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# Manufacturing Strategy in Inter-Firm collaborations

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A proposed model

TGZD15



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## ABSTRACT

The origin of the project comes from two main aspects. First, considering the concept of Skinner (1968), who stressed the need to attach a crucial importance of manufacturing strategy as a competitive weapon for companies. And second, *blending* it with the current scenario of relationships between firms all around the world, in response of the aggressive worldwide competition, in which the task of sustaining competitive advantage has become even tougher.

The current project attempts to study and analyze the manufacturing strategy field in a context of collaboration between firms, without forgetting the upper levels of strategic planning within a company, and how all this elements interact to each other and affect it.

The author will be supported by a theoretical background based on the topic and the classification of different inter-firm collaboration linkages that could take place in this moment. It is been studied the different levels of strategy within a firm, and how each affects the manufacturing level, in a context of cooperation between organizations, based on different approaches to firm's strategy, which could be valuable to the present work: Relational view, Resource-Based view and Extended Resource-Based view.

Related with the case study, the author provides a brief case of U.S. automobile manufacturing firms, being focused in General Motors, which offers with valuable information of the present topic. In order to analyze the manufacturing strategy with more detail, the author considered to highlight the case of the Joint Venture undertook between GM and Toyota, which gives a strong empirical support to the work.

In conclusion, this project provides a wide outlook of the scenario of collaboration linkages between firms, being focused on manufacturing decision areas, and taking into account all the elements involved, both theoretical and empirical data.

It is basic to state that during the work, *operations strategy* and *manufacturing strategy* are treated as synonyms that are referred to the same concept, as it is seen along the bibliography and documents.

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# 1. INTRODUCTION

In this chapter the author includes a brief introduction of the presented topic, allocating the research study in the proper context, explaining the main purpose of this project, the research questions formulated and the boundaries or limitations of the analysis.

## 1.1 Background

Over the last two decades, the world trade has experienced an increasing and non-stopping change process towards what is called globalization. International markets have experimented an important reduction of barriers, opening their markets to foreign countries thereby intensifying the worldwide competition. Shorter product lifecycles and an increasingly exigent demand, which requires continually a wider variety of high-quality products and services, force the companies to endeavor to a constant improvement and faster response to changes (Kim and Arnold, 1996; Doz and Hamel, 1998).

In this period of globalization, markets have evolved in a highly dynamic and uncertain arena in which companies face the matter of gaining and maintain its competitive advantage even further, steering their efforts in achieving this sustainable competitive edge above their main competitors. Strategic management field is currently coping with these new and unexpected challenges, which find their roots in the restless dynamics of environmental change and firms strategic action and thinking (Dagnino and Padula, 2002).

Over the previous years, manufacturing was seen just as a function that had to run effectively and give support to other functional areas and the strategy of the firm. However, Skinner (1968), with his seminar article "Manufacturing – Missing link in Corporate Strategy", first recognized the strategic role of manufacturing within firm's strategy to achieve competitive advantage, introducing the concept of manufacturing strategy. Although it is still quite kept on theoretical issues, it is being promoting progressively during the last years in a more empirical way.

Miltenburg (2005) also supported the relevance of manufacturing strategy for companies, stating that it means "planning their path from where they are currently to where they want to be".

The complexity of technological system and the increasing turbulence in the competitive scenario have strengthened the importance of inter-firm relationships of value creation and a way to stimulate firm performances (Dyer and Singh, 1998; Dagnino and Padula, 2002).

Small and medium sized companies struggle to compete in these aggressive and fearless nowadays' markets, and provide their main customers with the strategic needs they required. In order to achieve that requirements, enterprises use different strategies, becoming partnership and collaboration between them a powerful and recurrent mode to succeed.

Multinational and Global companies, in their effort to enter in foreign markets, develop technical and modern knowledge and improve effectiveness in production process, also rely on collaborations with different businesses to hold up their competitive advantage over their competitors.

According to many authors and researchers, the grade of these relationships and networks outside the company has become a key decision in their achievement of success. From the 1980s, the strategy of *go-it-alone* is seen as a non-viable alternative for the sustainability of the competitive advantage (Dyer and Singh 1998).

There are many classifications attending the kind of cooperation agreement carried out by the different range of companies, but also depends on the direction of these linkage processes, the level of integration between companies, depth of collaboration, number of agents involved or field of cooperation.

The current project proposes an analysis of elements and decisions that are made during these linkage processes between companies based on theoretical frameworks, and case study.

## 1.2 Purpose of the project

The aim of this project is to provide an analysis to get a better understanding about the factors or elements that affect strategic decisions within manufacturing strategy that are undertaken in a context of collaboration between firms. These collaboration agreements between businesses can take a wide variety forms and dimensions.

Consequently, the author provides a theoretical framework of the different elements that could interfere in these decisions, supported by economic theories considered meaningful to treat this topic. It will be analyzed the framework in which these decisions are undertaken, related to the type of collaboration agreement and the direction of the linkage between the firms, providing an insight about how this operations strategy is embedded in the business strategy.

## 1.3 Research Questions

There are proposed the following research questions to be addressed in the current analysis.

### Research Question 1.

- Which strategic manufacturing decisions are involved in collaborations between firms?

### Research Question 2.

- How are these strategic decisions within manufacturing undertaken related within their business strategy?

### Research Question 3.

- Why are these strategic manufacturing decisions undertaken related with the nature of the collaboration agreement ?



These research questions will be analyzed in the next project with the support of the literature found in different articles and journals specialized in the topic, as well as books. The description of the method used to provide this analysis is indicated with more detail in the methodology chapter.

## 1.4 Limitations

Due to the broad field we are getting into and time scope, the author contemplated to include different limitations in this research work.

Related with the different levels of strategic planning within companies, the author will be focused only on the functional strategy of manufacturing, and levels of strategy above it, neglecting deeper information about other functional strategies that could interfere somehow the field of study, such as marketing or finance strategy, which are not the purpose of the current project.

It is established also a limitation about the type of relationship undertaken between firms, due to the wide range of possible relationship agreements. The retrieval of information and data collected, suggested the author to discard some types of inter-firm relationships, such as Mergers and Acquisitions, Licensing or Franchising. This aspect is commented with more detail in the *Inter-firm Collaboration* chapter. These relationships have different strategic decisions that the ones intended by the author to study in the current project.

Other limitation emerges from the study sample. For this study, we considered books, journals and academic articles published in specialized databases, which are detailed in the methodology section.

Another, but not less important limitation, comes from the experimental data. The lack of easy access to empirical data also supposes a limitation for the thesis. A precise database containing descriptive and empirical data about the performance companies in these context would provide greater opportunities in the current research.



## 2. METHODOLOGY

This section describes the procedure and details of the methodological approach used in this study, the different sources of information from which the data has been collected ,the keywords used in the retrieval of the information and the process followed to present the analysis.

### 2.1 Literature Review

According to the definition of Literature Review carried out by (Cooper, 1999), the author considers to focus on research methods and applications found, in order to integrate the different information.

The author collected the data, which was analyzed and integrated in order to propose a detailed analysis of the different decision-making processes within the manufacturing strategy of firms taking into account the different kind of collaboration agreements or alliances that could exist between international companies.

#### 2.1.1 Type of data used

In the early stages of the project was necessary to acquire some elementary knowledge through the reading of some general books related with the subject, in order to obtain a better comprehension of the field concerned. During this first period, the author proceeded to the reading of several books such as "*Manufacturing Strategy: How to Formulate and Implement a Winning Plan, 2nd Edition*" Miltenburg (2005) , "*Manufacturing Strategy :Text and Cases, 2nd Edition*" Hill (1997) and "*Operations Strategy, 2nd Edition*" Slack and Lewis (2008). The author continued along the project with the support of these books.

It was also given some information related with the subject Operation Analysis, in form of slides, received from the supervisor, Veronica Lindström (Lectures 1, 2, 3), together with the project work of the students S. Mideklint, L. Johansson, A. Balzereit, M. Wiklund and N. Zeljaja about the Production Strategies for the future with the empirical study case in Storebro Boats.

Once the basic bibliography was read , the author searched more specific data within the different databases through Linköping University Database Search. The recurrent databases were:

- Web Of Science, Technology Research Database, Scopus and Science Direct.
- Emerald, LIBRIS and Google Scholar.
- DIVA, a database that includes a great number of project works developed by many students of Linköping University along the recent years.

The author also performed a research in the different journals specialized in this field, such as

- American Journal of Operations Research
- Central European Journal of Operations Research

- Handbooks in Operations Research and Management Science
- International journal of operations and production management

Although it is proved the wide variety and great amount of data that could be gathered in the different databases and journals, due to the time scope and first steps of the thesis, the author decided to be focused on few databases and few journals that were considered more accurate to present topic. These are :

- Web Of Science , Emerald and DIVA
- Journal of Operations Research
- Google and Google Scholar

The articles in these journals were analyzed in order to identify and assess which key elements and decisions are carried out during the process of partnership between international companies, depending on the kind of the linkage.

Related with the proposed study case of General Motors, the sources are detailed at the end of the *references* chapter.

### 2.1.2 Keywords used in the search

The retrieval of the information contained in the several databases and journals was made using some specific keywords during the database search. Although these keywords can carry us to general fields that are not precisely related with the aim of the topic, the author had to categorize, analyze and classify this information in order to obtain the material required for this topic.

The different keywords used during this search were :

*Collaboration, cooperation, manufacturing strategy, operations strategy , partnership , alliances , strategic alliances , joint venture , supply-chain collaboration , inter-firm collaboration , manufacturing decisions, operations decisions, inter-firm relationships, horizontal collaboration, vertical collaboration, ...*

## 2.4 Method description

The research questions proposed in the project will be answered following the next process.

1. First, an introductory part is presented, providing a brief insight of the different economic approaches that the author considered to be valuable for the presented project in terms of strategy.
2. It continues with an analysis of relevant elements and strategies concerning the topic.

3. The next step consists on a study of the concept of manufacturing strategy through specialized literature from different authors founded in journals and books in order to give a proper knowledge of the key issue.
4. Then, it is provided an alignment with the different fields which are related study of the relationships, summarized as a model indicating the different relationships and elements that could interfere in the decision undertaken in this context.
5. To sum up an empirical study the theoretical approach provided by the author, a final study case of a real situation be analyze to give an empirical support to the current project.

The *study process* of the current project resulted as follows, shortly resumed in Figure 1.

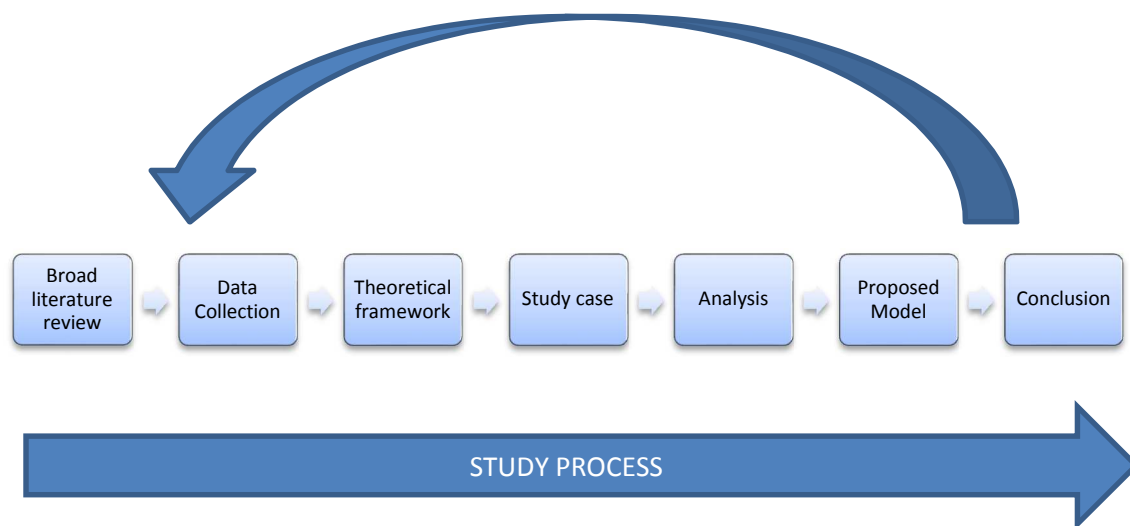


Figure 1 : Study process followed by the author



### 3. THEORETICAL FRAMEWORK

The author will be focused on the authors above mentioned, as well as different journals and articles of recent researchers which could contribute to a better understanding and updated concepts.

Manufacturing strategy seems to be a general and well-known concept over the last decades but its boundaries and limitations are no clear, or at least, there is no universal agreement among the different authors on how '*manufacturing strategy*' should be described. The person considered as the pioneer in this sense is Skinner (1968), who first recognized the strategic importance of manufacturing role within firms. From that point, the interest and research in manufacturing strategy, considering it as a competitive weapon within companies, has increased remarkably.

It is basic to state that during the work, *operations strategy* and *manufacturing strategy* are treated as synonyms that are referred to the same concept, as it is seen along the bibliography and documents.

The first step guide us to allocate the concept of operations strategy within the broad field of strategic planning of a company. According to Hofer and Schendel (1978), there exists multiple levels of strategy in organizations, ordered hierarchically from Corporate Strategy to Functional Strategy, in which manufacturing strategy is located, alongside with other functional strategies such as marketing or financial strategy.

- Corporate Strategy : Provides the overall direction of the firm and includes the different businesses in which the company wants to be in or involved. It is mainly characterized by the consideration of scope and resource deployments (Gupta and Lional, 1998).
- Business Strategy : Determines how to compete in the industry and includes the competitive priorities of the business (Cost, Quality,..). At this level, it is pointed out the scope and boundaries of each business unit. The objective is to achieve a preferential position in the markets (Ward et.al. 2007). Hitt (1997) defined business strategy as “an integrated and coordinated set of commitments and actions designed to exploit core competences and gain competitive advantage”
- Functional Strategy : Includes the contribution of the different functional areas to support the business strategy and how the different functional areas will complement each other (Hill, 1997; Gupta and Lional, 1998; Beckman and Rosenfield,2008).

