligations of each area (such as manufacturing), what kind of processes are to be used and which resources to develop. From this model, we work the implementation of the product in the assembly line with the modulists. (...) [this model] Has the organizations, engineering workgroups, quality and manufacturing, discussion forums, projects and implementation, the meetings that have to occur. (Interview 3)

The first radical NPD started in 2002 and a large number of Volkswagen employees from the Modular Consortium formed a multifunctional team and went to Germany to develop this new product jointly with the Volkswagen German team. Some of the interviewees were part of this multifunctional team and the implementation of the multifunctional teams don not show any particular difference and incorporates some of Toyota's Production System practices (MORGAN; LIKER, 2006), such as *obeya*.

How development occurs, is simultaneous engineering. There is a meeting of engineering and a "leader" who owns the system or part presents the system to the NPD community what it is developing. For example, the cooling system is like this or like that. And begins the discussion with the manufacture,

the logistics, as these will be able to input downstream concerns while in the definition process. (Interview 9)

The choosing of the suppliers for the new product concept does not have to be the modulist. The modulist can participate against other possible suppliers for the NPD project and if they became a supplier for that product the modulist joins the NPD multifunctional team. If the modulist is not chosen to become the supplier the modulist only start participating in the NPD project on later phases, such as pilot, prototyping and process testing.

So, we have a new product project. In this project, there is of course, a competition where suppliers are involved inherent in each product, as exemplified by the cabin that part of the AKC, are involved matrices and other stamping branch companies. So we participate in the commercial agreement and choice of supplier. In the case AKC is chosen, the modulist becomes involved in the project and follows up to the product launch in series. If another company is chosen, the modulist stays out of the NPD process until the pre-series. (Interview 2)

In the [product] development, how are set the responsibilities among the organizations? Are as follows, most of the NPD, customer service and quality are the automaker responsibility. The modulists have the responsibility to provide the parts, making the assembly process, make the whole process of development the process in the assembly line. Therefore, once the NPD effort reaches a point where they will start to work on the assembly line, the modulists start to participate in the manufacturing design. (Interview 8)

There is no effective participation [of the modulist] in the form of concurrent engineering. This process [CE] takes place within the MAN. But they come at the pilot test build, and pilot plant and pre-series. If they do not supply for the product that is the point where they get included in the process. Depending on the project size, you have some prototypes that are manufactured in this pilot series. (Interview 6)

Once the modulist become part of the NPD effort they should provide an risk study relating the actual assembly line and the insertion of a new product in it, the changes in the process and the productivity associated risks

The NPD effort in the Modular Consortium is the automaker's responsibility and the involvement of modulists is limited. The information regarding manufacturing and process design for Concurrent Engineering is mostly the automaker in the NPD multifunctional team, however there is a proximity to the modulists, since the manufacturing department works directly with them on the assembly line and brings indirect concerns proposed by the modulists.

A modulist can be involved in two points in the New Product Development project. If it is chosen to become the supplier for its module on the new product he starts by supply specifications, discussing process and manufacturing after the concept of the product is defined. If the modulist is not chosen to supply its module to the new product, the modulist becomes part of the New Product Development once the studies on the assembly line are needed, for prototyping, build the pilot series, the ramp up and validate the assembly process. If confronted to the theoretical model, the modulist can be involved in the NPD in two possible points of insertion in the ESI model proposed by Petersen, Handfield and Ragatz (2005) as shown on Figure 12.

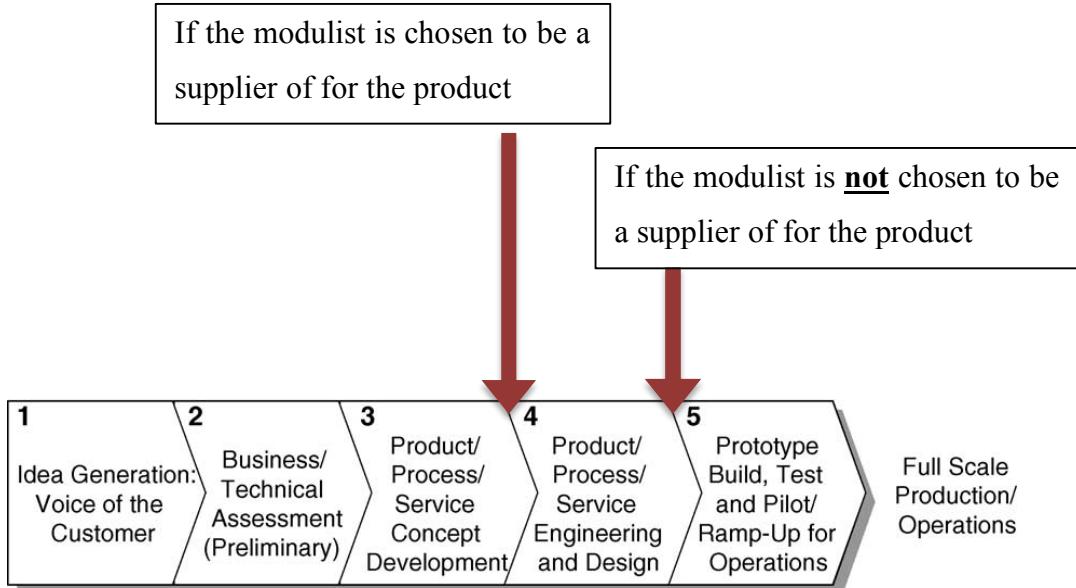


Figure 12 - Modulist possible entry points in the NPD Early Supplier Involvement model.

5.2 Modular Consortium and the National Culture Dimensions

Based on the last section and the interviews, some aspects of the Supplier Integration are correlated to traits of the National Culture Dimensions proposed by Hostede (1980, 2001).

5.2.1 Modular Consortium and the Power Distance (PDI)

The Power Distance dimension defined by Hofstede (2001) as the perceived power distance observed from the weakest party in the power relation, in this case the employee's viewpoint, and how that power distance is accepted and expected by the weakest party. Higher Power Distance relates to a better acceptance of the hierarchy and, therefore, centralization in the decision process and information as well responsibility for actions taken.

In the Modular Consortium is clear to see a relation to traits of a Lower Power Distance score, in which most interviewees described that autonomy is fostered in the Modular consortium: "For me, the management in my team is very good (...) we have autonomy to make decisions." (Interview 1). The empowering on the Modular Consortium happens on two

levels, on the boss-subordinate and the automaker-modulist relationships. The empowerment of teams and organizations permit a decentralized decision making process.

Within the manufacturing cell in the painting modulist we discuss supplier development, maintenance, projects, new products, modulist payments (budget) autonomously. (Interview 5)

People often prefer that problems are resolved at higher hierarchical levels and I miss the base personnel to resolve issues without involving part of supervision. Sometimes, they are very dependent on waiting the upper hierarchy to decide. (Interview 3)

From the excerpts above is clear to see that there is a decentralized decision process especially for operational matters. But the modules also participate on strategic discussions, such as mix planning, production capacity and human resource policies in the previously cited management meeting that take place twice a week.

Today, when we have to make a crippled vehicle (vehicle with missing pieces), we already called the modulist and ask, "What do you think?" And then he decides if it is worth to lose his per-unit on that vehicle (or postpone the last). (Interview 8)

(...) on cost reduction projects how is the relationship with the modulist? For instance, with the modulists for zero defects project, we create within each modulist one gate, the quality gate, that at that point the modulist already assesses defects, and released only if you have not defects. The module is responsible for this gate and has feed back into the system so that the defect does not repeat. (Interview 7)

As one prominent trait in Low Power Distance pole the information sharing to the lower levels of the hierarchy, so they can fully make decisions and assures that different groups, in different points in the hierarchy can be empowered (DE MOOIJ; HOFSTEDE, 2011; NAKATA; SIVAKUMAR, 1996). These passages from two interviews show how the lack of quality information sharing can impact the ability of the decision process and how the process of information sharing is achieved through the meetings:

We have complained a lot of it [lack of information sharing], even here in the painting and stamping manufacturing. On the other five modulists, the manufacturing information is concentrated in on manufacturing department and one logistics department alone. Here we are separated. In the time that I have

been here, we have found that the vertical information (top-down) has been much worse, and we realize that it has improved and information among peers flows better. For example: information regarding market conditions, (and it has happened) I do the labor of calculation with N vehicles per day for three months and today I calculate the values while the business intelligence has information that the market will grow to $1,2*N$ cars per day for the next three months. And at some point it happened that the information got to me by the modulist and not by the manufacturing in the automaker itself. These cases have diminished, but there are still flaws. (Interview 1)

Today our main channel of communication between the teams, peers and subordinates are the teamwork cells. The daily meetings are a tool used for information flow there. We also have HR and corporate emails that permeate the organization for a top-down corporate and institutional information. (Interview 4)

Another main variable in the Power Distance dimension is how the boss is perceived. The figure of the boss in the Modular Consortium also goes together with the expected ideal boss in the Low Power Distance. The ideal boss in Low PDI can be considered a democrat who guides his subordinates and people expect him to consult with subordinates before taking action.