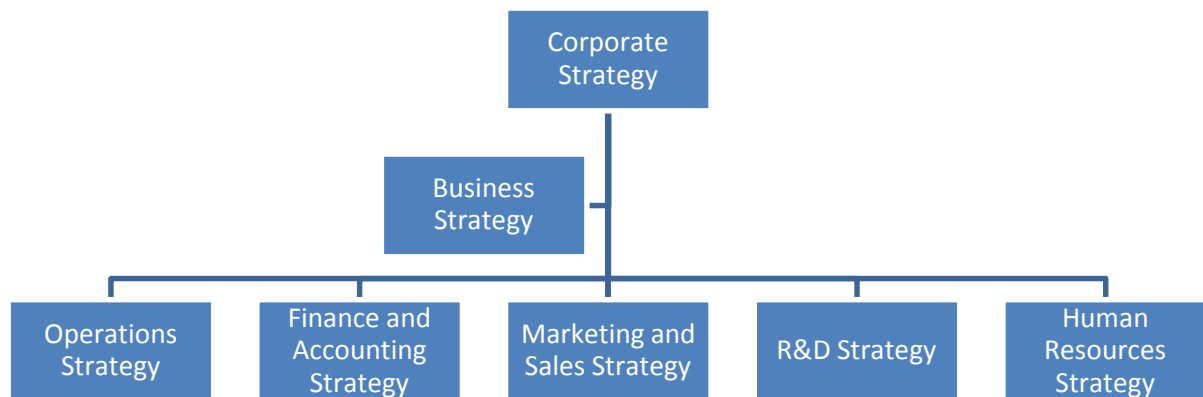


Figure 2 : Levels of Strategic Planning

Miltenburg (2005) considered one level extra above the Corporate Strategy, the Industry Strategy. This level of strategy focuses on issues such as financial markets, government policies, import and export practices, incentives for investment, international trade agreements, and infrastructure such as communications, education and transportation.

Schroeder, Anderson and Cleveland (1986) affirmed that manufacturing strategy is a process which uses business strategy to determine manufacturing mission and distinctive competence. The interaction between the different strategic levels, determines manufacturing objectives and leads to the formulation of manufacturing policies (Gupta and Lonial, 1998). Hayes and Wheelwright (1984) recommended that one of the criteria for evaluating a manufacturing strategy of an organization should be its consistency with the overall business strategy. It is critical for firms to link their manufacturing decisions with coherent business strategies (Dean and Snell, 1996).

The strategic effectiveness of a firm depends on the existence of fit, which is the compatibility of structures and processes both within the firm and with the environment in which it operates (Miller, 1992).

Hence, it is adequate to endow this study with a wider view of manufacturing strategy, not to treat it as an isolated term within the different strategies levels that are involved in the business performance, but giving the crucial importance and direct impact of business strategies and configurations in the strategic manufacturing decisions.

### 3.1 Approaches to Firm's Strategy

The author considers to include briefly different views or approaches that could be valuable in this project, based on the different theories created by schools of researchers and economists during the last decades, determining how competitive advantage of a firm is achieved and maintained in the long term.



The three theories related with business strategy and the main topic considered by the author are the Competitive Strategy View, Resource-Based View and Extended Resource-based View, which are shortly defined down below.

### 3.1.1 Competitive Strategy : The Positioning Based View

The Competitive Strategy View has its origin in the early economic schools, with its main exponent, Michael Porter. It could receive many other synonyms as the Environmental view or Market-based view, but both terms are referred to the same concept or idea (Dyer and Singh 1998, Slack and Lewis 2008).

The Positioning Based View's main contributor was Michael Porter (1980), who affirmed that companies gain competitive advantage through identifying external opportunities in new and existing markets, and then aligning the firm with these opportunities (Porter, 1980; Brown and Blackmon, 2005). The environment becomes the primary factor of a firm's strategy (Oosthuizen ,2002).

The Five forces of competition Model (Porter, 1980) determines the competitive intensity in the industry by analyzing the strength of the different forces involved in competition.

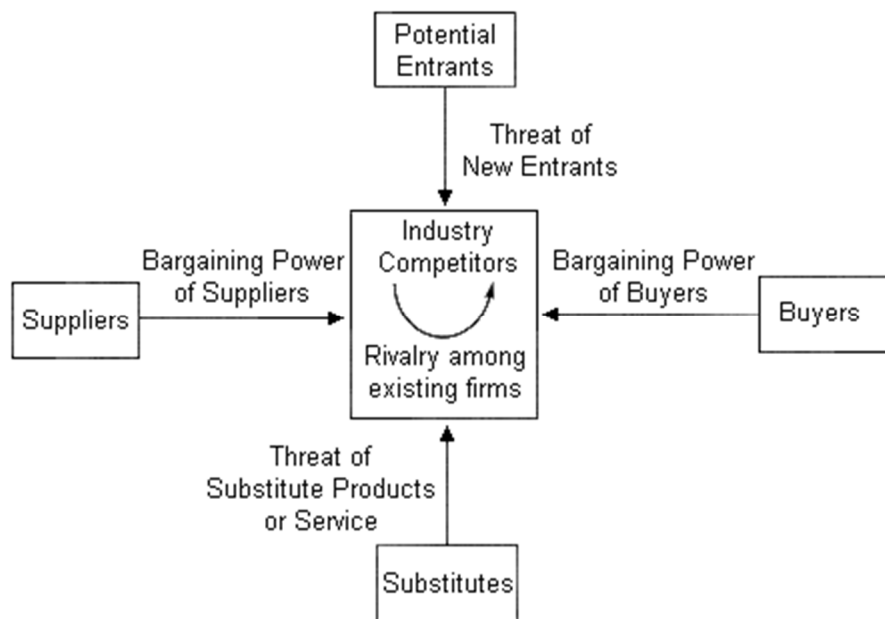


Figure 3 : The Five forces of competition Model

The underlying premise of competitive strategy is that there are good industries and bad industries in which to play, and that one should seek to become a dominant player in a good industry (Porter,1980). Hence, strategic frameworks such as Porter's (1980) five model could be used to analyze industry structure and identify a market position that provides competitive advantage.

Competitive strategy view stated that there are limited options for how a firm might position itself to gain that dominant position (Porter, 1980; Beckman and Rosenfield, 2008).

- Cost Leadership : Low cost provider in an industry
- Differentiation : Deliver a range of unique products or service through better performance and/or quality or distinctive features.
- Focus or Scope : Serve a narrow segment of the market

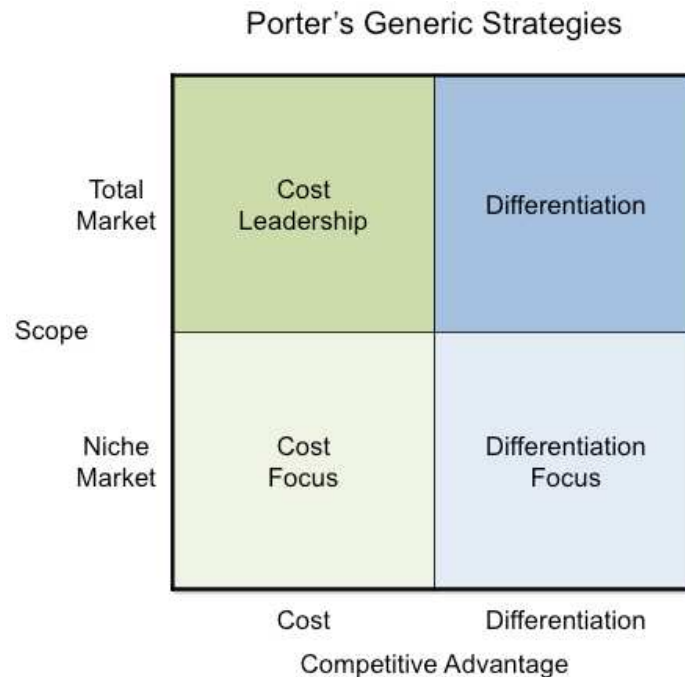


Figure 4 : Porter's generic strategies

Within these generic positions, firms may choose to distinguish themselves by choosing one of the following orientations : Variety-Based, Needs-Based or Access-Based (Porter, 1996).

A company's competitive strategy is a subset of its business strategy and it is focused on an enterprise's plan for competing successfully against competitors (Miltenburg, 2005). Under this approach, competitive strategies are devised by senior executives and translated into functional-level strategies through a top-down process (Brown and Blackmon, 2005). A company cannot deliver superior value unless it aligns and executes activities more effectively than competitors and builds capabilities that competitors cannot easily match (Miltenburg, 2005).

An approach to strategy development that arose from competitive strategy view is the now classic SWOT analysis (Beckman and Rosenfield, 2008). This SWOT analysis consists on the study of Opportunities and Threats of the firm, *Positioning-Based View*, and Internal competences, Strengths and Weaknesses, *Resource-based View*, which is explained hereafter.

### 3.1.2 Resource-Based Theory (RBT)

While the competitive strategy view suggests that industry structure plays the central role in creating opportunities for superior profitability, Resource-based View affirms that competitive advantage is derived from the firm's development of its resources and capabilities (Beckman and Rosenfield, 2008).

The Resource-Based View offers an interpretation of how the competitive advantage is generated by a company. The crucial contribution of this theory is that "long-term competitive advantage lies primarily in firms creating bundles of strategic resources that competitors find difficult to substitute or imitate without great effort" (Lewis et.al., 2010).

This theory is focused on firm's Strengths and Weaknesses. It suggests that the firm should assemble and deploy appropriate resources that provide opportunities for sustainable competitive advantage in its chosen markets to maximize returns (Barney, 1986; Dierickx and Cool, 1989). Firms therefore sustain competitive advantage through developing and guarding capabilities and competencies (Hayes, 1985). Competitive advantage is thus created not by the privileged end-product market position, but by distinctive, valuable firm-level resources that competitors are unable to reproduce (Makhija, 2003).

Resources, known as the set of technologies, methodologies and skills that are available to the firm that, when combined, can be used to create competitive advantage. Can be tangible (physical, technology, financial) or intangible (Brand reputation, culture, communication and information technologies) or human (motivation, interaction, skills and knowledge) (Lowson, 2002).

Capability, processes, activities and functions performed within a system and reflect the ability of an organization to perform a coordinated set of tasks, utilizing organizational resources (Lewis et.al., 2010).

Competences refer to the fundamental knowledge, know-how, experience and innovation. Capabilities reflect an organization's ability to use its competences (Lowson, 2002). There are four dimensions along which capabilities could be framed: Process-based, Coordination-based, organization-based and network-based capabilities (Beckman and Rosenfield, 2008).

The concept of strategic resources can include assets, capabilities, organizational processes, firm attributes, core competences, information, and knowledge. Resource-Based Theory classifies such strategic resources as those that are:

- *Scarce*. Strategic resources are by definition rare (Barney, 1986, 1991). Unequal access to resources leads to their uneven distribution amongst competing firms (Dierickx and Cool, 1989).
- *Imperfectly mobile*. Resources developed in-house, based on experience and tacit knowledge, or interconnected with other resources, are "bound" to the firm and cannot be traded. Any advantage they create can be retained over time by the firm.

- *Imperfectly imitable*. Whilst short-term advantage may be created by controlling a valuable resource, it is only sustainable if competitors are unable to duplicate the asset perfectly (Barney, 1986).
- *Imperfectly substitutable*. It is insufficient to have a resource that is scarce, imperfectly mobile and imperfectly inimitable if competitors are able to replace it with an alternative (Lewis et.al.,2010).

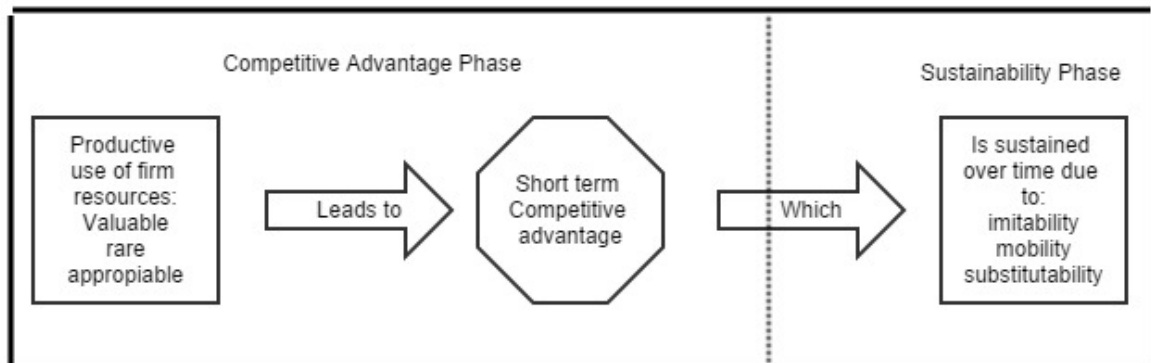


Figure 5 : Adapted Resource-based View over time

### 3.1.3 Extended Resource-Based Theory (ERBT)

The author considered convenient to include, due to its importance in the topic's nature, a 'new concept' or extension of the Resource-Based Theory, which appeared recently to give response to current strategies, the Extended Resource-Based Theory. It points out the importance of inter-firm relationships in the achievement of competitive advantage, as the collaboration beyond the boundaries of enterprises resources (Slack and Lewis 2008). As occurs with the previous approaches, this theory could also be appointed with other terms, like Kanter (1994), who called this perspective "collaborative advantage", or Dyer and Singh (1998), who defined it as the Relational View.

Diverse research have emerged considering the development of competitive advantage in situations where resources and capabilities are held beyond the boundary of the firm (Lewis, 2000; Dyer and Nobeoka, 2000). Whilst companies may need valuable, scarce, inimitable, non-substitutable resources, and capabilities, it is also understood that Resource-Based approach is insufficient when exists alliances across networks (Lavie, 2006; Lewis et.al., 2010).

Lewis (2000) illustrates how competitive advantage occurs through the interaction between firms and their external environment. He notes that provided resources cannot be copied by competitors, their ownership is not of critical importance – many strategic resources developed in manufacturing processes are "owned" by suppliers (Lewis et.al.,2010).

Extended Resource-Based Theory is based on the assumption that strategic resources beyond the boundaries of organizations can be accessed, especially given the existence of certain types of inter-firm relationships. ERBT represents an extension of classic RBT because the structure and function of relationships relates to the specificity of the resources to be transferred (Lewis et.al.,2010).

Dimensions	Resource-Based View	Relational View
Unit of analysis	Firm	Pair or network of firms
Primary sources of profit	Scarce physical resources, Human Resources/Know how, Technological resources, Financial resources, Tangible resources	Specific Relationship investments, Knowledge sharing routines, Sharing of complementary resources, Effective partnership governance
Mechanisms to preserve profits	Barriers to imitation at the firm level, such as : scarcity of resources, Property of rights,	Barriers to imitation at the partnership level, such as: Scarcity of partners, Indivisibility of resources, Interrelated inventory assets between firms,..
Property/Control of asset-generating resources and processes	Individual Firm	Collective (with exchange partners)

Table 1 : Comparison Resource-Based view and Relational View adapted from Dyer and Singh (1998)

### 3.1.4 Integrating Competitive Strategy, RBT and ERBT

Despite the debate of Competitive Strategy View or Resource-Based View, (Mintzberg et.al.1998); Hax and Wilde (2001) affirmed that strategy comes about through an iterative process that employs both perspectives.