(...) to make decisions, I try to manage more democratic than authoritarian, because of the job rotation I am newer in the logistics function than the rest of the team, for instance I came from product and process, and on logistics have on ten months. So always look for the opinion of my team for a more serious and technical matter. And when they bring the issues, I have to shake for more information and find the concepts (Interview 4)

Of course there are situations where I have to make decisions on things that I have no experience. In such cases, what I do: I make the decision and then take to my supervisor. "What do you think? What would you do in my place? (Interview 1)

As result the leader is seen as a guide instead of a supervisor. The subordinate expect to be informed and empowered to perform task independently.

I expect that a good manager is who can point the north, guide the employees. Being participative, there is a degree of maturity among employees, and thus you increase the challenges according to the maturity of each employee. Then it is up to the manager to know the manager know what degree of risk and autonomy you should give each employee. So I would say that the manager has to measure and know what is needed in terms of complementing the capabilities of the employees. That is, give a guideline so the employee can have the power of decision. (Interview 3)

Therefore, the practices to fully integrate the modulist in the Supply Chain in the Modular Consortium show a strong relation to the Low Power Distance pole.

5.2.2 Modular Consortium and the Uncertainty Avoidance (UAI)

As expected in the high UAI pole organizations follow rigorous codes of conduct and is widespread the belief in absolute truths or paradigms, these social groups have an emotional need rules and practices that minimize risk. On the other hand, lower UAI pole traits are related to activities and norms more tolerant with ambiguities (HOFSTEDE, 2001).

As another reflect in organizations with High UAI traits, as stated by Hofstede (2001), rules lean to a more detailed, rigorous and stern permitting only usual interpretations. As a reflex of that teamwork in higher UAI presents a very structured discussion, well defined agenda and clear and tangible objectives definition.

The Supplier Integration in the Modular Consortium Supply Chain represents an uncertainty inherent to the automaker production. The detailed and especially tailored contracts represent a form to fight and minimize the risks and ambiguities. Also, as previously discussed, the main concern in the first years of the Modular Consortium was to guarantee that every modulist followed the automaker standard of quality and processes. This need for control over risk is a trait related to High Uncertainty Avoidance pole. The NPD is controlled by the automaker and is also defined by a formal and very detailed NPD process.

The quote bellow portrays how the automaker creates mechanisms to reduce risks.

We realize that the human being needs to be monitored all together. Then we have the MCPS that the automaker introduced for all modules through work cells and this was reflected in an efficiency of these self-managed teams

and had an effort of a general organization between these work cells. (Interview 2)

Another trait from high Uncertainty Avoidance pole that becomes clear in the Modular Consortium is that there is a tolerance to familiar risks, while ambiguous and unfamiliar risks are avoided. For instance, if is a operational decision that can reflect on rework has to be made, it is taken based on previous decision and expectations.

[on assuming risks] (...) in certain departments we are incentivized to take risks, in others not. In our area (manufacturing) in general I see that we are encouraged. But for example we are not encouraged to take risks on a compulsory basis. For example, the quality: we have a vehicle with a defect on the line, the quality decides but it affects my capacity. So the need to always be producing and delivering on target, we are always encouraged to take risky measure. (Interview 1)

On the other hand that Supplier Integration also presents some traits closer to the Low Uncertainty Avoidance pole. On the Modular Consortium there is a institutional program to award idea generation, the Brilliant Minds Award, that award innovative work focused on cost reduction or opportunity generation and nurtures risk taking actions, while in control of those risks. A senior executive points:

No doubt, the incentive exists constantly [to bear the risk] from the teamwork concept that includes goals for each cell. Nothing prevents them I say personal or more specific goals they have to meet. We have some instruments such as generating ideas and suggestions and we also have a program that is Brilliant Minds, which is an annual event where the best projects are classified. In addition to financial gain, which depending on the economy found the employee can earn a share compared to the estimated savings for year. (Interview 6)

This proximity with the High UAI pole seems to be more related to the automaker proximity to it than the Modular Consortium itself, but it permeates the organization since the MC is a concept generated and headed by the automaker and its mechanisms are strongly related to a High Uncertainty Avoidance pole.

5.2.3 Modular Consortium and the Individualism (IDV)

The High IDV pole traits are correlated to activities where the individual needs tend to be prioritized over the collective needs. Therefore, organization and groups designate accomplishment, ideal motivation and leadership differently in the different contexts of individualism. For instance, in higher IDV scores success can be measured by the individual success or the leader success, while on low IDV the individual appreciation depends on the group's results (HOFSTEDE, 1980).

The Modular Consortium promotes a collective definition of success. It was observed that during all interviews that the interviewee defined successful projects and aspects of the Modular Consortium as success of the team. This is particularly important when integrating the supplier, for the supply chain must favor all members in it, not just the buyers or Supplier Company. For this Supply Chain Integration perspective, the Modular Consortium is correlated to the Low IDV pole. For instance, one of the interviewees puts: "We have this concern of how to do, but it is not the DNA of MAN to stop making why you can not do, but instead we find solutions" (Interview 4) It is important to highlight that he focus on a collective characteristic to define himself.

Most practices in the Modular Consortium are related to the Low IDV such as information sharing that was discussed on the previous sections and it is highly contextual through daily and periodic meetings. It was observed during one meeting that the information is useful and appropriate in the group, but also creates a gap for people outside the context to understand the messages. Donnellon (1993) speculates that higher IDV can be accounted for a less successful teamwork performance of U.S. new product teams when compared to Asian teams. Consonant with that, another factor that brings the Supplier Integration According to the interviewees, the teamwork and success is defined by the team success:

[Successful factors] (...) most important is the synergy between the teams, either with manufactory or even the logistics that is intended that the implementation happens. Through the teamwork tools: the regular meetings, the indicators, find the points of difficulty, alignment of goals and process concepts we found better results. (Interview 3)

I was the launching team in the 2012 Delivery model project (incremental project for the series 2000) and we had to work very hard to ensure the entry of this model in the production on the deadline. And the one thing that took us this stressful situation: it was the team spirit among the members of the group and of the Modular Consortium and the synergy between general areas

involved. There was an understanding between the problems of areas and tried to find solutions. This project was urgent, was complex and very important for the Modular Consortium to manage the market leadership. (Interview 4)

On Low IDV pole the formal qualification has propriety to segregate groups instead of bringing gain to the individual that holds a diploma for example. One senior executive made an interesting declaration, where: “[regarding the initial years of the MC plant] The region also favored, had good employee training in relation to the factory floor, that has always been a premise that they have to enter the high school degree and this gives a basic level for understanding the standards and designs” (Interview 6). Hence, qualified employees could be part of the Modular Consortium and contribute to its growth.

To conclude this section, is clear a strong relation of the Modular Consortium to the Low IDV pole. These findings went as reflect on Supplier Integration theoretical background, that relies on collaboration and acting as one unit instead of several organizations (KIRKMAN; LOWE; GIBSON, 2006; MCCARTER; FAWCETT; MAGNAN, 2005; PAGELL; KATZ; SHEU, 2005).

5.2.4 Modular Consortium and the Masculinity (MAS)

The Masculinity dimension impacts the definition of success, as well the motivation in the organization (HOFSTEDE, 1980). The inclination for either pole (High MAS or Low MAS) was not found in the Supplier Integration phenomena, which leads that some aspects of the High MAS and some of the Low MAS pole facilitate the Supplier Integration in the MC.

This goes close with findings in NPD for MAS dimension. For example, product leaders who set clear objective goals to the NPD effort were considered as a key item to success in NPD and also leaders who combined human relations focus outperformed pure technical NPD leaders (BARCZAK; WILEMON, 1992; THAMHAIN, 1990).

There were found some aspects in the Supplier Integration in the MC closer to the High MAS pole, such as the assertive definition of goals in projects, the preoccupation to look for the best of employees and trying to maximize their potential.

Project that was successful? I think a lot in euro 5 (delivery model), it was a necessity of change of the entire product portfolio. And all models had to be adapted to the new engine. And he had a deadline to change, because the date of the legislation had changed in relation to consumption and emissions. And the initial dates of this project were very diffuse why we did not have the how the market would react. (Interview 4)

The Constellation model is an example that hit all product launch indicators. For example, we have a quality indicator in the audit that is amounts of defects that appear in the consumer's eyes, which is a very strong discipline within Volkswagen. And in a new project is expected to have a more tolerant goal, and the Constellation hit the rigorous goal for quality indicators and has been continuously improving. (Interview 6)

On the other hand, low MAS traits are also present in the Supplier Integration in the Modular Consortium. For instance, the focus on equality among employees and quality of life is a recurrent point brought by the interviewees: “Assemble the team together and everyone to come satisfied in the morning, and when people come from bad mood in service we did something wrong” (Interview 2) and:

(...) on the Modular Consortium with the differentiated system of work, a very positive thing here is the relationship between MAN and modulists and inside the organization and its employees, the working environment has improved since the factory in Anchieta, Ipiranga and now here is the best in terms of quality in the workplace as well as personal life balance. (Interview 6)

According with a low MAS pole trait, the managers and supervisors in Modular Consortium also attempt to solve challenges while looking for a consensual solution. This aspect is also extant on the modulist and automaker relations, where a resolution to a problem is defined in the meetings in which the Modular Consortium tries to achieve a consensus.

Therefore, for the Supplier Integration and the Masculinity dimension, some aspects of the SI in the Modular Consortium is closer to the Low and some to the High poles. In concordance with Nakata and Sivakumar (1996) there may be some aspects from each pole that benefit the Supplier Integration, or a balanced approach is the most beneficial.

5.2.5 Modular Consortium and the Long-Term Orientation (LTO)

On organizations, the different aspects of the Long-term Orientation dimension show a moderating role on various points. For instance, Naor, Linderman and Schroeder (2010) find that organizations on cultures with a higher LTO inclination tend to incentivize risk-taking by its employees.

It was found that the Supplier Integration in the Modular Consortium shows some traits relates to the Low Long-Term Orientation pole and to the High Long-Term Orientation pole as well. For instance, the partnership formed between the suppliers and the automaker focus the long-term for its sustainability and for thriving on the market. On the other hand, the Modular Consortium focuses on rapid trimestral growth and according to one interviewee: “Shorter span focus has higher priority, today the company has to produce. I work on projects that will be implemented in two years, one year, and they will bear their results once they are implemented, moreover have the problems that have to be resolved promptly takes priority.” (Interview 3).

To lose face and experience shame in the group is a trait of the High LTO pole, that means that situations that could make someone lose face are avoided if possible. The Modular

Consortium there is little preoccupation with face losing, for example when asked about negative feedback several interviewees converged to a direct resolution, the excerpt below illustrate it.

As for the feedbacks when it is positive is easy. When it is a specific critic, so that the person can improve some behavior and it stops or change it or an attitude that he has done, we follow something like: you must prepare “the listening” for him to feel calm and be honest, professionally, and there things go normally. In my team I do without delay, without stalling, eye to eye sit and solve a problem. I guess that is the important part, we are not psychologist, we have to focus on the problems, not on the person (Interview 4)

The Modular Consortium showed that gives a important focus on leisure time for its employees, Human Resource policies are decided together in order to preserve and create little friction between the different organizations employees. This group of characteristics relates do Low LTO pole for pays more attention on the present, than sacrificing it for a better future.

On the other hand, the Modular Consortium did show the ability to work under several norms and rules and most employees showed a synthetic view of the themselves, the industry and the organizations, instead for an analytical. These two factors are closer to the High LTO pole and authors have found that this combination favors more tolerance to errors in innovative process development (NAVEH; EREZ, 2004). Therefore, the Supplier Integration in the Modular Consortium did not showed an specific proximity to either pole of the Long-Term Orientation dimension.

6 FINAL CONSIDERATIONS

The main objective of this research project was to find and investigate the relationships between the National Culture Dimensions and the Supplier Integration, from both a Supply Chain Management perspective as on New Product Development. To achieve this objective a case study was chosen where the Supplier Integration is very aggressive and the suppliers work directly on the buyer's assembly line, the Modular Consortium.

Firstly, a systematic review of the literature was made by searching (a) the Supplier Integration on two fields of knowledge: the New Product Development and The Supply Chain Integration and (b) Culture impact on organizations. This review also promoted the interface between these two topics and was the basis for the creation of Chapters 2 and 3 in this dissertation. This review also pointed a crescent demand for culture related research in both NPD and SCM literatures. While seminal papers have been published in each area, no author has published, both in quantity on quality, a comprehensive study on this interface (Culture and the Supplier Integration).

The Supplier Integration and National Culture interface has not been fully studied from a human factor influence on management practices. Several authors have recently published the importance of human factor on the Supply Chain Integration (FOGAÇA, 2014; METTERS, 2008; PAGELL; KATZ; SHEU, 2005; SHUB; STONEBRAKER, 2009; TELLER; KOTZAB; GRANT, 2012) and on New Product Development (CLARK; FUJIMOTO, 1991; JOHNSEN, 2009; NAKATA; SIVAKUMAR, 1996; RODRIGUES; SANTOS, 2013; WYNSTRA; VAN WEELE; WEGGEMANN, 2001), just a few have dedicated attention to the cultural aspect. Hence, this work contributes to the knowledge frontier on cultural studies in the SCI and NPD.

On Chapter 2, the main approaches to the Supplier Integration in the Supply Chain Integration and the New Product Development fields are presented. An evolutionary perspective approach was presented in order to visualize how the Supplier Integration takes place in both fields as well how culture is considered to have some effect on practices and the success in both SCI and NPD endeavors. Chapter 3 presents the Culture study, using a

consolidated framework proposed by Hofstede (1980, 2001) for National Culture. The main aspects and limitations are presented as well and its main implications to organizational practices.

At this point, the objective a method of research was defined. Chapter 4 defines a characterization of the research, refinement of the research question and the definition of the research variables: the five Hofstede's National Culture dimensions (Power Distance, Uncertainty Avoidance, Individualism, Masculinity and Long-Term Orientation) and the Supplier integration on NPD, SCI and Process Development (Process development is a variable that is composed in both NPD and SCM). At this point was defined that an exploratory case would be the appropriate form to answer the research question. The chosen case study was the Modular Consortium plant, for it represents a most advanced stage of the Supplier Integration success case. Due to the exploratory aspect of the research, the main data collection was through a series of semi-structured interviews and a content analysis was performed.

A intermediate objective in the research was to portray the Supplier Integration in the Modular Consortium and identify the main landmarks in the Modular Consortium timeline, relating those to changes in the Supply Chain changes, New Product launching and Process changes and critical events of general nature. This intermediate objective was necessary to characterize the case study and present data to be related to the culture variables. The first section of Chapter 5 presents the main findings of this intermediate objective.

On the second section of Chapter 5 the objective to relate the Supplier Integration to the National Culture dimensions was achieved and presented against each dimensions separately. This chapter also puts these findings in the light of the theoretical background presented on the previous Chapters and with congruency between them. An important contribution of this work is to link organizational and competitive practices and National culture since one constant concern where the practices will be employed (METTERS, 2008).

The findings show that the Modular Consortium, which is an advanced and complex form of Supplier Integration configuration, shows great proximity with some the National Culture Dimensions poles. The Supplier Integration on the Modular Consortium is strongly related to the Low Power Distance pole, to the Low Individualism pole and to the High

Uncertainty Avoidance pole. When relating to the Masculinity and the Long-Term Orientation the SI on the Modular Consortium did not show any special proximity to either pole for these cultural dimensions.

The Uncertainty Avoidance plays an important role to diminish ambiguity and avoid risk that might lead to stop of the line, friction on the modulists and the automaker relationship. Detailed contracts, a complex indicators method and a network of moderators between the workgroups work together as to provide a ambiguity-free environment. While most of interview participants point a incentive to take risks, those risks are clear and defined. Uncertainty is strongly controlled in the Modular Consortium nature.