Strategy is deciding where you want your business to go and how you want to get there (Miltenburg, 2005). It becomes an iterative process of examining marketplace for opportunities and leveraging the firm's ever changing capabilities in new and interesting ways (Beckman and Rosefield, 2008).

Firms may choose a position in the marketplace and then develop the capabilities they need to compete in that position and may examine their capabilities and choose to leverage them in identifying new businesses or market segments to compete (Beckman and Rosenfield,2008). Extended Resource-Based theory comes as an option for firms to achieve that strategic capabilities and resources through partnerships with different enterprises for a determined period.

Ritala and Ellonen (2010) proposed that relational attributes should be taken into the internal and industry analysis in order to obtain a complete picture of cooperative strategy and to gain complementary explanations rather than contradictory theorizing.

Ritala and Ellonen (2010) proposed the concept of a refined SWOT analysis to illustrate their proposal to integrate relational attributes into the classical framework.

	Positioning BV	Resource BV	Relational BV
Unit of analysis	Industry Structure	Internal resources and capabilities of the firm	Interfirm relationships
Source of competitive advantage	Relative position in the industry	Valuable and rare resources and capabilities	Relation-specific assets, knowledge-sharing practices, complementary resources,
Source of sustainability of competitive advantage	Barriers to entry	Barriers to imitation	Network barriers to imitation
The role of interfirm cooperation	Source of market power	Source of complementary resources and capabilities	Main source of competitive advantage

Table 2 : Adapted from Ritala and Ellonen (2010)

It is valuable to clarify that in most strategic partnerships, the dyadic relationships are neither strictly competitive nor strictly cooperative: they are simultaneously competitive and cooperative (Dagnino and Padula, 2002).

Dagnino and Padula (2002), studied *coopetition* as a new interpretive category in strategy, when the competitive and the cooperative, are simultaneously considered. Coopetition strategy concerns inter-firm strategy which allows the firms involved to manage a partially convergent interest and goal structure and to create value by means of co-opetitive advantage (Dagnino and Padula, 2002).

### 3.1.5 Synchronization Process of Collaboration Agreements

Danilovic and Winroth (2014) give additional information about the process of govern and synchronization in a cooperation agreement between companies.

According to their research study, the synchronization process is built following the next steps:

1. First, each company performs an analysis of their own manufacturing strategy and production system. The conditions between the System Integrator (core company) and each network partner are then synchronized in a number of steps.
2. The SI correlates its competitive priorities with its production system and detects suitable changes.
3. The SI performs an analysis of its strategic decision categories and makes suitable changes , either to the production system design or the decision categories.
4. The SI's strategic decision categories give input to the decision categories of the different partners (suppliers/customers)
5. Each partner correlates its competitive priorities with its production system and detects suitable changes.
6. Each partner performs an analysis of its strategic decision categories and makes suitable changes , either to the production system design or the decision categories.
7. The partner coordinate their decision categories and take necessary actions.

## 3.2 Concept of Business Strategy

The author considers to include this chapter due to the undeniable importance and impact of business strategy in manufacturing strategy decisions. As is defined above, Business strategy is defined by Hitt (1997) as “an integrated and coordinated set of commitments and actions designed to exploit core competences and gain competitive advantage”. According to Hill (1997), business strategy determined the scope of the business and how it is going to compete, in order to achieve a sustainable preferential position in the markets.

Referring to business strategy, there exist several classifications attending to different authors and periods (Hofer and Schendel, 1978; Hayes and Wheelwright, 1984; Dean and Snell, 1996; Ward et.al, 2007), examining these linkages in specific environments.

There exist a broad variety of possible business strategy configurations (Hambrick, 1983;Ward et.al. ,2007). The different paths to attain competitive advantage support the idea of different business strategies configurations.

Porter (1980), as the main contributor of the positioning view or environmental view, determined business strategy as the ability of a firm to influence competitive forces or threats in an industry coming from five sources seen in the approaches chapter: potential competitors, existing competitors, substitutes, suppliers’ power and buyers’ power,

According to Porter (1980), competitive advantage within an industry could be sustained by following a differentiation strategy or cost strategy , applied across all segments in an industry or

focused on a niche within the industry. Before Porter, Miles and Snow (1978) made a different classification attending to business strategies of firms. These typologies are related to the different “responses to changing environmental conditions; that is, the rate at which an organization changes its products or markets to maintain alignment with its environment” (McDaniel and Kolari, 1987). They classified them into four groups :

- Defenders : Attempt to protect a stable portion of market and customers.
- Prospectors : continuously trying to innovate and take advantage of new product and market opportunities, entailing high risk
- Analyzers : Protect a stable business but simultaneously try to enter into new markets, entailing moderating risk.
- Reactors : Consider only immediate needs, without having a strategy in the long term.

A meaningful finding of Hambrick’s study (1983), relevant to the research question of manufacturing-decision differences among business strategy configurations, was the difference in functional attributes of prospectors and defenders. Prospectors had higher R&D and marketing expenses, while defenders displayed an emphasis on efficiency characterized by high-capital intensity, high-employee productivity and low-direct costs.

### 3.3 Concept of Manufacturing Strategy

Once the concept of manufacturing strategy is located within the context of Strategic Planning, the next step is to determine its definition and all the elements involved. As it is clarified previously, throughout the current project, the author treats the terms manufacturing and operations as synonyms, according to the literature examined. Prior that, the author considers to determine and study the definitions of *operations* and *strategy* separated, and subsequently, the concept of operations strategy as an unit.

*Operations* is defined by many authors as the activity of managing the resources and processes that produce and deliver goods and services. It is determined as the activity of transforming resource inputs into outputs (Slack and Lewis, 2008). No matter what type of business or organization, every company produces any mix of products or services.

On the other hand, the concept *strategy* comes from the Greek word ‘Strategos’ ,which means ‘leading an army’, quite meaningful term if we compare it with the field discussed (Slack and Lewis, 2008) .Both meanings share some concepts that could be applied, such as setting broad objectives directed to achieve a specific goal , planning the way to achieve that goals and the time scope, which is based on the long-term (Slack and Lewis, 2008).

Pooling both terms, operations strategy could be defined as "the total patterns of decisions which shape the long-term capabilities of any kind of operation and their contribution to overall strategy , through the ongoing reconciliation of market requirements and operation resources. All businesses have markets, all businesses own or deploy resources, therefore all businesses are concerned with



the reconciliation of markets and resources" (Slack and Lewis,2008). Manufacturing strategy is how a company uses its assets and prioritizes its activities to achieve its business goals (Miller and Roth 1994), a pattern of competition that tries to generate competitive advantage and it depends on a company's industry and geographic location (Chen, 1999; Miltenburg, 2009).

A short but powerful concept is given by Miltenburg (2005), stating that manufacturing strategy is a plan for moving a company from where it is to where it wants to be. In this process, companies face a wide range of constraints and choices that make this a difficult task. Summarizing the concept of manufacturing strategy throughout these last decades given by several authors :

<b>Miltenburg (2005)</b>	"the pattern underlying the sequence of decisions made by manufacturing over a long time period. When a formal manufacturing strategy exists, decisions follow a neat, logical pattern. The essence of manufacturing strategy is to formulate explicitly how manufacturing decisions will be made so that manufacturing will help the company achieve a long-term advantage over its competitors"
<b>Hill (1996)</b>	"Set of decisions aimed to put together the resources and capabilities to support the business to achieve a competitive advantage"
<b>Stonebraker &amp; Leong (1994)</b>	"the current domain and pattern of resource commitments to transformation processes, and planned improvements, as a means to achieve the distinctive competence and goals of the firm."
<b>Raturi &amp; Evans (2005)</b>	"the set of decisions across the value chain that supports the implementation of a higher-level business strategies."
<b>Hayes et. al 2005</b>	"a set of goals, policies, and self-imposed restrictions that together describe how the organization proposes to direct and develop all the resources invested in operations so as to best fulfill (and possibly redefine) its mission."
<b>Slack and Lewis (2008)</b>	"the total patterns of decisions which shape the long-term capabilities of any kind of operation and their contribution to overall strategy , through the ongoing reconciliation of market requirements and operation resources"
<b>Beckman &amp; Rosenfield (2008)</b>	"connecting operations goals with customer concerns."
<b>Finch (2008)</b>	"a strategy that establishes the link between operations decision making and business strategy."

Table 3 : Insight of definitions of manufacturing strategy

To give some more approaches about the field we are getting into, Slack and Lewis(2008) considered operations strategy to be concerned with how the competitive environment is changing and what the operation has to do in order to meet the current and future challenges, being the pivotal reason for their competitive superiority for many companies (Slack and Lewis,2008).

Although it is commented above the uncertainty of the definition of manufacturing strategy among the different researchers, we can conclude that four common insights are shown in most of these authors' literature.

- OS is a top-down reflection of what the whole business wants to do. From the broader Corporate Strategy , through Business Strategy and Functional Strategy.
- OS is a bottom-up activity where operations improvements build strategy, often called Emergent Strategy (Slack and Lewis 2008, Beckman and Rosenfield 2008). Learning from day-to-day activities and philosophy of a continuous and incremental improvement.
- OS involves the translation of market requirements into operations decisions.
- OS involves exploiting the capabilities of operations resources in chosen markets.



Figure 6 : Adapted from Operations Strategy by Slack and Lewis (2008).

Although the outlooks from Corporate and Business Strategy and also from the Emergent Strategy are undeniably related with the manufacturing strategy of a company , it is usually highlighted the concept of operations strategy as the reconciliation between market requirements with operations resources (Slack and Lewis ,2008).

Other authors referred manufacturing strategy in a different way, Gupta and Lonial (1998) identified three main dimensions of manufacturing strategy, Process-structure complexity, product-Line complexity and Organizational scope.

Market Requirements, known as the outcome of understanding markets, customer needs, actions of competitors and the desirable market positioning. These market requirements, which are not easy to determine, are translated into parameters that could be measured and used by operators and managers, are the Performance Objectives, Manufacturing Priorities or Competitive Priorities, depending on the author (Hill, 1999; Miltenburg, 2005; Slack and Lewis, 2008).

According to Wheelwright (1984), there exist a group of basic competitive priorities that are common to all companies. He stated four basic priorities: Cost efficiency, Quality, Flexibility and Dependability. Over the years, different authors have added or specified another priorities to the list above. The author Terry Hill (1999) included Delivery (Speed and Reliability) as a priority, as well as, Flexibility, in terms of Product Range and Volume. However, Miltenburg (2005) added as priorities the concepts of Performance and Innovativeness. Later, Slack & Lewis (2008) added Speed as a competitive priority.

Although several authors have most often been referred to these competitive priorities (e.g., Hayes & Wheelwright, 1984), in manufacturing literature, many others have used different terms to describe them, such as manufacturing capabilities. Roth and van der Velde (1991) distinguish between intended and realized capabilities by referring to the former as competitive priorities and the latter as competitive capabilities. Hill (1994) classifies such capabilities as order winners and qualifiers, according to their importance in gaining customers (Ward et al., 1996).

Swink and Way (1995) affirmed that manufacturing tasks have been named which fit neatly within the basic objectives of conformance, performance, speed, variety, delivery speed and reliability.

Once known the different parameters in which the market requirements are translated, next step continues taking a look inside the enterprise, within different resources of the company that are able to match these market requirements.

As occurs with the market issues, understanding the resources and processes of companies is not an easy task for managers or operators. The different resources of a company, could be tangible, as the equipment or staff, and intangible, as the reputation of the firm or experience, and similarly to market requirements, are not easy to determine. The set of the different capabilities, processes and resources conformed the operations strategy decisions or operations-based decision areas (Hill, 1999; Miltenburg, 2005; Slack and Lewis, 2008).

### 3.3.1 Content and Process of manufacturing strategy

It is crucial at this point to define and distinguish two concepts involved in the definition of operations strategy, Content and Process. These terms are defined as the *decisions* and *plan* affecting resources and policies directly related to the sourcing, production and delivery of tangible products (Swink and Hay, 1995). According to Miltenburg (2005), "The essence of manufacturing strategy is to *formulate* explicitly how manufacturing *decisions* will be made so that manufacturing will help the company achieve a long-term advantage over its competitors".

*Content* means the set of decisions made within the operations domain and is concerned with the strategic choices, plans and actions which shape and develop the long-term direction of the operations strategy. It particularly highlights the importance of understanding the interaction between the operation's competitive priorities and the decisions that it takes concerning resource deployment (Swink and Way,1995; Slack and Lewis, 2008).

Meanwhile, *process* of manufacturing strategy refers to the "process" or way of formulating and implementing operations strategies. It is defined as the collection of procedures which are used to formulate operations strategy and it determines how an operation pursues the reconciliation between its market requirements and operations resources in practice (Swink and Way,1995; Slack and Lewis, 2008).

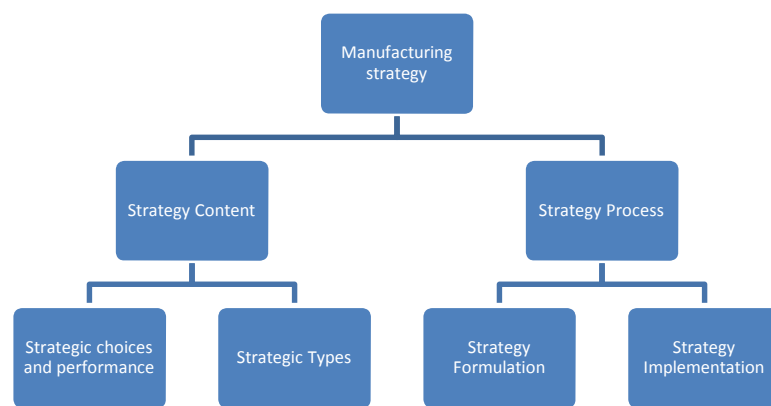


Figure 7 : Content and Process of OS. Adapted from Swink and Hay's (1995)

### 3.3.2 Content : Decision types in manufacturing strategy of a firm

Focusing on the *content* concept defined before, it is examined deeper the kind of decisions undertaken in manufacturing task of a firm. Creating an operations strategy essentially entails making a set of decisions about the structure and infrastructure of operations (Skinner 1969, Hayes and Wheelwright 1984). Following the literature of Miltenburg (2005), six main groups of categories or manufacturing levers are revealed:

#### Human Resources

This subsystem comprises the company's human resource policies for the production system in use. The adjustments made in this subsystem include decisions such as the mix of skilled and unskilled employees , number of job classifications ,training level ,policy on layoffs or promotion opportunities (Hill, 1999; Miltenburg, 2005; Beckman and Rosenfield, 2008).