The Modular Consortium showed a solid relationship with the Low Power Distance dimension pole. Characteristics such as a decentralized decision process, empowering of the modulists, as well of subordinates in the workgroup cells, and management practices all relate to the low Power Distance pole. The low PDI alongside with the High UAI creates an environment considered an “well-oiled machine” by Hofstede (1980), where the high formalization increases the distribution of power and protects the less powerful converting the power to the role of the boss in each process, and not to the person.

The findings also support that the Supplier Integration is related to the Low Individualism. The identity of the modulist only can be defined as part of the Modular Consortium. The indicators in the Supply Chain and the Product and Process development efforts are strongly related to the performance of the supply chain as a whole. The Low Individualism creates a bond in the plant and it is fostered by measures such as to keep information in high-context format, visual unity in the plant. This relationship to the Low IDV together with the previously discussed UAI and PDI generates a form to empower the organizations and employees while maintaining loyalty and strategic alignment in the Supply Chain.

Evidence also shows that the Modular Consortium strives to a balance on the dimensions Masculinity and Long-Term Orientation. Therefore, a more in-depth study is needed to provide better insight as to which aspects of each of these dimensions are highly associated with an advanced form of Supplier Integration.

These findings contribute to complement the literature on Supplier Integration and provide assessment to decompose activities to facilitate the Supplier Integration efforts.

Organizations that seek to integrate suppliers should take in account measures that empower organizations and employees, create a ambiguity free and collaborative environment.

Is important to salient that this research has limitations intrinsic to its methods and variables. The case study is a very specific form of organization and Supplier Integration so the applicability of the findings found here to other cases should have complementary research. While the objective of the research was exploratory the building of findings was prioritized instead of its applicability.

The qualitative method used inserts the researcher in the phenomena, hence the researcher is not a observer as it is also part of the interpretation of the findings as well the research has the power to change the data collection script. This subjectivity was declared on Chapter 4, but different methods should be used to corroborate the findings of this research.

Another limitation to be considered is the culture model used. While Hofstede's model is the one most used to cross-cultural research, it is not the only one and there are several critics to it on literature (BASKERVILLE, 2003; MCSWEENEY, 2002; OYSERMAN; COON; KEMMELMEIER, 2002). Also the authors advise to be careful when relating the National Culture Dimensions to Organizations, since those were build on the study of societies.

6.1 Future Research

From the findings of this research, its limitations, literature gaps not discussed in this present work. The following future possible studies are proposed:

- Research within the Modular Consortium using quantitative methods, in order to measure and test the evidence shown in this work;
- Research in other supplier integration environments, with different levels of integration and partnership, in order to comprehend if the relationship to the National Culture dimensions are static in different levels of Supplier Integration;
- Research on different countries similar configurations of Supplier Integration, since no other Modular Consortium exists, so it investigates (1) can other

aggressive Supplier Integration relate to the Modular Consortium and (2) if the country's culture impacts the Supplier Integration;

- The use of other National Culture models as to characterize the human factor in organizations, such as the GLOBE Project dimensions (JAVIDAN; HOUSE, 2001); and
- Research the Modular Consortium Production System in detail to provide insight as to alternatives, or adaptations, of the Toyota Production System (MORGAN; LIKER, 2006).

7 REFERENCES

- ANFAVEA, A. N. DOS F. DE V. A. **2015Tabelas estatísticas**, 6 out. 2015. Disponível em: <<<http://www.anfavea.com.br/tabelas.html>>>
- AUTRY, C. W.; SKINNER, L. R.; LAMB, C. W. INTERORGANIZATIONAL CITIZENSHIP BEHAVIORS: AN EMPIRICAL STUDY. **Journal of Business Logistics**, v. 29, n. 2, p. 53–74, set. 2008.
- AYCAN, Z.; KANUNGO, R. N.; SINHA, J. B. P. Organizational Culture and Human Resource Management Practices: The Model of Culture Fit. **Journal of Cross-Cultural Psychology**, v. 30, n. 4, p. 501–526, 1 jul. 1999.
- BARCZAK, G. The Future of NPD/Innovation Research. **Journal of Product Innovation Management**, v. 29, n. 3, p. 355–357, maio 2012.
- BARCZAK, G.; WILEMON, D. Successful new product team leaders. **Industrial Marketing Management**, v. 21, n. 1, p. 61–68, fev. 1992.
- BARRETO, L. M. T. DA S. et al. Cultura organizacional e liderança: uma relação possível? **Revista de Administração**, v. 48, n. 1, p. 34–52, 2013.
- BLACKBURN, J. D.; HOEDEMAKER, G.; VAN WASSENHOVE, L. N. Concurrent software engineering: prospects and pitfalls. **IEEE Transactions on Engineering Management**, v. 43, n. 2, p. 179–188, maio 1996.
- BOOZ; ALLEN; HAMILTON. **New products management for the 1980s**. [s.l.] Booz, Allen & Hamilton, 1982.
- BOWERSOX, D. J.; CLOSS, D. J. **Logistical management: the integrated supply chain process**. [s.l.] McGraw-Hill Companies, 1996.
- BUENO, M. J. C.; VENDRAMETTO, O.; ALISANCIC, A. **O consórcio modular como fator de competitividade: um estudo de caso na Volkswagen Resende e São Bernardo do Campo**. In: SEGET – SIMPÓSIO DE EXCELÊNCIA EM GESTÃO E TECNOLOGIA. 2007
- CADDEN, T.; MARSHALL, D.; CAO, G. Opposites attract: organisational culture and supply chain performance. **Supply Chain Management: An International Journal**, v. 18, n. 1, p. 86–103, 2013.
- CENTELHAS, M. R.; GIFALLI, S. DE A.; PERES, T. B. Do aço aos carros: processos de industrialização e formação de classe no Sul Fluminense. **Primeiros Estudos**, v. 4, p. 11–23, 2013.
- CLARK, K. B. Project Scope and Project Performance: The Effect of Parts Strategy and Supplier Involvement on Product Development. **Management Science**, v. 35, n. 10, p. 1247–1263, out. 1989.

CLARK, K. B.; FUJIMOTO, T. **Product Development Performance: Strategy, Organization and Management in the World Auto Industry.** [s.l.] Harvard Business School Publishing India Pvt. Limited, 1991.

CLARK, K. B.; WHEELWRIGHT, S. C. **Managing New Product and Process Development: Text and Cases.** [s.l.] Free Press, 1993.

COOPER, R. G. . B C; EDGEOTT, S. J. . E; KLEINSCHMIDT, E. J. . Optimizing the stage-gate process: What best-practice companies Do-I. **Research Technology Management**, v. 45, n. 5, p. 21–27, 2002.

COOPER, M. C.; LAMBERT, D. M.; PAGH, J. D. Supply Chain Management: More Than a New Name for Logistics. **The International Journal of Logistics Management**, v. 8, n. 1, p. 1–14, jan. 1997.

COOPER, R. G. **Winning at New Products: Creating Value Through Innovation.** [s.l.] Basic Books, 2011.

COOPER, R.; KLEINSCHMIDT, E. An investigation into the new product process: Steps, deficiencies, and impact. **Journal of Product Innovation Management**, v. 3, n. 2, p. 71–85, jun. 1986.

COUSINS, P. D. et al. Creating supply chain relational capital: The impact of formal and informal socialization processes. **Journal of Operations Management**, v. 24, n. 6, p. 851–863, dez. 2006.

CRAWFORD, C. M.; DI BENEDETTO, C. A. **New Products Management: Ninth Edition.** [s.l.] McGraw-Hill Irwin, 2008.

DAFT, R. L.; LENGEL, R. H. Organizational Information Requirements, Media Richness and Structural Design. **Management Science**, v. 32, n. 5, p. 554–571, maio 1986.

DAUGHERTY, P. J. Review of logistics and supply chain relationship literature and suggested research agenda. **International Journal of Physical Distribution & Logistics Management**, v. 41, n. 1, p. 16–31, fev. 2011.

DE BRENTANI, U.; KLEINSCHMIDT, E. J. Corporate Culture and Commitment: Impact on Performance of International New Product Development Programs. **Journal of Product Innovation Management**, v. 21, n. 5, p. 309–333, set. 2004.

DE MOOIJ, M. On the misuse and misinterpretation of dimensions of national culture. **International Marketing Review**, v. 30, n. 3, p. 253–261, 2013.

DE MOOIJ, M.; HOFSTEDE, G. Cross-cultural consumer behavior: A review of research findings. **Journal of International Consumer Marketing**, v. 23, n. 3-4, p. 181–192, 2011.

DONNELON, A. Crossfunctional Teams in Product Development: Accommodating the Structure to the Process. **Journal of Product Innovation Management**, v. 10, n. 5, p. 377–392, nov. 1993.

DYER, J. H.; SINGH, H. THE RELATIONAL VIEW: COOPERATIVE STRATEGY AND SOURCES OF INTERORGANIZATIONAL COMPETITIVE ADVANTAGE. **Academy of Management Review**, v. 23, n. 4, p. 660–679, 1 out. 1998.

DYER, J.; OUCHI, W. JAPANESE-STYLE PARTNERSHIPS - GIVING COMPANIES A COMPETITIVE EDGE. **Sloan Management Review**, v. 35, n. 1, p. 51–63, FAL 1993.

ELLRAM, L. M.; TATE, W.; CARTER, C. R. Applying 3DCE to environmentally responsible manufacturing practices. **Journal of Cleaner Production**, v. 16, n. 15, p. 1620–1631, out. 2008.

ELLRAM, L. M.; TATE, W. L.; CARTER, C. R. Product-process-supply chain: an integrative approach to three-dimensional concurrent engineering. **International Journal of Physical Distribution & Logistics Management**, v. 37, n. 4, p. 305–330, 2007.

ENGELEN, A.; BRETEL, M. Assessing cross-cultural marketing theory and research. **Journal of Business Research**, v. 64, n. 5, p. 516–523, maio 2011.

FINE, C. H. **Clockspeed: Winning Industry Control in the Age of Temporary Advantage**. [s.l.] Basic Books, 2008.

FINE, C. H.; GOLANY, B.; NASERALDIN, H. Modeling tradeoffs in three-dimensional concurrent engineering: a goal programming approach. **Journal of Operations Management**, v. 23, n. 3-4, p. 389–403, abr. 2005.

FIXSON, S. K. Product architecture assessment: a tool to link product, process, and supply chain design decisions. **Journal of Operations Management**, v. 23, n. 3-4, p. 345–369, abr. 2005.

FLEISCHER, M.; LIKER, J. K. The hidden professionals: product designers and their impact on design quality. **IEEE Transactions on Engineering Management**, v. 39, n. 3, p. 254–264, ago. 1992.

FLYNN, B. B.; HUO, B.; ZHAO, X. The impact of supply chain integration on performance: A contingency and configuration approach. **Journal of Operations Management**, v. 28, n. 1, p. 58–71, jan. 2010.

FLYNN, B. B.; SALADIN, B. Relevance of Baldridge constructs in an international context: A study of national culture. **Journal of Operations Management**, v. 24, n. 5, p. 583–603, set. 2006.

FOGAÇA, D. et al. **Revisão Sistemática de Literatura na Intereface entre o Gerenciamento da Cadeia de Suprimentos e a Cultura Organizacional** ANAIS SIMPEP. Anais... In: XIX SIMPEP. 2012

FOGAÇA, D. R. **Relações entre dimensões culturais e a integração da cadeia de suprimentos: estudo de caso no setor aeronáutico.** [s.l.] Universidade de São Paulo, 2014.

FROHLICH, M. T.; WESTBROOK, R. Arcs of integration: an international study of supply chain strategies. **Journal of Operations Management**, v. 19, n. 2, p. 185–200, fev. 2001.

GOVINDARAJAN, V.; GUPTA, A. Building an effective global business team. **MIT SLOAN MANAGEMENT REVIEW**, v. 42, n. 4, p. 63–71, SUM 2001.

GREEN JR, K. W.; WHITTEN, D.; INMAN, R. A. The impact of logistics performance on organizational performance in a supply chain context. **Supply Chain Management: An International Journal**, v. 13, n. 4, p. 317–327, 2008.

GRIFFIN, A. Evaluating QFD's Use in US Firms as a Process for Developing Products. **Journal of Product Innovation Management**, v. 9, n. 3, p. 171–187, set. 1992.

GRIFFIN, A.; HAUSER, J. R. Integrating R&D and Marketing: A Review and Analysis of the Literature. **Journal of Product Innovation Management**, v. 13, n. 3, p. 191–215, maio 1996.

GUERRA, I. C. **Pesquisa qualitativa e análise de conteúdo: sentidos e formas de uso.** [s.l.] Principia, 2006.

GUIRDHAM, M. **Communicating across cultures at work.** New York; Basingstoke: Palgrave Macmillan, 2005.

HANDFIELD, R. B.; BECHTEL, C. The role of trust and relationship structure in improving supply chain responsiveness. **Industrial Marketing Management**, v. 31, n. 4, p. 367–382, jul. 2002.

HANSON, P.; VOSS, C. Benchmarking best practice in European manufacturing sites. **Business Process Management Journal**, v. 1, n. 1, p. 60–74, 1995.

HOFSTEDE, G. Motivation, leadership, and organization: Do American theories apply abroad? **Organizational Dynamics**, v. 9, n. 1, p. 42–63, jun. 1980.

HOFSTEDE, G. et al. Measuring Organizational Cultures: A Qualitative and Quantitative Study Across Twenty Cases. **Administrative Science Quarterly**, v. 35, n. 2, p. 286, jun. 1990.

HOFSTEDE, G. **Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations.** [s.l.] SAGE Publications, 2001.

HOFSTEDE, G. What did GLOBE really measure? Researchers' minds versus respondents' minds. **Journal of International Business Studies**, v. 37, p. 882–896, nov. 2006.

HOFSTEDE, G. H. **Culture's consequences: international differences in work-related values**. Beverly Hills: Sage Publications, 1984.

HOFSTEDE, G. H. **Cultures and organizations: software of the mind**. Rev. ed. ed. New York: McGraw-Hill, 1997.

HOFSTEDE, G. H. **BRAZIL - GEERT HOFSTEDE**, 2015. Disponível em: <<http://geert-hofstede.com/brazil.html>>

HOFSTEDE, G. J.; PEDERSEN, P. B.; HOFSTEDE, G. H. **Exploring Culture: Exercises, Stories and Synthetic Cultures**. [s.l.] Nicholas Brealey Publishing, 2002.

HOPE, C. A.; MUHLEMANN, A. P. The impact of culture on best-practice production/operations management. **International Journal of Management Reviews**, v. 3, n. 3, p. 199–217, set. 2001.

HOUSE, R. et al. Understanding cultures and implicit leadership theories across the globe: an introduction to project GLOBE. **Journal of World Business**, v. 37, n. 1, p. 3–10, mar. 2002.

HOUSE, R. J. **Culture, leadership, and organizations: the GLOBE study of 62 societies**. Thousand Oaks, Calif.: Sage Publications, 2004.

HUANG, G. Q.; ZHANG, X. Y.; LIANG, L. Towards integrated optimal configuration of platform products, manufacturing processes, and supply chains. **Journal of Operations Management**, v. 23, n. 3-4, p. 267–290, abr. 2005.

HUO, B. The impact of supply chain integration on company performance: an organizational capability perspective. **Supply Chain Management: An International Journal**, v. 17, n. 6, p. 596–610, 2012.

JAVIDAN, M. et al. Conceptualizing and measuring cultures and their consequences: a comparative review of GLOBE's and Hofstede's approaches. **Journal of International Business Studies**, v. 37, n. 6, p. 897–914, nov. 2006.

JAVIDAN, M.; HOUSE, R. J. Cultural acumen for the global manager: Lessons from project GLOBE. **Organizational Dynamics**, v. 29, n. 4, p. 289–305, 2001.

JOHNE, F. How experienced product innovators organize. **Journal of Product Innovation Management**, v. 1, n. 4, p. 210–223, dez. 1984.

JOHNE, F.; SNELSON, P. Success factors in product innovation: A selective review of the literature. **Journal of Product Innovation Management**, v. 5, n. 2, p. 114–128, jun. 1988.

KIRKMAN, B. L.; LOWE, K. B.; GIBSON, C. B. A quarter century of Culture's Consequences: a review of empirical research incorporating Hofstede's cultural values framework. **Journal of International Business Studies**, v. 37, p. 285–320, maio 2006.

KLEINSCHMIDT, E. J.; DE BRENTANI, U.; SALOMO, S. Performance of Global New Product Development Programs: A Resource-Based View. **Journal of Product Innovation Management**, v. 24, n. 5, p. 419–441, set. 2007.

KNIGHT, G. A.; CAVUSGIL, S. T. Innovation, organizational capabilities, and the born-global firm. **Journal of International Business Studies**, v. 35, n. 2, p. 124–141, mar. 2004.