#### Organization Structure and Control

This subsystem comprises the structure of the organization, control systems, reward systems and culture. The variety of decisions undertaken in this subsystem are such as the production system as a cost or profit center, organization flattened or hierarchically structured, centralized or decentralized, managers' selection and responsibility, management and authority at each level of the organization, responsibility of quality or performance measures (Miltenburg, 2005; Slack and Lewis, 2008; Hill, 1999; Beckman and Rosenfield, 2008).

#### Sourcing

This lever focuses on relationships with suppliers and distributors. Decisions undertaken in this subsystem include the extent of vertical integration along the chain, number and size of suppliers and distributors and their capabilities, outsourcing necessity, adversarial or partnership relationships with suppliers and customers and their responsibility for design, cost and quality (Miltenburg, 2005; Slack and Lewis, 2008; Hill, 1999; Beckman and Rosenfield, 2008).

#### Production Planning And Control

This subsystem consists decisions related to order entry, master production scheduling (MPS), materials planning (MRP), scheduling of machines and employees, controlling production on the factory floor, coordinating production support departments, push or pull control system, amount of raw material, work-in-process and finished goods inventories, schedule maintenance, schedule design changes and new products into production (Miltenburg, 2005; Slack and Lewis, 2008; Hill, 1999; Beckman and Rosenfield, 2008).

#### Process Technology

This subsystem considers decisions related with machines, processes, and technologies used to produce products. The kind of adjustments made in this area assess the process technology, implementation of new ways or forms of technology processing, their performance, efficiency and impact on the objectives. It includes as well the development of technology internally or purchase it from external sources and the level of automation (Miltenburg, 2005; Slack and Lewis, 2008; Hill, 1999; Beckman and Rosenfield, 2008).

#### Facilities

This subsystem includes adjustments related to the buildings within which production takes place, and production support departments such as material handling, maintenance, engineering, and tooling. Size, number and location of facilities, with a general purpose or specialized, capacity planning or capabilities of production (Miltenburg, 2005; Slack and Lewis, 2008; Hill, 1999; Beckman and Rosenfield, 2008).

Although these adjustment areas are classified distinctively by many authors, as a brief summary along the literature studied, the author concludes that there is no appreciable difference among the decisions involved in the Operations Strategy.

Types of decision areas	Terry Hill "Manufacturing Strategy"	John Miltenburg "Manufacturing Strategy"	Slack & Lewis "Operations Strategy"
Process Technology	x	x	x
Capacity	x		x
Facilities	x	x	
Vertical Integration/Sourcing	x	x	x
Organization Structure and Control	x	x	x
Human Resources	x	x	
Quality	x		
Production Planning and Control	x	x	

Table 4 : Decision areas considering different authors

### 3.3.3 Process : Models for Manufacturing Strategy of a company

Models of manufacturing strategy are helpful for companies because they organize the important objects in manufacturing strategy into a structure that enables enterprises to understand and use them (Miltenburg ,2009). Many models are possible and there is no particular model that is best for all companies. The author includes a briefly overview about the most significant models examined and developed by different known authors.

Several authors try to model the manufacturing strategy process. Wheelwright and Hayes (1985) provided Two-Object approach, process for the development and implementation of manufacturing strategy, which determines the process competences (quality, costs..) and links the structural and infrastructural decisions to match that competences.

First, on the basis of the intended business strategy such as low price or product differentiation, manufacturing's competitive priorities should be determined in terms of relative emphasis given to low cost, quality, flexibility and delivery. Afterwards, various structural and infrastructural decisions should be linked such that there is consistent support for chosen competitive priorities (Wheelwright and Hayes ,1985).

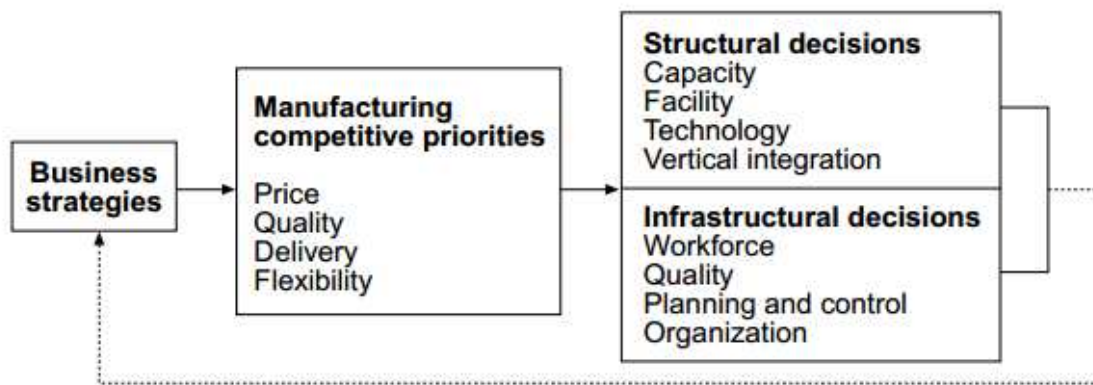


Figure 8 : Two-stage Model Adapted from Wheelwright (1984)

Later, Hill (1997) proposed a process implementing another functional strategy, marketing strategy, between business and manufacturing strategy.

Then, Platts (1998) stated the Five-object Model, an extended version of the Three-object Model of Wheelwright(1984), providing a better understanding of the strategy objects and the different linkages between them.

- Object 1 - Business Strategy : It sets the Business Strategy and the basis of competitive advantage.
- Object 2 - Market Requirements :Specifies the quality, Cost, delivery.. requirements for each product in each market.
- Object 3 - Manufacturing objectives : Measurable performance targets for the competitive priorities.
- Object 4 - Manufacturing Capabilities : Specifies the capabilities that manufacturing possesses in the areas of cost, quality...
- Object 5 - Structural and infrastructural systems in Manufacturing : Specifies the decisions in the structural and infrastructural systems.

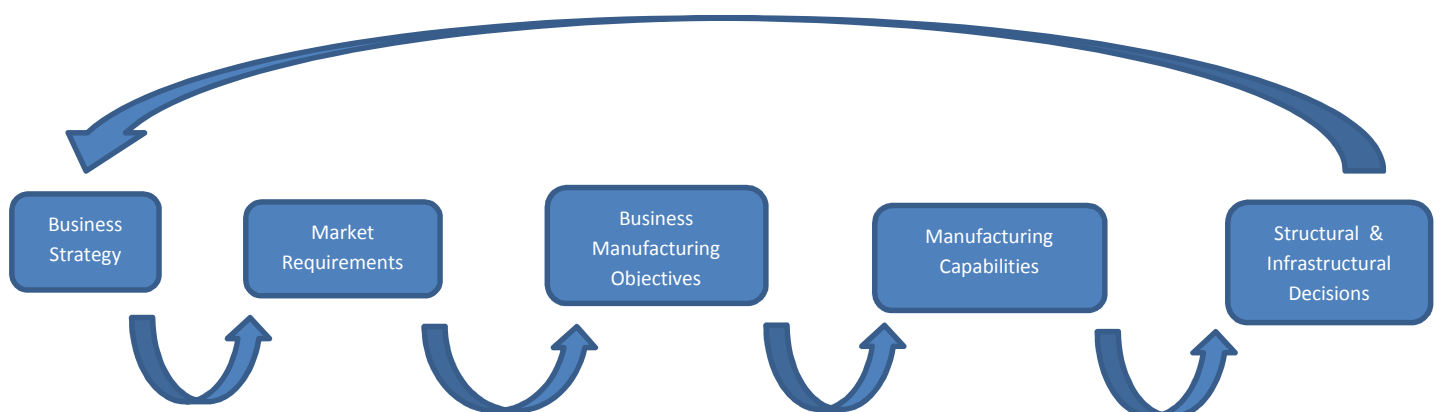


Figure 9: Five-Object Model of Platts (1998)

Miltenburg (2005), in turn, proposed a model which offers a useful graphic tool, enabling us to visualize all the different objects of manufacturing strategy of factory. It is seen previously the strategic outputs provided by a production system in a factory, based on Miltenburg (2005) literature, which are cost, quality, performance, delivery, flexibility, and innovativeness. The level at which each output is provided depends on the type of production system and the level of capability of the production system.

Following Miltenburg's literature (2009), manufacturing strategy can be studied at different levels : industry, corporation, company, strategic business unit, factory and focused factory-within-a-factory. The next chapter treats manufacturing strategy in a more upgraded version, focused on the company's international manufacturing network, and provides an enhancement to the current project, due to the nature of the topic discussed, and is explained in the next chapter.

### *3.3.3.1 Model for manufacturing strategy in an International Manufacturing Network*

Nowadays a company's sources of competitive advantage are rarely found solely within its immediate boundaries, rather they are usually found within the boundaries of a network of facilities and companies (Gulati ,2000; Miltenburg, 2009). According to this statement, emerges the Extended Resource-Based View (ERBV) which is examined in the previous chapter, considering the development of competitive advantage in situations where strategic resources and/or capabilities are found beyond the limits of the enterprise.

In this model offered by Miltenburg (2009), the objects and linkages between them do not follow a structured order one by another like the Five-Object Model of Platts (2005). Four main objects can be distinguished in this model: types of manufacturing networks, strategies for international manufacturing networks and manufacturing networks outputs and levers. Each one of these objects is shortly examined below.

#### *Types of Manufacturing Networks*

International companies organize their manufacturing activities into networks. There are nine well known manufacturing networks attending to their scope of operations : Domestic, Domestic export, International, Multi-domestic, Multinational, Global product, Global function, Global mixed and Transnational. Each one are specified briefly in the next table.

There exist other manufacturing networks that could result from diverse inter-organizational relationships such as mergers, acquisitions, alliances or joint ventures. In these situations, manufacturing networks could have special structures or interfaces which connects both networks, and are built to make interaction, coordination, and cooperation .



## Strategies for International Manufacturing Networks

It does not exist a unique way that an international company can organize manufacturing activities, it will depend on its strategy for international manufacturing. According to Miltenburg's (2005) literature there are seven different strategies. Each is a response to two important pressures international companies face: pressure for globalization and pressure for local responsiveness.

*Domestic strategy* is the simplest strategy. Companies compete in local domestic markets where they manufacture.

*Multi-domestic strategy* is used by companies that establish manufacturing facilities in different regions of the world to produce unique products that satisfy customer needs in local markets. Economies of scale cannot be achieved because products are unique.

*International strategy* is followed in situations that customer needs are the same in all country markets, so standard products are produced. This leads to price competition. Companies must achieve economies of scale to be competitive, so large factories are established in different regions of the world or mergers and acquisitions are used to increase production volume.

*Global strategy* is used when price competition is intense and quality requirements are very high. Companies pursue economies of scale in production, marketing, and distribution. Economies of scale and benefits of experience are realized when companies produce and sell larger and larger volumes of standard products and services to global markets. Activities are dispersed to the best locations around the world and are carefully coordinated and tightly controlled.

*Multinational strategy* is used by companies which establish factories in most countries worldwide where significant demands for their products exist. Factories have autonomy to adapt products to meet customer needs in local markets. In this case, acquisitions and joint ventures are used to gain access to new country markets. When exists high pressure for globalization and increases price competition, companies follow a special multinational strategy called *transnational strategy*, which forces companies to optimize their manufacturing networks.

## Manufacturing Network Outputs

Besides the six manufacturing outputs described above provided by a production system of a single factory, an international manufacturing network provide four different outputs : Accessibility (to foreign markets or Production factors), Thriftiness , Mobility (of Products, Processes and Personnel or Facilities) and Learning ( of Culture ,Needs or Technology) (Miltenburg, 2005).

### Accessibility

Geographic dispersion of facilities and amount of autonomy given to dispersed facilities determine how close a company gets to the people and organizations that are important to it. When facilities

and activities are widely dispersed, a company is in close proximity to customers, factors of production, and governments in most parts of the world. Accessibility is important for all international and also in rapidly changing industries (Miltenburg, 2005).

#### Thriftiness

The more tightly coordinated a manufacturing network, the more thrifty it becomes. A high degree of coordination helps a company achieve economies of scale and realize the benefits of experience (Miltenburg, 2005).

#### Mobility

Geographic dispersion of facilities and amount of specialization determine the level at which the mobility output is provided. Worldwide and regional dispersion of facilities give the highest level. Opportunities for mobility exist when facilities are dispersed worldwide or in some or all of the world's major trading regions. The more specialized the facility, process, or personnel, the more difficult it is to move. Companies move products, processes, personnel, and facilities in response to changes in customer needs, production factors, competitors' actions, government regulations, and company strategy. Mobility is important for all international companies and also in rapidly changing industries (Miltenburg, 2005).

#### Learning

There exist two types of learning. The first is learning about cultures, customer needs, employee needs, and government regulations. The second is about product technology, process technology, and managerial systems (Miltenburg, 2005).

### Manufacturing Network Levers

Following Miltenburg's literature, an international manufacturing network consists of eight elements or levers, which can be adjusted to fit the operations strategy of the firm. These elements are: facility characteristics, geographic dispersion, vertical integration, organization structure, coordination mechanisms, knowledge transfer mechanisms, response mechanisms, and capability building mechanisms.

#### Facility Characteristics

Lever consists on the type of decisions related with factories, offices, research centers, and warehouses that conform the manufacturing network of a firm. These decisions involve capabilities, size or focus of the set of facilities within manufacturing network and depends on the kind of network of the firm. For instance, factories could be large or small, highly specialized or standard, according to the type of network of the company (Miltenburg, 2005).

#### Geographic Dispersion Level.

Several ways to disperse value system activities exist. The levels at which network outputs must be provided, especially accessibility and mobility, determine how to disperse activities (Miltenburg, 2005).

## Vertical integration

It is the extent to which a network contains facilities engaged in upstream activities involving sources of supply, and downstream activities, such as distribution and sales, involving users of final products. Greater vertical integration of upstream activities provides higher levels of the thriftiness and learning outputs. Greater vertical integration of downstream activities provides a higher level of the accessibility output (Miltenburg, 2005).

## Organization Structure

Each manufacturing network uses a particular organization structure. Small differences in structure are possible within each network. A company designs an organization structure appropriate for its network, consistent with its capabilities, and best able to provide the required levels of the network outputs (Miltenburg, 2005).

## Coordination Mechanisms.

Manufacturing networks would be impossible without modern computer and communication technologies. Most networks require enterprise resource planning (ERP) systems to organize data and make information available to all parts of the network. Mechanisms are also needed to set plans for activities in the network and to monitor and control execution of plans (Miltenburg, 2005).

## Knowledge Transfer Mechanisms

How product knowledge and process knowledge are transferred between facilities and departments in a manufacturing network affects the levels at which network outputs are provided, especially thriftiness and learning. Different networks use different knowledge transfer mechanisms. A measure of the effectiveness of a company's knowledge transfer mechanisms is the ease with which it makes product and process changes as products move through their life cycles (Miltenburg, 2005).

## Response Mechanisms Threats and opportunities

can arise anywhere in a network. They must be recognized, analyzed, and when appropriate, acted upon. The systems and procedures for doing this depend on the network in use and the levels at which network outputs are provided (Miltenburg, 2005).

## Capability Building Mechanisms

Competitive advantage is built and sustained by improving and upgrading sources of competitive advantage. In the long run, all sources of competitive advantage can be copied, so a company also needs mechanisms to build new sources (Miltenburg, 2005).

### 3.4 Empirical alignment analysis between Business Strategy and Manufacturing Strategy

As it is commented before, the primary role of manufacturing strategy is to support the overall business strategy, aligned with other functional strategies, and business strategy should be formulated taking into account manufacturing resources and capabilities, top-down & bottom-up perspective. Manufacturing strategy acquires relevant importance as a source with significant effect on competitive advantage (Hayes and Wheelwright ,1984; Skinner 1978).

While the configurations show the business strategy followed by the firms, subsequent analyses of their manufacturing investment decisions make explicit the linkages between their business strategies and manufacturing decisions (Ward, McCreery, Anand,2007).

Wheelwright and Hayes (1985) emphasized the importance of manufacturing in business strategy for gaining a competitive edge. Kim and Arnold (1996) explored linkages of business strategy with manufacturing related decisions and proposed a model for aligning manufacturing decisions with business strategy.

The next research developed by Ward,et.al. (1995), study the linkage and alignment between business and manufacturing strategy, representing patterns of decisions in the industry. The authors presented four different configurations, based on Porter's one, but slightly modified. The four configurations considered are : Niche differentiator, Broad Market differentiator, Cost leader and Lean competitiveness. Their study released important differences among the different configurations in some fields such as Competitive Strategy dimensions (Quality/Low price, Innovation and R&D,..), Environmental Dimensions (Dynamism, Complexity,..), Structural Dimensions (Centralization, Specialization,..) and Strategic Manufacturing capabilities ( Cost/ Quality/ Delivery performance & Flexibility).

On the next table, it is summarized the main differences among the distinct business configurations, including their manufacturing strategy and the strategic decisions affecting manufacturing field. It exists broad differences in their decisions.

The next table to summarize the main results of the research study developed by Ward et.al. (1995).

		Niche Differentiator	Broad market differentiator	Cost Leader	Lean Competitor
Competitive strategy		Specialized product/service in a market segment	Wide range of products and markets, basis of quality or service	Lower price than competitors Mature Products	Cost leadership and differentiation
Manufacturing Strategy		Flexibility , differentiation in delivery and quality	flexibility and output predictability , manufacturing perspective on the basis of volume, product or service characteristics	Low Cost & Quality , Economies of scale	Capabilities at high level from long term programs
Strategic manufacturing decisions	Process Technology	Job Shop or small batches and well executed programs AMT	intermittent batches and flow production, Advanced manufacturing technologies appropriately used	Mechanized flow	
	Capacity, facilities and vertical integration	Facilities focus related to good performance	various products lines - multiple plants	Upstream and Downstream integration > loss of flexibility / Use of alliances	Low inventories and Just-In-Time
	Production and inventory control systems	small inventories , minimize raw materials inventories , accurate purchasing, Just-In-Time programs		maximize utilization and minimize Work in Progress	Continuous improvement
	Workforce management	highly skilled workers , TQM , employee empowerment	Changes in production and support areas implies a reallocation of resources	Centralized organization and few direct production workers	Cross-functional relationships

Table 5 : Information gathered in the research of Ward et.al. (1995)

Manufacturing strategy contributes substantially not only to manufacturing performance but also to business strategy, as measured by business unit performance on market share, growth and profits (Brown and Blackmon, 2005). With this brief study, the author tries to demonstrate the wide different options of key strategic decisions depending on the business configuration adopted by the company.

The following step to take is a brief recapitulation about the literature and information gathered until here, studying the linkages and main elements involved.

## 3.5 Inter-Firm Collaboration

*"Coming together is a beginning; keeping together is progress; working together is success".*

Henry Ford

*"Alliances are a big part of this game [of global competition]. . . They are critical to win on a global basis . . . The least attractive way to try to win on a global basis is to think you can take on the world all by yourself".*

Jack Welch , CEO of General Electric (Speech at Harvard Business School , October 28 , 1987)

Although two decades ago the concept of strategic alliances and collaborations were only options available for big corporations and multinationals, this choice has become recurrent to every company, regardless the dimension or geographical location (Ritala and Ellonen ,2010). During the last decades, an increasing number of firms have entered into alliances with other firms within the same industry, as well as within other industries (Varadarajan and Cunningham, 1995). The numerous and different cooperation agreements done by Japanese and American companies during the previous decades could offer us a clear example about the importance of these relationships between businesses.

The strategy of *go-it-alone* is seeing as a loss of competitiveness, not taking advantage of the wide range of opportunities that an alliance or collaboration agreement could offer. "Sometimes, large differences in capabilities and resources exist between rival companies. When one company develops new products faster, achieves better quality at lower cost, or has more resources at its disposal to exploit opportunities, a rival company must move quickly to catch up. Often, the quickest way is with the capabilities and resources of a strategic partner" (Miltenburg, 2005).

Before the commencement of the next chapter, there are important questions to clarify. The author will be focused on the features of alliances or cooperative agreements that would affect somehow the manufacturing field of the firm, letting for other research and works issues like the process of selection of partners, or the rate and reasons of alliances to succeed or fail, which has an important relevance but are far from the purpose of the author in the present project.

### 3.5.1 Forms of Inter-organizational Relationships

Before getting deeper in the topic presented, the author considered to provide an overview of the different relationships that could take place between enterprises, in order to provide a wider perspective of the subject presented. According to the literature of Todeva and Kocke (2005) , based on different theoretical and research studies, there can be distinguished thirteen basic inter-organizational relations between businesses:

- Hierarchical relations: through acquisition or merger, one firm takes full control of another's assets and coordinates actions by the ownership rights mechanism.

- Joint ventures: two or more firms create a jointly owned legal organization that serves a limited purpose for its parents, such as R&D or marketing.
- Equity investments: a majority or minority equity holding by one firm through a direct stock purchase of shares in another firm.
- Cooperatives: a coalition of small enterprises that combine, coordinate, and manage their collective resources.
- R&D consortia: inter-firm agreements for research and development collaboration, typically formed in fast-changing technological fields.
- Strategic cooperative agreements: contractual business networks based on joint multi-party strategic control, with the partners collaborating over key strategic decisions and sharing responsibilities for performance outcomes.
- Cartels: large corporations collude to constrain competition by cooperatively controlling production and/or prices within a specific industry.
- Franchising: a franchiser grants a franchisee the use of a brand-name identity within a geographic area, but retains control over pricing, marketing, and standardized service norms.
- Licensing: one company grants another the right to use patented technologies or production processes in return for royalties and fees.
- Subcontractor networks: inter-linked firms where a subcontractor negotiates its suppliers' long-term prices, production runs, and delivery schedules.
- Industry standards groups: committees that seek the member organizations' agreements on the adoption of technical standards for manufacturing and trade.
- Action sets: short-lived organizational coalitions whose members coordinate their lobbying efforts to influence public policy making.
- Market relations: arm's-length transactions between organizations coordinated only through the price mechanism.

After this broad classification of organizational relationships, it is logical to determine that not all of them can be considered in the present project, that could result quite far from the main features and characteristics of collaboration agreements. Related to the scope of the study, the type of inter-organizational relations that can be seen as collaboration agreements between companies are such as Joint Ventures, R&D Consortia or Strategic cooperative agreements, neglecting other relations which are not related with any kind of cooperation, like Acquisitions, Mergers, Licensing or Franchising.

### **3.5.2 Delimitation of Inter-Firm Collaboration concept**

Glaister and Buckley (1996) stated "an inter-firm collaboration is a cooperative long-term agreement between two or more companies in a given economic space for the achievement of mutually well-defined strategic goals". In many cases this cooperation agreement is formed through a joint venture or strategic partnering agreement.

Related with the consistency of the concept of *inter-firm collaboration*, the most accurate term that could match closer is *strategic alliance*. It is defined “as a legal agreement, often with a limited scope and function, between two or more companies to share access to their technology, trademarks or other assets. This partnership choice is undertaken when enterprises desire to gain fast a new area of expertise or access new markets or technologies”. Gulati (1998) defined strategic alliances as “voluntary agreements between firms involving exchange, sharing, or co-development of products, technologies, or services. They can occur as a result of a wide range of motives and goals, take a variety of forms, and occur across vertical and horizontal boundaries”.

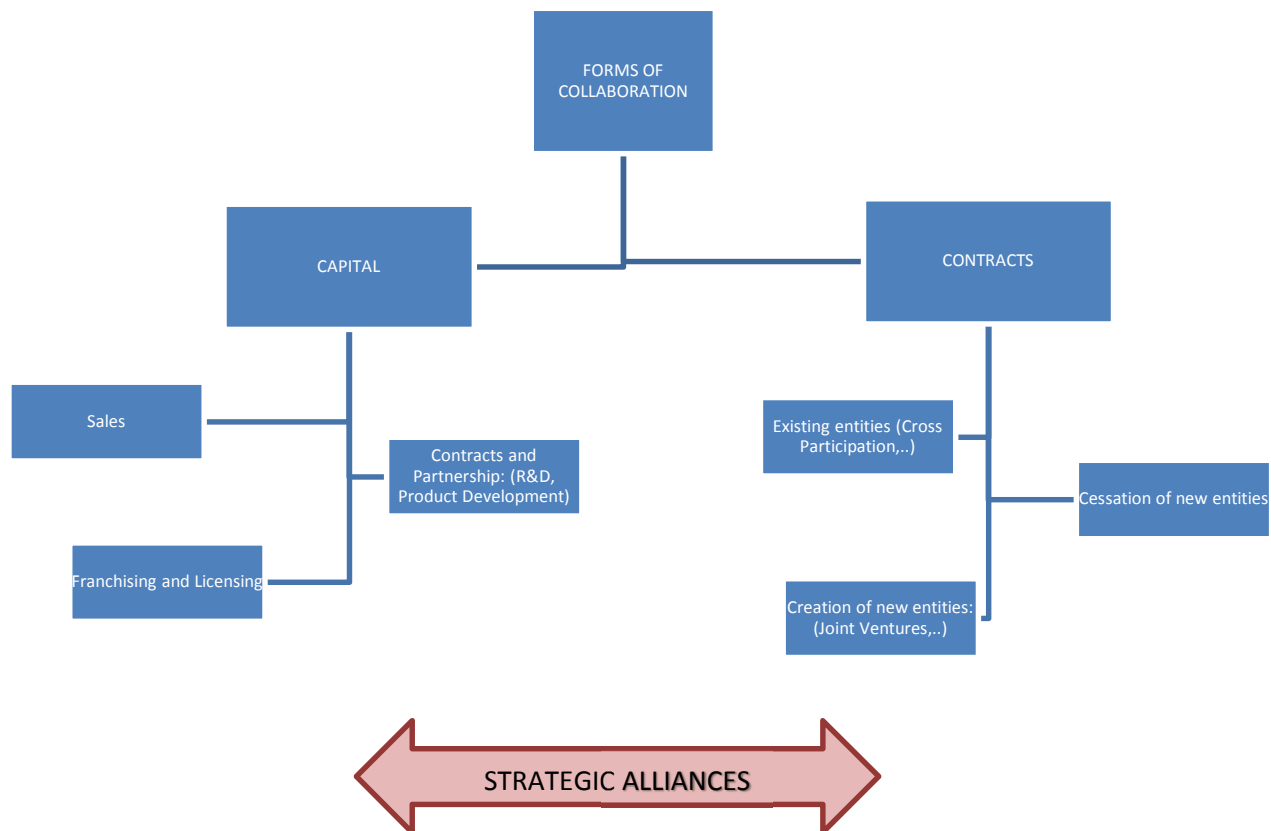


Figure 10 : Adapted from Mockler (1999)

Along the work, the author found some inconsistencies between the concept and definition of strategic alliances and joint ventures. Meanwhile some researchers determine the concept of joint venture as a subset of strategic alliance, others consider that are different concepts. Onwards, the author contemplates joint venture as a kind of strategic alliance.

The limitation and the scope of strategic alliance conception proposed by the author is supported by many other authors. Throughout the literature gathered, several researchers and authors use the following terms synonymously with *Inter-Firm Collaborations* : business alliances, strategic alliances, strategic partnerships, strategic networks, inter-firm cooperation, collaborative joint ventures, partnerships, inter-organizational linkages, collaborative agreements, quasi-integration strategies,



cooperative strategies and corporate strategies, to list a few (Gulati and Singh, 1998; Varadarajan and Cunningham, 1995; Dyer, 2004; Todeva and Kocke, 2005).

Considering the domain of *strategic alliance*, and supported by the previous graphic regarding different forms of collaboration, it could be structured as :

- A distinct *corporate entity* to which the alliance partners commit agreed upon skills and resources and in which each of the alliance partners hold an equity position, like joint ventures (Varadarajan and Cunningham, 1995).
- A distinct *inter-organizational entity* to which the alliance partners commit agreed upon skills and resources, like joint production or joint development center. (Varadarajan and Cunningham, 1995).

Vyas, Shelburn and Rogers (1995) considered the dimensions of the alliance depending on different parameters : intra-industry or inter-industry , domestic or international or along the supply chain (with the supplier or customer) or non-supplier. This classification can be observed in the next graphic.