KOUFTEROS, X. A.; EDWIN CHENG, T. C.; LAI, K.-H. “Black-box” and “gray-box” supplier integration in product development: Antecedents, consequences and the moderating role of firm size. **Journal of Operations Management**, v. 25, n. 4, p. 847–870, jun. 2007.

KOUFTEROS, X. A.; VONDEREMBSE, M. A.; DOLL, W. J. Integrated product development practices and competitive capabilities: the effects of uncertainty, equivocality, and platform strategy. **Journal of Operations Management**, v. 20, n. 4, p. 331–355, ago. 2002.

KOUFTEROS, X.; VONDEREMBSE, M.; DOLL, W. Concurrent engineering and its consequences. **Journal of Operations Management**, v. 19, n. 1, p. 97–115, jan. 2001.

KOUFTEROS, X.; VONDEREMBSE, M.; JAYARAM, J. Internal and External Integration for Product Development: The Contingency Effects of Uncertainty, Equivocality, and Platform Strategy. **Decision Sciences**, v. 36, n. 1, p. 97–133, fev. 2005.

KRISHNAN, V.; EPPINGER, S. D.; WHITNEY, D. E. A Model-Based Framework to Overlap Product Development Activities. **Management Science**, v. 43, n. 4, p. 437–451, abr. 1997.

LAMBERT, D. M.; COOPER, M. C. Issues in Supply Chain Management. **Industrial Marketing Management**, v. 29, n. 1, p. 65–83, jan. 2000.

LAMBERT, D. M.; EMMELHAINZ, M. A.; GARDNER, J. T. Developing and Implementing Supply Chain Partnerships. **The International Journal of Logistics Management**, v. 7, n. 2, p. 1–18, jul. 1996.

LAU, A. K. W. Supplier and customer involvement on new product performance: Contextual factors and an empirical test from manufacturer perspective. **Industrial Management & Data Systems**, v. 111, n. 6, p. 910–942, 2011.

LAWRENCE, P. R.; LORSCH, J. W. **Organization and environment: managing differentiation and integration**. [s.l.] Division of Research, Graduate School of Business Administration, Harvard University, 1967.

LEE, Y.; CAVUSGIL, S. T. Enhancing alliance performance: The effects of contractual-based versus relational-based governance. **Journal of Business Research**, v. 59, n. 8, p. 896–905, ago. 2006.

LEWIS, M. A. Lean production and sustainable competitive advantage. **International Journal of Operations & Production Management**, v. 20, n. 8, p. 959–978, 2000.

LUQUET, M.; GRIMBAUM, R. Resende dá show: Nova fábrica de caminhões da Volkswagen é o centro de atenção da industria automobilistica mundial. **Revista Veja SP**, out. 1996.

MAGNUSSON, P. et al. Breaking through the cultural clutter: A comparative assessment of multiple cultural and institutional frameworks. **International Marketing Review**, v. 25, n. 2, p. 183–201, 2008.

MASCARENHAS, A. O. **Gestão estratégica de pessoas: evolução, teoria e crítica**. [s.l.] Cengage Learning, 2008.

MATHEWS, B. P. et al. European quality management practices: The impact of national culture. **International Journal of Quality & Reliability Management**, v. 18, n. 7, p. 692–707, 2001.

MCCARTER, M. W. . D E; FAWCETT, S. E. . F; MAGNAN, G. M. . G H. The effect of people on the supply chain world: Some overlooked issues. **Human Systems Management**, v. 24, n. 3, p. 197–208, 2005.

MCSWEENEY, B. Hofstede's Model of National Cultural Differences and their Consequences: A Triumph of Faith - a Failure of Analysis. **Human Relations**, v. 55, n. 1, p. 89–118, 1 jan. 2002.

MENTZER, J. T. et al. DEFINING SUPPLY CHAIN MANAGEMENT. **Journal of Business Logistics**, v. 22, n. 2, p. 1–25, set. 2001.

METTERS, R. A case study of national culture and offshoring services. **International Journal of Operations & Production Management**, v. 28, n. 8, p. 727–747, 2008.

MING, Y.; GRABOT, B.; HOUÉ, R. A typology of the situations of cooperation in supply chains. **Computers & Industrial Engineering**, v. 67, p. 56–71, jan. 2014.

MINKOV, M.; HOFSTEDE, G. The evolution of Hofstede's doctrine. **Cross Cultural Management: An International Journal**, v. 18, n. 1, p. 10–20, 2011.

MORGAN, J. M.; LIKER, J. K. **The Toyota Product Development System: Integrating People, Process And Technology**. [s.l.] Taylor & Francis, 2006.

NAKATA, C.; SIVAKUMAR, K. National Culture and New Product Development: An Integrative Review. **Journal of Marketing**, v. 60, n. 1, p. 61, jan. 1996.

NAOR, M.; LINDERMANN, K.; SCHROEDER, R. The globalization of operations in Eastern and Western countries: Unpacking the relationship between national and organizational culture and its impact on manufacturing performance. **Journal of Operations Management**, v. 28, n. 3, p. 194–205, maio 2010.

NAVEH, E.; EREZ, M. Innovation and Attention to Detail in the Quality Improvement Paradigm. **Management Science**, v. 50, n. 11, p. 1576–1586, nov. 2004.

NEWMAN, K. L.; NOLLEN, S. D. Culture and congruence: The fit between management practices and national culture. **Journal of International Business Studies**, v. 27, n. 4, p. 753–779, 1996.

O'LEARY-KELLY, S. W.; FLORES, B. E. The integration of manufacturing and marketing/sales decisions: impact on organizational performance. **Journal of Operations Management**, v. 20, n. 3, p. 221–240, jun. 2002.

PAGELL, M. Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. **Journal of Operations Management**, v. 22, n. 5, p. 459–487, out. 2004.

PAGELL, M.; KATZ, J. P.; SHEU, C. The importance of national culture in operations management research. **International Journal of Operations & Production Management**, v. 25, n. 4, p. 371–394, 2005.

PETERSEN, K. J.; HANDFIELD, R. B.; RAGATZ, G. L. A Model of Supplier Integration into New Product Development*. **Journal of Product Innovation Management**, v. 20, n. 4, p. 284–299, jul. 2003.

PETERSEN, K. J.; HANDFIELD, R. B.; RAGATZ, G. L. Supplier integration into new product development: coordinating product, process and supply chain design. **Journal of Operations Management**, v. 23, n. 3-4, p. 371–388, abr. 2005.

PIRES, S. R. I. Managerial implications of the modular consortium model in a Brazilian automotive plant. **International Journal of Operations & Production Management**, v. 18, n. 3, p. 221–232, 1998.

PIRES, S. R. I. **Gestão da cadeia de suprimentos (supply chain management): conceitos, estratégias, práticas e casos**. São Paulo (SP): Atlas, 2009.

PORTER, M. E. **Attitudes, Values, Beliefs, and the Microeconomics of Prosperity. In Culture Matters: How Values Shape Human Progress**. New York: Basic Books, 2000.

PRAJOGO, D.; OLHAGER, J. Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration. **International Journal of Production Economics**, v. 135, n. 1, p. 514–522, jan. 2012.

PRASAD, S.; BABBAR, S. International operations management research. **Journal of Operations Management**, v. 18, n. 2, p. 209–247, fev. 2000.

RAGATZ, G. Success factors for integrating suppliers into new product development*1. **Journal of Product Innovation Management**, v. 14, n. 3, p. 190–202, maio 1997.

RAGATZ, G. L.; HANDFIELD, R. B.; PETERSEN, K. J. Benefits associated with supplier integration into new product development under conditions of technology uncertainty. **Journal of Business Research**, v. 55, n. 5, p. 389–400, maio 2002.

RALSTON, D. A. et al. The impact of national culture and economic ideology on managerial work values: a study of the United States, Russia, Japan, and China. **Journal of International Business Studies**, v. 39, n. 1, p. 8–26, jan. 2008.

RODRIGUES, C. H. R.; SANTOS, F. C. A. Empowerment: ciclo de implementação, dimensões e tipologia. **Gestão & Produção**, v. 8, n. 3, p. 237–249, dez. 2001.

RODRIGUES, F. P.; SANTOS, F. C. A. **REVISÃO SISTEMÁTICA DE PUBLICAÇÕES SOBRE A RELAÇÃO ENTRE A CULTURA NACIONAL E O DESENVOLVIMENTO DE PRODUTOS**ANAIS SIMPEP. Anais... In: SIMPEP. 2013

ROZENFELD, H. et al. **Gestão de desenvolvimento de produtos: uma referência para a melhoria do processo**. [s.l.] Saraiva, 2007.

RUNGTUSANATHAM, M. et al. TQM across multiple countries: versus arguments. **Journal of Operations Management**, v. 23, n. 1, p. 43–63, jan. 2005.

SACOMANO NETO, M.; TRUZZI, O. M. S. Posicionamento estrutural e relacional em redes de empresas: uma análise do consórcio modular da indústria automobilística. **Gestão & Produção**, v. 16, n. 4, dez. 2009.

SANTOS, F. C. A. et al. **Relações entre dimensões culturais de Hofstede e configurações organizacionais de Mintzberg**. In: SIMPEP. 2010

SCHEIN, E. H. On dialogue, culture, and organizational learning. **Organizational Dynamics**, v. 22, n. 2, p. 40–51, set. 1993.

SCHON, D. A. **Champions for Radical New Inventions**. [s.l: s.n.].

SCOTT, W. R. **Organizations: rational, natural, and open systems**. 5th ed ed. Upper Saddle River, N.J: Prentice Hall, 2003.

SHANE, S. A. Why do some societies invent more than others? **Journal of Business Venturing**, v. 7, n. 1, p. 29–46, jan. 1992.

SHUB, A. N.; STONEBRAKER, P. W. The human impact on supply chains: evaluating the importance of “soft” areas on integration and performance. **Supply Chain Management: An International Journal**, v. 14, n. 1, p. 31–40, 2009.

SINGHAL, K.; SINGHAL, J. Imperatives of the science of operations and supply-chain management. **Journal of Operations Management**, v. 30, n. 3, p. 237–244, mar. 2012a.

SINGHAL, K.; SINGHAL, J. Opportunities for developing the science of operations and supply-chain management. **Journal of Operations Management**, v. 30, n. 3, p. 245–252, mar. 2012b.

SIVAKUMAR, K.; NAKATA, C. The stampede toward Hofstede's framework: Avoiding the sample design pit in cross-cultural research. **Journal of International Business Studies**, v. 32, p. 555–574, 2001.

SMITH, P. B. Organizational Behaviour and National Cultures. **British Journal of Management**, v. 3, n. 1, p. 39–51, mar. 1992.

STAKE, R. E. **The art of case study research**. Thousand Oaks: Sage Publications, 1995.

STEVENS, G. C. Integrating the Supply Chain. **International Journal of Physical Distribution & Logistics Management**, v. 19, n. 8, p. 3–8, 1989.

STOCK, G. N.; GREIS, N. P.; KASARDA, J. D. Logistics, strategy and structure: A conceptual framework. **International Journal of Operations & Production Management**, v. 18, n. 1, p. 37–52, 1998.

SWAN, J.; NEWELL, S.; ROBERTSON, M. The diffusion, design and social shaping of production management information systems in Europe. **Information Technology & People**, v. 13, n. 1, p. 27–46, 2000.

SWINK, M. L. A tutorial on implementing concurrent engineering in new product development programs. **Journal of Operations Management**, v. 16, n. 1, p. 103–116, jan. 1998.

TANGPONG, C. Content analytic approach to measuring constructs in operations and supply chain management. **Journal of Operations Management**, v. 29, n. 6, p. 627–638, set. 2011.

TATIKONDA, M. V.; STOCK, G. N. Product Technology Transfer in the Upstream Supply Chain. **Journal of Product Innovation Management**, v. 20, n. 6, p. 444–467, nov. 2003.

THAMHAIN, H. Managing technologically innovative team efforts toward new product success. **Journal of Product Innovation Management**, v. 7, n. 1, p. 5–18, mar. 1990.

THWAITES, D. Organizational Influences on the New Product Development Process in Financial Services. **Journal of Product Innovation Management**, v. 9, n. 4, p. 303–313, dez. 1992.

TROMPENAARS, A.; TROMPENAARS, F.; HAMPDEN-TURNER, C. **Riding the Waves of Culture: Understanding Cultural Diversity in Business**. [s.l.] Nicholas Brealey Publishing Limited, 2012.

TURATO, E. R. Métodos qualitativos e quantitativos na área da saúde: definições, diferenças e seus objetos de pesquisa. **Revista de Saúde Pública**, v. 39, n. 3, p. 507–514, jun. 2005.

ULRICH, K. T.; EPPINGER, S. D. **Product Design and Development**. [s.l.] McGraw-Hill/Irwin, 2004.

VAN DER VAART, T.; VAN DONK, D. P. A critical review of survey-based research in supply chain integration. **International Journal of Production Economics**, v. 111, n. 1, p. 42–55, jan. 2008.

VAN HOEK, R.; CHAPMAN, P. How to move supply chain beyond cleaning up after new product development. **Supply Chain Management: An International Journal**, v. 12, n. 4, p. 239–244, 2007.

VENAIK, S.; BREWER, P. Critical issues in the Hofstede and GLOBE national culture models. **International Marketing Review**, v. 30, n. 5, p. 469–482, 2013.

VERGARA, S. C. **Métodos de pesquisa em administração**. São Paulo (SP): Atlas, 2005.

WHEELWRIGHT, S. C.; CLARK, K. B. **Revolutionizing product development: quantum leaps in speed, efficiency, and quality**. New York; Toronto; New York: Free Press ; Maxwell Macmillan Canada ; Maxwell Macmillan International, 1992.

WIENGARTEN, F. et al. Exploring the impact of national culture on investments in manufacturing practices and performance: An empirical multi-country study. **International Journal of Operations & Production Management**, v. 31, n. 5, p. 554–578, 2011.

WYNSTRA, F. et al. Supplier Development Responsibility and NPD Project Outcomes: The Roles of Monetary Quantification of Differences and Supporting-Detail Gathering: Roles of Monetary Quantification of Differences and Detail Gathering. **Journal of Product Innovation Management**, v. 29, p. 103–123, dez. 2012.

WYNSTRA, F.; VAN WEELE, A.; WEGGEMANN, M. Managing supplier involvement in product development: **European Management Journal**, v. 19, n. 2, p. 157–167, abr. 2001.

YIN, R. K. **Case study research: design and methods**. [s.l]: s.n.].

ZHAO, X. et al. The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain. **Journal of Operations Management**, v. 26, n. 3, p. 368–388, maio 2008.

ZHAO, X. et al. The impact of internal integration and relationship commitment on external integration. **Journal of Operations Management**, v. 29, n. 1-2, p. 17–32, jan. 2011.

Appendix A – Research Invitation Letter



EESC • USP

Escola de Engenharia de São Carlos

Prezado Sr.(a)

Estamos realizando uma pesquisa de mestrado sobre as “Relações da Cultura Nacional e do Desenvolvimento da Tríade Produto, Processo e Cadeia de Suprimentos”, realizada na USP, com apoio do Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) e bolsa da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).

Embora existam pesquisas estrangeiras abordem essa interação, pouco se sabe sobre a dinâmica dessa relação em empresas instaladas no Brasil e suas relações com a cultura brasileira. Assim, esse campo de estudo desponta como um tema ainda pouco abordado, seja no âmbito acadêmico, seja no contexto organizacional. Desta forma, o principal objetivo deste estudo é analisar as relações no desenvolvimento de produto, processo e cadeia de suprimentos sob a óptica da cultura nacional e seu impacto organizacional. Por meio dos resultados da pesquisa, poderão ser abertas novas possibilidades em termos de melhores práticas gerenciais e organizacionais, assim como trabalhos futuros.

Nesse sentido, desejamos realizar um estudo de caso em profundidade e vimos solicitar sua valiosa colaboração de alguns profissionais da empresa para participarem de entrevistas, acesso a documentos e visita às instalações fabris com a devida autorização da empresa. As entrevistas demandarão, em média, 75 minutos por entrevista e o escopo da mesma é apresentado na carta “Proposta para Entrevista e Participantes”.

Ressaltamos que se trata de uma pesquisa acadêmica, cujos resultados serão de uso restrito e confidencial para a confecção de dissertação de mestrado e artigos científicos. Além disso, será mantido o anonimato dos participantes, uma vez que os dados serão tratados de forma consolidada. Uma cópia da dissertação contendo uma síntese dos principais resultados da pesquisa será posteriormente enviada à empresa.