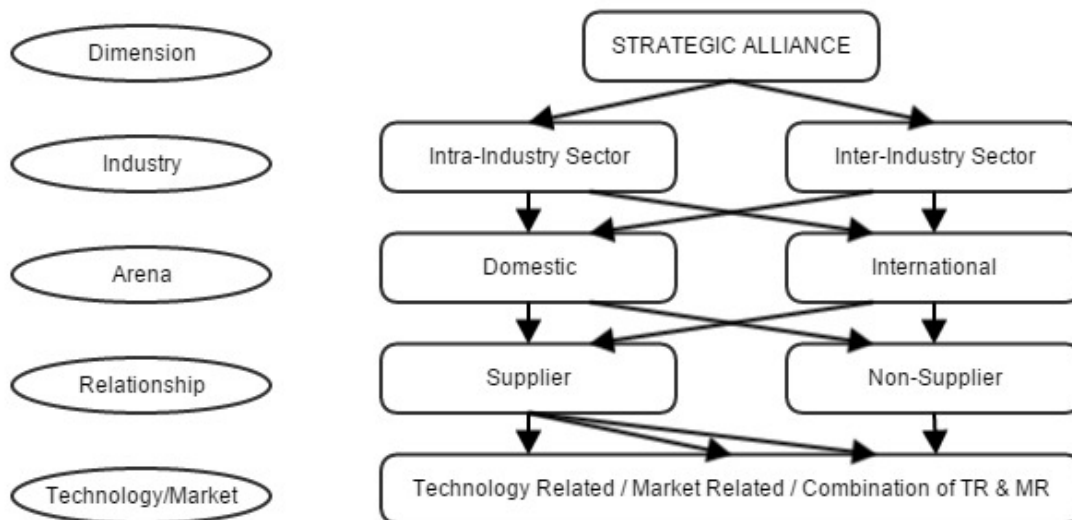


Figure 11 : Adapted from Vyas, Shelburn and Rogers (1995)

Elmuti and Kathawala (2001) stated in their research another possible classification of the different kind of alliances, developed by Technology Associates and Alliances (1999), which divided the types of alliances focusing the area of the linkage:

- Marketing and sales alliances (Joint Marketing Agreements, Value Added resellers)
- Product and Manufacturing Alliances (Procurement- Supplier alliances, Joint Manufacturing)

- Technology and know-how alliances (Technology development , University /Industry joint research).

In order to synthesize, and after the analysis of the different and wide range of possible inter-firm relationships between business, the author considered supported the fact that the definition more accurate to the intended topic is “Strategic Alliance”. In order to give an extended comprehension of the limits and boundaries of the term, the author provides a brief outlook of the definition given by many authors about the current concept.

Dussauge and Garrette , 1995	An alliance is a cooperative agreement or association between two or more independent enterprises, which will manage one specific project, with determined duration, for which they will be together in order to improve their competences. It is constituted to allow its partners to pool resources and coordinate efforts in order to achieve results that neither could obtain by acting alone.
Yoshino and Rangan , 1995	A strategic alliance is a partnership between two or more firms that unite to pursue a set of agreed upon goals but remain independent subsequent to the formation of the alliance to contribute and to share benefits on a continuing basis in one or more key strategic areas, e.g. technology, products.
Douma , 1997	An strategic alliance is a contractual, temporary relationship between companies remaining independent, aimed at reducing the uncertainty around the realization of the partners’ strategic objectives by means of coordinating or jointly executing one or several of the companies’ activities. Each of the partners are able to exert considerable influence upon the management or policy of the agreement.
Gulati , 1998	Strategic alliances are voluntary arrangements between firms involving exchange, sharing or co-development of products, technologies or services.
Phan, 2000	Alliances are long-term, trust-based relationships that entail highly relationship-specific investments in ventures that cannot be fully specified in advance of their execution.

Table 6 : Different definitions of *Strategic Alliance*

It can be summarized the main features and characteristics of strategic alliances are the following:

1. Two or more organizations make an agreement to achieve objectives of a common interest, while remaining independent with respect to the alliance.
2. The partners share both the advantages and control of the management of the alliance for its entire duration.

3. The partners contribute, using their own resources and capabilities, to the development of one or more areas of the alliance (important for them), such as technology, marketing, production, R&D, or other areas.

### 3.5.3 Reasons or motives for alliances or collaboration agreements

Alliances are developed and propagated as formalized inter-organizational relationships particularly among companies in international business systems. These cooperative arrangements seek to achieve organizational objectives better than collaboration than competition, but alliances also generate problems at several levels of analysis (Isoraite,2009).This manifestation of inter-organizational cooperative strategies entails the pooling of specific resources and skills by the cooperating organizations in order to achieve common goals, as well as goals specific to the individual partners (Varadarajan and Cunningham, 1995).

Companies in most industries use strategic partnerships because of its potential benefits. A company could form strategic partnerships due to many reasons: to increase its competitive advantage in domestic and international markets, to help defend itself against competitor challenges, to reduce uncertainties or to achieve some particular strategic goals (such as reaching economies of scale, new distribution channels or increased market share). Moreover, partnerships help a company overcome the slower and more costly process of building capabilities internally (Webster, 1999; Todeva and Kocke, 2005; Miltenburg, 2005; Büyüközkan and Arsenyan, 2012; Mazzola and Perrone, 2013).

Elmuti and Kathawala (2001) summarized the motives of partnership between companies as a key factor to success in :

- Growth strategies and entering new markets
- Obtain new technology, best quality or cheapest cost
- Reduce financial risk and share costs of research and development
- Achieve or ensure competitive advantage.

Alliances are not easy. Companies must select a partner who shares the company's view of the alliance's purpose. The level of cooperation between businesses is influenced by many factors such as the history of the partnering firms' relationships, the current market positions of each firm, their joint resource capabilities and information asymmetries (Dietrich, 1994).For a smooth performance, it requires a great amount of meetings among the numerous workers or managers involved over the long term. They also require a trustful flow of shared information between the companies implicated. But potential benefits could never be materialized if these tasks are executed poorly. Miltenburg(2005).

Although we have seen the crucial importance of partnership between companies, Miltenburg (2005) contributes with an important clarification: "An alliance is an option for extending competitive advantage, not a means for sustaining it. Companies must not let alliances distract them from this important task of developing their internal sources of competitive advantage".

In the next figure, Vyas, Shelburn and Rogers (1995) offered a valuable framework about the selection of strategic partners, considering the type of industry and diversifying if the alliance is market or technology related.

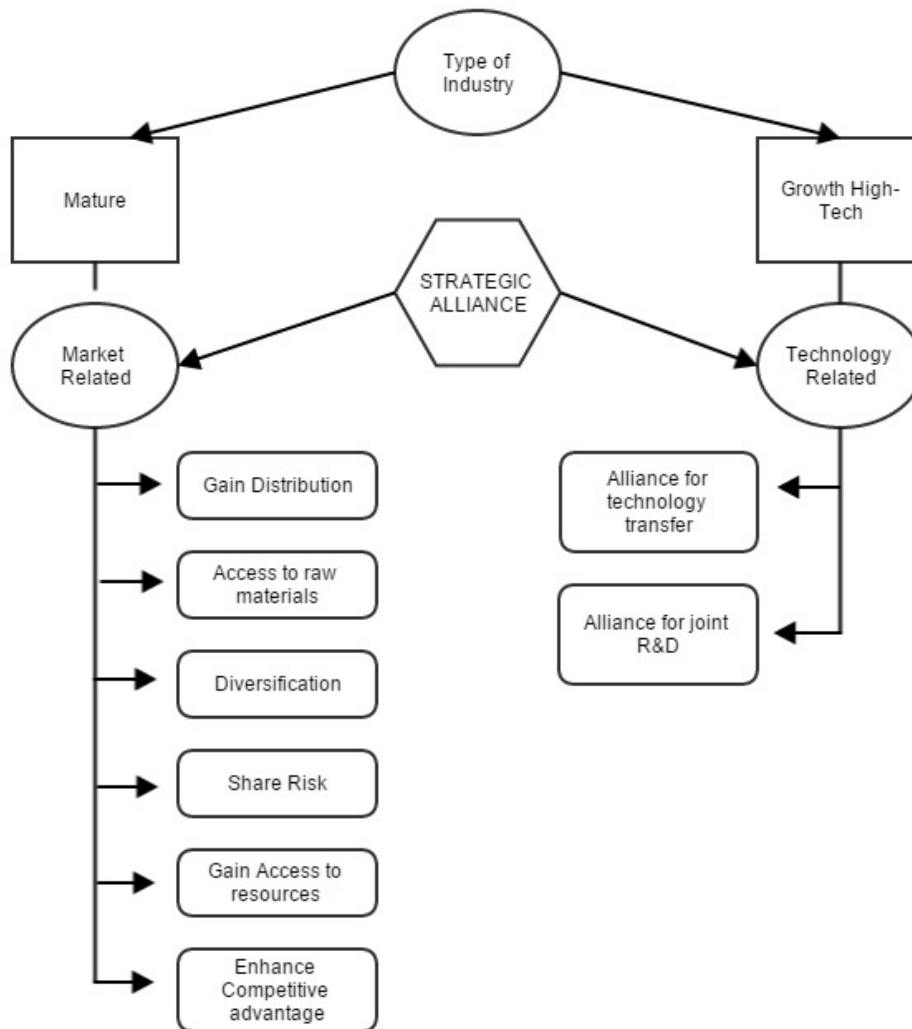


Figure 12: Adapted from Vyas, Shelburn and Rogers (1995)

An meaningful and brief recapitulation of the main reasons or motives to establish strategic alliances was proposed by Bleeke and Ernst (1993), who summarize the generic needs of firms seeking alliance as *cash, scale, skills, access, or their combinations*.

### 3.5.4 Directions of Collaboration linkages

Different inter-organizational cooperative relationships can exist between firms, both of whose primary economic commitment is to the same set of value chain activities, or between two firms whose primary economic commitments are to adjacent stages of the value chain. The former is

illustrative of a horizontal inter-organizational collaborative relationship and the latter of a vertical inter-organizational collaborative relationship (Varadarajan and Cunningham, 1995). It exists another consideration of alliance, diagonal relationships, which are formed among partners from different industries, used by firms that seek to create and exploit new interdisciplinary markets by achieving synergies (Spekman et.al., 1998; Dagnino and Padula, 2002).

The next figure refers to the *Scheme of Horizontal Collaboration*, which determines any type of linkage or collaborative agreement between two firms at the same level in the supply chain, within the same industry. For instance, Ford and Mazda’s Joint venture.

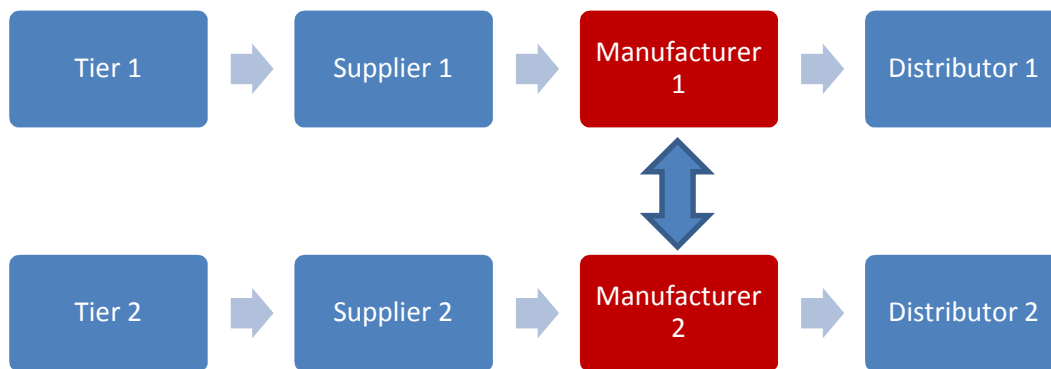


Figure 13 : Horizontal Partnership Scheme

The next figure refers to *Scheme of Vertical Partnership*, which indicates a cooperation agreement with another agent of the supply chain, within the same industry, usually direct customers or suppliers/distributors (Spekman et.al., 1998). For instance, Ford Motor Co. with its auto parts suppliers. As it is determined before, if this linkage exists at different levels in different industries, it receives the term *Diagonal Collaboration* (Dagnino and Padula, 2002).

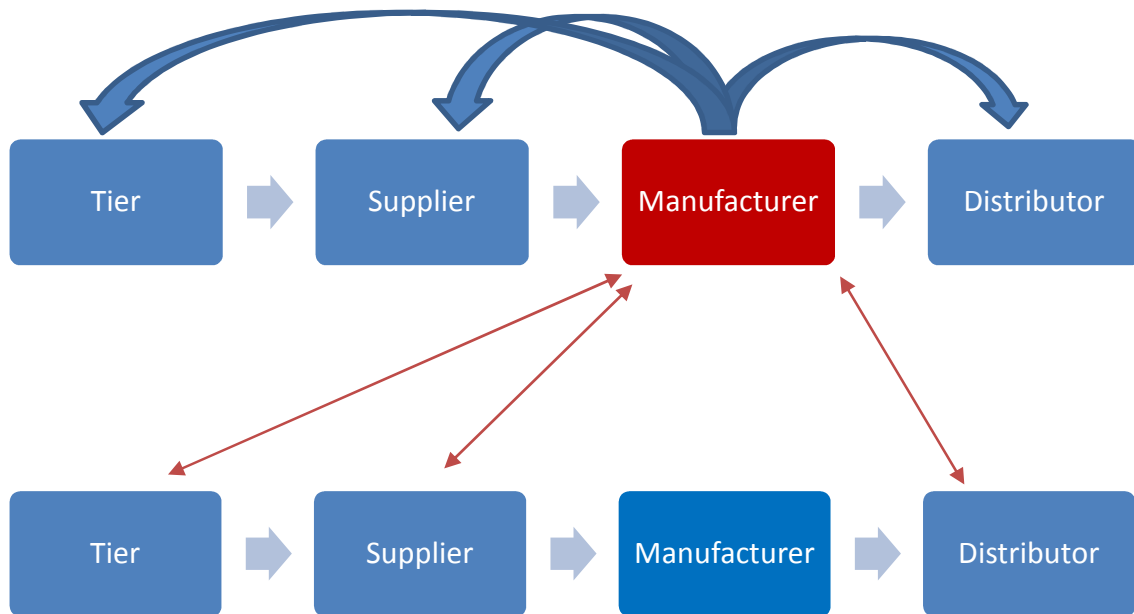


Figure 14: Vertical and Diagonal Partnership scheme

Related with Diagonal collaborations, complementary firms coming from different industries may not be completely aligned in the choice of the courses of action in the ongoing relationship. This may be related to the fact that, since the value of a resource depends on the way in which a resource is combined to other resources (Penrose, 1959), it follows that a different resource endowment brought by firms coming from different industries may result in an incomplete alignment as concerns the alliance's most convenient course of action (Dagnino and Padula, 2002).