Cordialmente,

Prof. Dr. Fernando César Almada Santos

Professor da Escola de Engenharia de São Carlos – USP

Coordenador: Integração das Estratégias de Recursos Humanos e de Produção
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Appendix B – Interview Invitation Letter



Escola de Engenharia de São Carlos

Proposta para Entrevistas e Participantes

Esta pesquisa tem por objetivo a análise as relações no desenvolvimento de produto, processo e cadeia de suprimentos sob a óptica da cultura nacional. Desta forma, gostaríamos de realizar as entrevistas com profissionais:

- de diferentes níveis hierárquicos da organização, incluindo (porém não se limitando a) diretores, operadores, técnicos, gerentes e supervisores;
- que participam de atividades nas áreas de Recursos Humanos, Gestão da Cadeia de Suprimentos, Desenvolvimento de Produtos, Processo de Montagem e Logística Interna e Externa; e
- que possuam pelo menos 5 (cinco) anos trabalhando no Consórcio Modular, ou que possuam experiência anterior em outras plantas do Grupo Volkswagen.

Gostaríamos de realizar cerca de 5 (cinco) entrevistas distribuídas pelas características supracitadas. Nas entrevistas terão ponto focal em projetos executados pelo profissional entrevistado, abordando escopo de atividades, dificuldades, relações entre os atores do projeto.

Ressaltamos que se trata de uma pesquisa acadêmica, cujos resultados serão de uso restrito e confidencial para a confecção de dissertação de mestrado e artigos científicos. Além disso, será mantido o anonimato dos participantes, uma vez que os dados serão tratados de forma consolidada.

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Appendix C – Interview structured script – Part I

A primeira parte da entrevista trata da situação do estudo de caso e as principais características refletindo as práticas segundo a óptica da Engenharia Simultânea Tridimensional (3DCE)

Introdução – (realizar teste da gravação)

- Qual o seu cargo na (empresa)? Há quanto tempo você está na (empresa)? Deste tempo quanto atuando no consorcio modular? Sempre esteve no mesmo cargo?

Consórcio Modular – Analise Transversal e Longitudinal

- Quais os principais marcos na história da planta em Resende? Por que? Houveram que tipos de mudanças nestes marcos?
- Como se dá a relação entre os modulistas e a montadora? Em que nível elas ocorrem (nível executivo, gerência ou operacional)? Qual o papel desempenhado por cada parte? Como isso foi e é determinado?
- E entre modulistas?
- Como são
- Existem práticas para facilitar a integração entre os profissionais das diferentes empresas que atuam no consórcio modular?
- Qual o nível de integração no consórcio modular? O que integração significa pra você e como você determina o quanto de integração interna que a empresa tem? Você pode dar alguns exemplos?
- Há equipes multifuncionais dentro da empresa? Com que frequência e quem são geralmente os participantes destas equipes? que tecnologias (de informação e comunicação)?
- E entre empresas do consórcio?
- Existe um clima de confiança entre as empresas?
- Quais os principais desafios que o consórcio modular enfrenta?
- Quais os principais desafios que a empresa enfrenta em relação ao consorcio modular?
- Há contratos com os clientes? Como são estes contratos? (detalhados ou não; uso de métricas)

Gestão e Integração da Cadeia de Suprimentos

- Como é realizada a gestão da cadeia de suprimentos no consorcio modular?
- Quando são tomadas as decisões na sua área e na sua empresa, você considera o impacto no resto da cadeia de suprimentos?
- Quando tomam decisões em outras áreas com que frequência consideram o impacto dessas decisões na sua áreas?
- Qual o nível de integração com os clientes e com os fornecedores? Por quê? O que integração com os demais agentes da cadeia significa pra você e como você determina o quanto de integração com os clientes que a empresa tem? exemplos?
- Qual a qualidade e frequência da comunicação com os clientes?

- Há o uso de tecnologias informação e comunicação com os clientes? Quais? (e-mail, intranet, EDI, ERP, código de barras)
- Há preocupação com problemas que o cliente e o fornecedor enfrentam?
- Quais mecanismos a empresa tem para criar, manter e avaliar esta integração?

Desenvolvimento de Produto e Processo (Engenharia simultânea)

- Existe um processo formal de desenvolvimento de produtos dentro da empresa? Ele está integrado com o resto do consórcio? Qual a duração média dos projetos de DP?
- Como é definido o escopo do desenvolvimento de produtos? Como se da a relação com os modulistas e montadora no PDP?
- Como e em que ponto são inseridos os modulistas e outros colaboradores no desenvolvimento de produtos e processos?
- Como são avaliados os projetos de desenvolvimento de produto?
- Quais as principais ferramentas, técnicas e conhecimentos utilizados no PDP dentro do consórcio?
- Como é feito o acompanhamento do PDP? Como é distribuído o poder de decisão em relação ao PDP?
- O desenvolvimento do processo é realizado de maneira simultânea?
- Você pode citar dois projetos considerados de sucesso realizados na empresa? Quais foram seus principais desafios?
- Você poderia citar algum projeto que foi considerado como não bem-sucedido, quais as dificuldades que este projeto teve? Como isto foi percebido pela organização?

Appendix D – Interview structured script – Part II

A segunda parte da entrevista consiste em avaliar as variáveis organizacionais relacionadas as dimensões culturais de Hofstede (2001).

Geral

- Como são os dias de trabalho na (empresa)? São praticamente iguais ou a cada dia há novos desafios?
- Como são feitas as contratações na empresa? A competência no trabalho é o único critério para contratação? Ou se leve em conta outros critérios (background/família/etc)?

Power Distance

- Como é a hierarquia dentro da (empresa)? E qual seu papel?
- O que é um bom gestor/chefe dentro da organização?
- Como é distribuída a informação entre os diferentes níveis da organização? Em que nível elas são compartilhadas (informações futuras, avaliações, estratégicas, etc)
- Em decisões que afetam diretamente os funcionários, a gerência costuma consultar os funcionários? (e levam isso em consideração?)
- As críticas que os funcionários têm em relação aos gestores são discutidas diretamente com eles/elas? (ou são deixadas de lado e apenas discutidas com outros funcionários?)
- As críticas que um gestor tem em relação ao funcionário são discutidas abertamente com o funcionário?
- Como é o controle do trabalho dos funcionários pela gerência? Os gestores costumam verificar se os funcionários estão trabalhando? Qual sua opinião a respeito?

Uncertainty Avoidance

- Pessoas se sentem confortáveis com situações desconhecidas? Você diria que a organização vê as incertezas como um ameaça ou oportunidade?
- As pessoas evitam correr riscos ou são incentivadas?
- As regras e normas tem que papel dentro da (empresa)?
- Os gestores e supervisores tem obrigação de saber as respostas?
- Existe incentivo a novas ideias? Ou valoriza-se mais que os funcionários sigam sempre os procedimentos já estabelecidos? Exemplo.
- Como é a tomada de decisões pela alta gerência? Apenas baseada em fatos?

Individualism

- Quando ocorrem projetos especiais que necessitam de cooperação entre várias áreas, como isso se dá? (é penoso ou há uma rápida cooperação?)
- Quando há problemas na sua área, outras áreas costumam ajudar prontamente?
- O conflito direto entre duas ou mais áreas é comum dentro da (empresa)?
- A gestão é focada nas equipes ou no aproveitamento individual dos profissionais? Exemplo.
- A comunicação e troca de informações entre áreas da (empresa) tem que nível de profundidade? E entre as empresas modulistas?

Masculinity

- As pessoas se esforçam ao máximo no trabalho? Como isso é avaliado?
- Como a gerência se comporta em relação aos problemas pessoais dos funcionários? (se preocupa ou não) O que você pensa a respeito?
- Quando há conflitos pessoais entre funcionários da área, como a gerência/gestores atua? (tenta resolvê-los ou não)
- Na (empresa), você diria que se prioriza a qualidade ou a quantidade de seus produtos? E de seus ativos?
- A gerência incentiva os funcionários a se autodesenvolverem? De que forma? Qual o foco ao fazer cursos e participar de conferência (para gerar maior lucro ou real interesse no desenvolvimento do funcionário?)

Long-Term Orientation

- Qual o horizonte de pensamento que as pessoas costumam ter na (empresa)? 3 anos pra mais ou menos?
- A valorização das tradições organizacionais é forte ou são adaptados dependendo das circunstâncias?
- Os erros de um funcionário/colega, em geral, são discutidos publicamente com ele/ela? (ou discutido nas costas?)
- Como são avaliados os riscos que a (empresa) enfrenta?
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