Another division or classification of organizational relationships in line with the previous literature, provided by (Varadarajan and Cunningham, 1995) :

- Buyer partnerships with intermediate customers and/or ultimate customers.
- Supplier partnerships with good suppliers or service suppliers.
- Lateral partnerships with competitors, non-profit organizations and/or government
- Or Internal partnerships among the various business units.

About Diagonal collaborations, Dagnino and Padula (2002) defined them as *macro level*, while knowledge value is added by intense communication and information flows and inter-industry new knowledge creation and transfer, which in turn allow to join more knowledge stock, economic value is achieved through reduced aggressive and suboptimal rent-seeking and profit and fund sharing arrangements.

Concerning collaborations within the same industry, *meso level* Dagnino and Padula (2002), whereas knowledge value is attained through intra-industry new knowledge creation and transfer, deep communication and information flows and product co-design and co-development, economic benefit is accomplished through increased R&D investment and workforce training investment, joint

R&D and production, faster agreement on standards and reduced time-to-market for products (Dagnino and Padula, 2002).

	<i>Coopeting</i> Actors	Knowledge Value	Economic Value
Diagonal partnerships	Clusters of Firms	Communication and Information Flows	Reduced Aggressive and Suboptimal Rent-Seeking
	Firms Across Industries	Inter-Industry New Knowledge Creation and Transfer	Profit and Fund Sharing Arrangements
Horizontal collaborations	Firms in an Industry (Horizontal Relations)	Intra-Industry New Knowledge Creation and Transfer	R&D Investment Workforce Training Investment Quicker Agreement on Standards
Vertical collaboration	Purchasers and Suppliers (Vertical Relations)	Communication and Information Flows Co-Design Co-Development	Reduced Time-to-Market Joint R&D Joint Production

Table 7 : Adapted from Kenworthy (1995)

### 3.5.5 Number of Partners involved

Regarding the typology of inter-firm collaboration agreement, it can be distinguished two basic forms: i.e., dyadic and network collaboration.

- *Dyadic* refers to firm dyads or simple two-firm relationships: Collaboration relationships between the two firms along one single level of the value chain or the same level of value chain.
- *Network* cooperation concerns a structure of complex collaborative relationships among more than two firms (or multiple) at the same time along the supply chain or among competitors.

The next model is proposed to summarize the main elements involved in collaboration agreements, synthesizing the most important features that affects or could affect the manufacturing strategy of firms:





## 5. STUDY CASE : The U.S. Automobile Manufacturing Industry, the case of General Motors Co.

According to the model proposed in the previous chapter, the author suggests a study of the one of the main car-makers in the United States of America, General Motors, involved in the group often called as the *Big 3*, with Ford Co. and Chrysler.

The author considers relevant to include this study case due to the high grade of manufacturing activity of these industry, the active collaboration profile of the participant, global requirements and features of the industry, with rapid changes and endowed with a high technological importance, resulting adequate for the present study.

Consequently, it is provided a brief insight of the Industry, market forces and production trends, competitiveness and product strategy.

This study case is based on the report on the U.S. automobile manufacturing industry, which is mainly concentrated on the Big 3 firms (Chrysler, Ford, and General Motors) and discusses the condition of the industry, product and production strategies, the importance of the supply chain, distribution and retailing, supplementing the importance of strategic partners along the supply chain and with competitors. New challenges are clear as the global market, technology, and industry structure continue to evolve.

According to the topic of the project, especially important could result chapter related with the *Joint venture undertaken by Toyota and GM* in 1983, which is thoroughly explained in this section.

### 5.1 The Automotive Industry Today: A Global Endeavor

The U.S. automobile manufacturing industry has gone through difficult times in the past 20 years. It continues to experience dynamic change, although sometimes was featured as “mature”. If auto manufacturers want to succeed, they must manage large and complex supply chains, spanning many geographic regions, and pursue opportunities in diverse national markets.

While national policies play an important role in shaping the environment for local manufacturing operations and resulting products, cost competition increasingly drives the industry towards global product offerings.

The report studied explores several important dimensions of the forces of change facing the industry and reviews the responses of the Big 3 manufacturers (Chrysler, Ford, and General Motors) to those forces.

*“Automotive industry is often considered around the world as “the industry of industries,” due not only to its huge size in the economy of nations, but also to the high-dimensional complexity it exhibits. On so many dimensions—product complexity in design and manufacture, number of product attributes important to customers, process technology variety, supply chain size and complexity, rate*

*of globalization, intensity of government involvement, complexity of labor relations, and impact on the landscape of human lives— the automobile industry presents a scope of management challenges whose complexity dwarfs that of most other industries”.*

## 5.2 Forces of Change in the U.S. Market

The range of motor vehicles is expanding and the market is no longer dominated by a handful of very high volume cars. American manufacturers’ competitive disadvantage in model mix complexity creates a barrier to their ability to compete in product diversity. The principal factors that influence customers are performance, suitability to personal needs, and family lifestyle, safety, comfort and appearance.

Important changes are under way in the U.S. market, both in the type of vehicles preferred by consumers and in the system that delivers those vehicles to consumers. Equally important, foreign firms, like Japanese and German, are opening new assembly plants in the United States, and foreign suppliers of parts and components are building a domestic presence, increasing competition into the supply automotive parts. In automotive development and manufacturing, geography plays a major role.

In response to shifting consumer preferences, the variety of products supplied by the automotive industry has increased dramatically.

*“Diverse research suggested that management of automotive supply chains was improved by the development of close relationships among auto manufacturers and suppliers who develop and produce components and subsystems. Recent events suggest a number of key issues in the management of these relationships. The nature of the relationship may vary with the supplier’s degree of involvement in the development of parts for the manufacturer.”*

## 5.3 Competitiveness And Product Strategy

One of the most critical issues for the automotive industry today is competitiveness in cost, quality, and product offerings. Companies cannot survive in today’s market if they neglect any of these areas.

The automobile is one of the most complex consumer products in existence. The automotive manufacturing process serves as the “moment of truth” for the entire design, development, supply chain, and manufacturing process. Thus, automotive companies focus a great of attention on understanding and improving the manufacturing process.

The manufacturing segment of the business has become increasingly competitive. No firm can relax its efforts for continual and significant improvement. Related with the area of Product Development, automakers continually face the challenge to create “best in class” vehicles and maintain a corporate reputation for performance and value. To achieve this objective, they must be adept at managing

the development process, including involving suppliers as design partners. Product development includes understanding customer needs and desires; translating those needs into “key characteristics”; developing the concepts, systems, components, and tools to deliver those key characteristics; and designing the immense logistical systems required to deliver vehicles in quantity at competitive cost and quality

Concerning the development of products, four patterns or strategies of vehicle development management practice are used currently : functional management; single-car project management; multi-project management; and multi-firm, multi-project management.

Developing a robust product development infrastructure involves a number of initiatives: eliminating duplication in product development assets through reorganization, globalization, and alliances; developing platform and component set strategies across a portfolio of vehicle projects; defining critical areas of firm expertise and focus; creating strategic links to technology suppliers; and improving the way “lessons learned” are fed back into an interdisciplinary organization focused on new product development.

Customer demand for high levels of product quality, safety, reliability, and sophistication, even in the most economical vehicle classes, poses a major challenge, particularly in an information climate that rapidly disseminates reports on good and bad product attributes.

## 5.4 Technology in the U.S. Automotive Industry

As it is previously indicated, the automobile is a highly engineered, with sophisticated products that meets reliability, durability and social requirements. Its design, manufacture, and operation call more and more for cutting-edge technology.

The Big 3, Ford, Chrysler and GM, have a long history of aggressively pursuing research and development (R&D) to compete, in order to meet the changing needs of the consumer and federal requirements. The diverse ways in which the companies meet these technology needs reflect their diverse corporate competitive strategies. However, understanding the key importance of R&D and managing the high risks and costs associated, they agreed built a collaboration agreement, combined with other public and private enterprises. This alliance receives the name of *Cooperative Research and the Partnership for a New Generation of Vehicles*.

Complementing their individual efforts, the Big 3 automakers have also placed increasing emphasis on research collaborations with one another. For instance, in 1992, Chrysler, Ford, and GM created the United States Council for Automotive Research (USCAR) to facilitate, monitor, and promote precompetitive cooperative research. Through this cooperative effort, resources are coordinated more effectively to conduct research and evaluate alternative technologies to improve the automobile.

Besides working with each other to research and develop technologies for the next generation of vehicles, the Big 3 automakers are working with the federal government in a cooperative, precompetitive research effort called the Partnership for a New Generation of Vehicles (PNGV). Combining the technology resources of seven federal agencies, twenty government laboratories, and USCAR, this historic public/private partnership aims to strengthen U.S. global competitiveness,

preserve American jobs, reduce our country's dependence on foreign oil, and improve the environment.

At an early stage of the partnership, the participants recognized the importance of involving the traditional base of automotive suppliers as well as some nontraditional sources of supply. Since that time, a special effort has been devoted to understanding the supplier community, recognizing its importance as a source of technical innovation, and finding means for its effective interaction with PNGV. Currently, more than 400 automotive suppliers and universities have joined in PNGV research.

## 5.5 Supply Chain

One of the features of 1980s, lean production, is a relatively long-term relationship between assembler and supplier, characterized by a rich flow of information between the two. These partnership relationships tend to continue indefinitely or carry the implicit promise of renewal at the end of a specified contract.

When supplier responsibility for product development and investment is not an issue, the arm's-length relationship is often sufficient and partnership relations would be superfluous. Furthermore, while Japanese-style partnerships have economic benefits, they are costly to set up and maintain and may reduce a customer's ability to switch away from inefficient suppliers. But when the supplier's responsibility includes involvement in the development of new or altered parts, Japanese-style partnerships become increasingly advantageous to both parties and tend to result in superior performance all around.

Partnering firms (1) share more information and are better at coordinating interdependent tasks; (2) invest in relation-specific site, human, and physical assets that lower inventories, improve quality, and speed product development; and (3) rely on trust to govern the relationship, which is a highly efficient governance mechanism that minimizes transaction costs for both parties. Assembler-supplier partnerships are important vehicles for speeding product development, sharing risks and resources, and accessing technology and knowledge.

## 5.6 General Motors Corporation Strategy

GM's strategy is diverse and multiple, maintaining a coherent product portfolio, Customer needs' research, a standardized four-phase development process, strategic links between its North American and international operations and organizational revitalization.

GM's Platform rationalization is under way to support each brand's mission and achieve greater commonality of platforms and components. GM is aiming at unique variations on flexible engineering themes rather than a proliferation of unique systems. GM is making an increased effort to understand and foresee customer needs, through Needs Segmentation market research.

GM's structure is a matrix organization, with a Vehicle Launch Center and Centers of Expertise. GM's five North American Operations Technical Centers for design, engineering, manufacturing, research and development, and quality hold Centers of Expertise and support the Vehicle Launch Center with central staff experts and personnel loaned to platform teams.

### 5.5.1 Joint Venture between Toyota and General Motors : NUMMI case

Following the topic of the study case, the author considered valuable to include an example with more detail, the NUMMI case, a Joint Venture undertaken by carmakers General Motors (USA) and Toyota (Japan). The information contained is based on a report/exercise included in the reference list.

In 1983, General Motors (GM) and Toyota entered into an alliance that resulted in the creation of the New United Motor Manufacturing Incorporated, NUMMI, a new company to be equally owned by the two parents and with equal representation on the board of directors.

Apart from cash contribution from both sides, GM contributed also with its plant in Fremont, California, which had been idle before due to low productivity, poor quality and high absenteeism.

Toyota had intentions of being in the North American market for the long term, in lines with their global strategy. The company hoped that an alliance with GM would help it learn how to work with U.S. suppliers and market, helping them to understand the complexity of logistics in the vast country, and achieve its global strategy of a manufacturing presence in the United States.

On the other side, GM had two main objectives for its alliance with Toyota. One was to gain quick access to a world-class small car, a gap in GM's product line that could be filled by Toyota's strengths in this area. The other was to utilize an idle plant. Moreover, the alliance would also allow GM to learn about Toyota's famous production system (TPS). This system was credited with having achieved very low inventory levels and high efficiency.

Under the terms of the collaboration agreement, Toyota appointed NUMMI's top officers, including the CEO and president. GM assigned up to 16 executives three-year assignments on a rotating basis. NUMMI would be a stamping and assembly operation, and components would be supplied both from Japan (by Toyota) and other suppliers in the United States.

In managing NUMMI, Toyota followed many of its established practices. Initially many workers were sent to Japan for training. It carefully selected employees, trained workers for more than one job, and delegated decision making to small worker teams. Executive dining rooms were given up for a common cafeteria, managers wore the same uniforms as the workers, and there were no reserved parking spaces for executives.

The plant maintained high quality and productivity standards. Under Toyota's management, the production rate increased remarkably with approximately one third of the previous workforce, dropping absenteeism from 22% to 2%, enabling the plant to be ranked as one of the best auto plants on initial quality in 2002.

NUMMI employed about 5,400 workers and could manufacture up to 400,000 cars. There were plans to invest in additional production lines. The Pontiac (from GM) model *Vibe* (identical to the Toyota *Matrix*) was developed jointly with GM providing the styling and Toyota undertaking the design and engineering. Although NUMMI produces cars for both GM and Toyota, marketing is the responsibility of the respective parent.

Slowly, the Toyota Production System began to be implemented successfully in several GM plants around the world. GM executives attributed the increase in quality of their cars to the learning from Toyota. Three GM plants were ranked among the best in quality in North America and tied with the NUMMI plant. GM also learned how to build small cars properly and build flexibility in duties among line workers. The working relationship also gave GM an insight into Toyota's organization and operating systems. However, aspects of Toyota's proprietary engineering and manufacturing processes that were outside the partnership were not accessible to GM.

Toyota moved fast in its expansion in North America. Within a year of commencing operations at NUMMI, Toyota began planning its first assembly plant, which was established in Kentucky. The company learned how to deal with local suppliers and sourced from over 500 suppliers in North America. By 2008, Toyota had eight manufacturing/assembly plants in North America, and produced about two-thirds of the vehicles it sold there.

Alumni of NUMMI went on to head important positions in both companies. When Toyota needed a manager with experience in pickup truck production for its Tundra pickup plant, it hired Mr. Norm Bafunno, a GM production manager who had spent time at NUMMI. Toyota was looking to break into the pickup market dominated by the three U.S. automakers.

Despite these collaborations, GM and Toyota exhibited normal competitive behavior. GM's share of the U.S. market fell from 44.6% in 1980 to 28.4% in 2002, while Toyota's share grew from 6.4% to 10.4% over the same period. By 2007, Toyota's share was 16%; GM's was 24%. GM was beset not only by falling market share, but also shrinking profitability due to its high cost of operations.

Toyota had set a goal of reaching a 15% global market share by 2010 (up from about 12% in 2005). Thus, Toyota spread its vehicle, engine, and parts factories through eight states in the U.S., sprinkling manufacturing jobs and building a network of favorably inclined state and federal politicians. Toyota indicated that they would share technology with U.S. car makers and even raise prices to give them "breathing room."

Toyota's production system, also called "*lean manufacturing*," was more than *kanban* (where parts arrive just in time for manufacture) and a method in which productivity and quality were maintained at high levels. It was a broad system that engaged its participants in their work, combining management, participation, incentives, and technology to optimize productivity, motivation, and the development of people at work.

Toyota's new manufacturing technology, called "simple and slim," was installed in its San Antonio plant. The technology used smaller, lighter machinery, and reduced plant size by one-third of a comparable GM plant. Toyota also developed a shorter assembly line in Japan that could churn out different cars simultaneously on the same line every 50 seconds. It has not yet been introduced in the U.S.

## 5.6.2 Strategic Alliance General Motors and PSA Peugeot Citroën

In this case, the author provides an example of an strategic alliance with a competitor PSA Peugeot Citroën, in several areas and diverse geographic locations. PSA Peugeot Citroën and General Motors announced in 2012 the creation of a *Global Strategic Alliance*, which was built around two main pillars:

1. Sharing of vehicle platforms
2. The creation of a global purchasing joint venture.

Later that year, both companies, PSA Peugeot Citroën and General Motors, announced further developments. Definitive agreements on purchasing, logistics and joint vehicle development have been signed in line with the original schedule.

### *A logistics cooperation agreement*

The logistics agreement signed between General Motors and PSA Peugeot Citroën in 2012 is aimed at enhancing operational efficiency and reducing costs. In one of the largest agreements ever signed in the automotive logistics sector in Europe,

### *Shared purchasing organization up and running*

Also in 2012, the partners signed a final agreement to create a joint venture to pool their purchasing in Europe. This new organization, operational since February 2013, leverages the combined global purchasing power of the two groups to unlock synergies for both players.

### *3 shared projects*

In 2013, the two partners confirm continued cooperation for two products based on PSA platforms in B-MPV and C-CUV segments. The B-MPVs from both companies will be built in the GM Spain plant in Zaragoza and the future C-CUVs in the PSA Peugeot Citroën plant in Sochaux, France.

Additionally, the partners will collaborate on new generation products in the light commercial vehicle B-segment, which are based on a PSA Peugeot Citroën new generation platform. A balanced division of roles and responsibilities will allow each partner to derive the greatest benefit from this collaboration. The first jointly developed vehicles will be launched in 2016.

## 5.6.3 Importance of Information Technologies in GM's strategic partnerships

The grade of complexity of GM's global operations needs a carefully constructed series of contractual relationships with a range of IT suppliers in order that the firm can work to its strategic objectives.

Historically, the company has operated using different enterprise resource planning (ERP) systems throughout the world; however its long-term ambition is to use a single system which encompasses the entire corporate network infrastructure and partners. *GM hopes to reduce the number of ERP systems in operation from 70 to below 6, with a single ERP system allocated to GM Finance, GM product development and few more* . (Bartholemew, 2007).

Through a series of cleverly contracts to IT suppliers (such as HP or Cap Gemini) the firm has established a collaborative alliance, which will offer innovative solutions which will ultimately lead to GM delivering on its long-term strategic ambition of “creating an infrastructure supporting global vehicle development and production”.

GM has proven adept at instilling in its worldwide workforce a culture which encourages active collaboration with companies such as Cap Gemini who hold responsibility for “enterprise wide application integration management for strategic planning and architecture, as well as application integration management for purchasing and supply chain, sales, service and marketing” (Bartholemew, 2007).

Not all of GM’s strategic partnerships have resulted in success; notably its global alliance strategy with other automakers in both Europe and Asia.

The argument has been made that GM came to the financially costly realization that GMS-related efficiencies were simply impractical within the wider context of ad-hoc alliances which lacked fully-fledged structural integration of all operational activities between alliance partners (Guilford, 2006).

However, as previously shown, GM’s alliance with Toyota has proven to be an on-going success story, and this is primarily down to the fact that GM have demonstrated an ability to fully utilize its Information System capabilities in support of knowledge management sharing throughout the organization.



## 5. DISCUSSION

Initially, the very first intention of the author was to obtain a *short and synthetized* pattern of key decisions involved within manufacturing strategy depending each collaboration context. However, while the project progressed, the author realized the wide range of different decisions that could take place in one situation or another.

Hence, the main objective of the present project turned to study and analyze the manufacturing strategy in context of collaboration between companies. After the inclusion and study of the main theories considered by the author, it was presented a detailed study of the concept of manufacturing strategy, its elements and parts involved, and how the different configurations of business strategies affects in a direct way the kind of decisions undertaken, supported by a research study done by previous authors.

The current project is followed by an analysis of the different kind of collaboration agreements that enterprises could carry out, determining its main features and the relationships with strategic levels of a firm. In order to obtain a wider point of view of these situations, the author proposed a study case to analyze empirical situations that could give us a real example of the topic, and a model presenting the different elements which interfere and affect directly the different strategic decisions in manufacturing field of firms, based on previous models, and serves the purposes to answer some of the research questions proposed.

### Research Questions formulated

1. Which strategic manufacturing decisions are involved in collaborations between firms?
2. How are these strategic decisions within manufacturing undertaken related within their business strategy?
3. Why are these strategic manufacturing decisions undertaken related with the nature of the collaboration agreement ?

#### 1. ***Which strategic manufacturing decisions are involved in collaborations between firms?***

Being supported by the framework developed by the author, it can be appreciated the extension and variety of elements that affects the strategic field of manufacturing within a firm. Neglecting collaboration agreements related with other functional areas, such as marketing or finance, the concept of *strategic alliance* falls directly in the concept of the *sharing and pooling together strategic resources or skills*. The next scheme is quite valuable to explain this concept, based on the literature of Varadarajan and Cunningham (1995), and give us a summary of the first research question formulated.

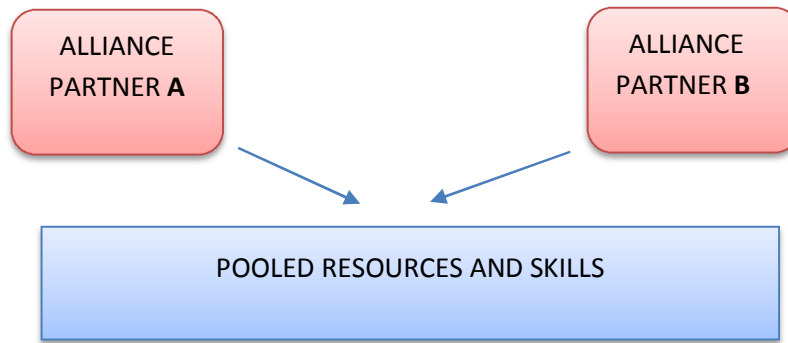


Figure 15 : Scheme Strategic Alliance Partners

Manufacturing resources :

- Location of facilities
- Size, Scale economies , Scope economies : Capacity
- Newness of plant and/or Equipment
- Information technology and systems

Related Resources:

- Relationship with suppliers, Product line, Knowledge of product-market

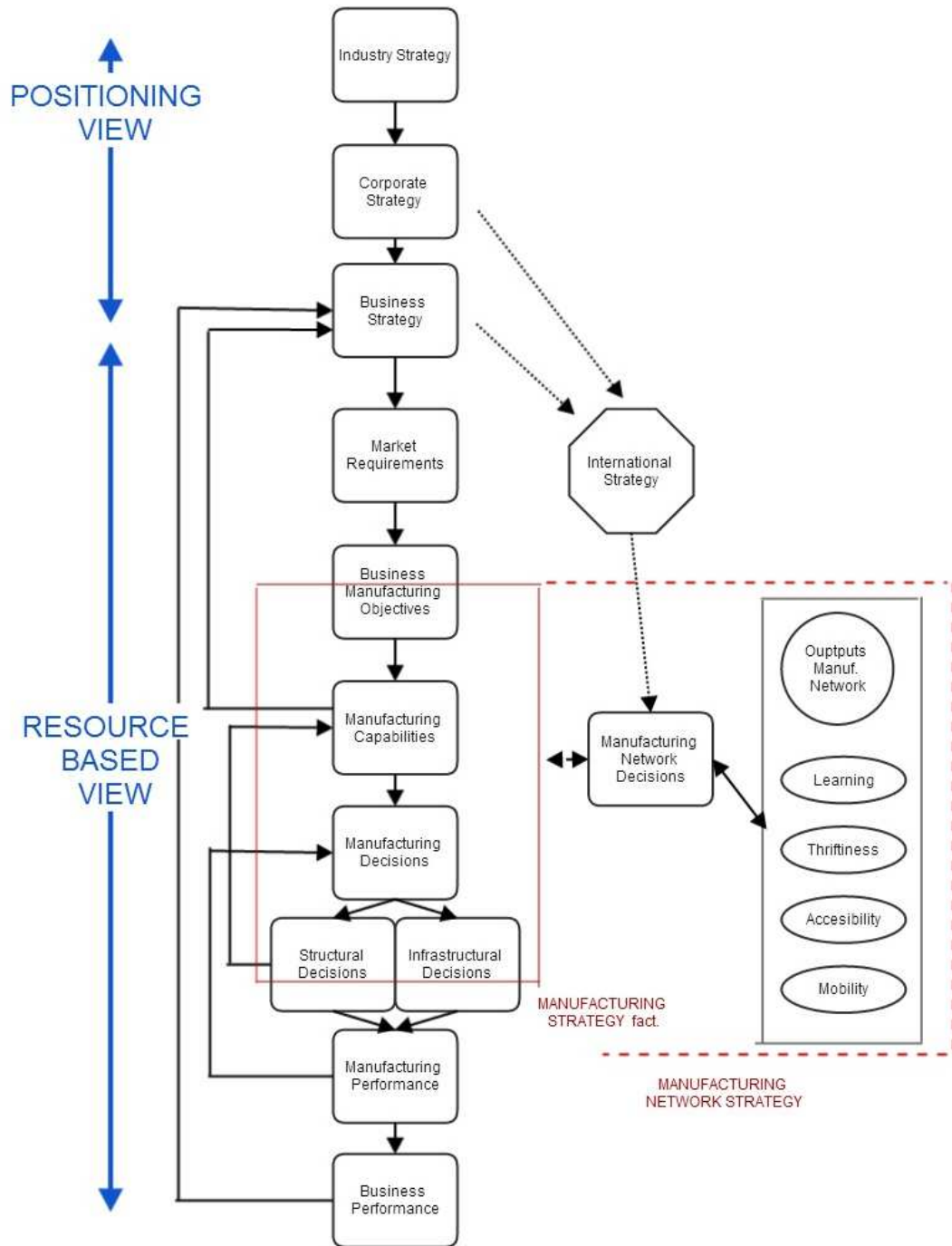
Manufacturing Skills

- Low Cost manufacturing skills
- Flexible manufacturing
- R&D Skills
- Product Development
- Planning and Implementation related skills
- Organizational expertise, producer learning and expertise effects.

**2. How are these strategic decisions within manufacturing undertaken related within their business strategy?**

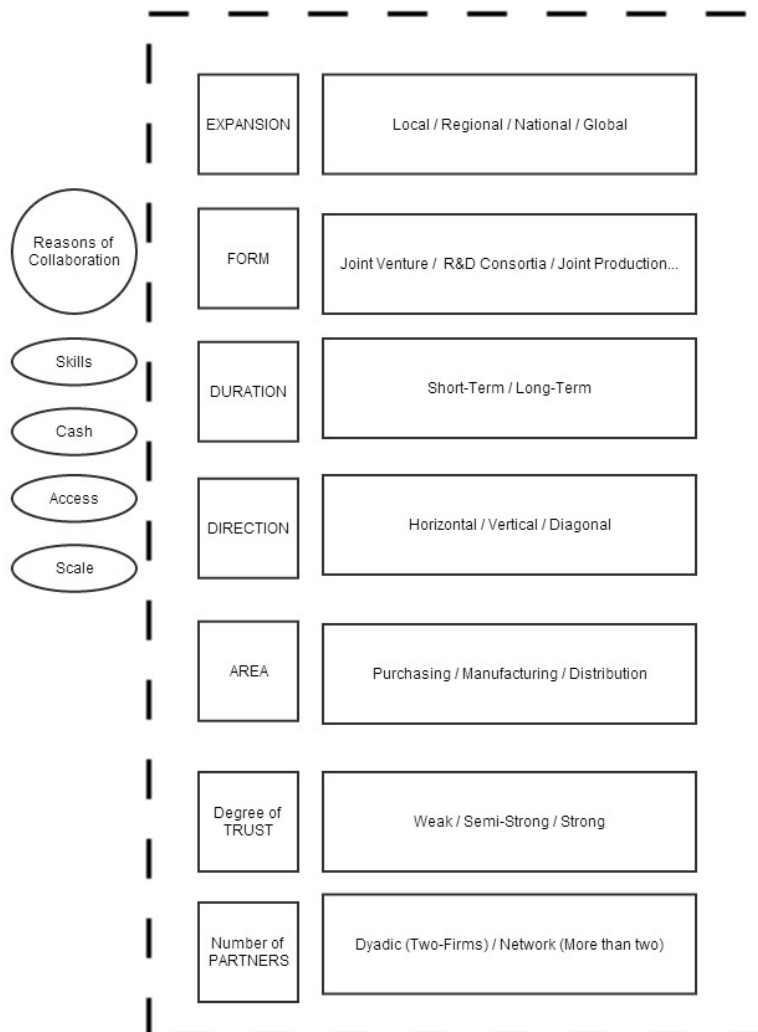
The reasons or motives to undertake a collaborative strategy and create cooperative agreements go together and aligned with the business strategy of each company. For instance, if a company follows a *cost differentiation strategy*, they will take choices in order to maintain that competitive priority, and deploy the resources to achieve that objective. They can carry out many different alternatives, and consequently, the manufacturing decisions involved will vary drastically. They could establish a long-term agreement with a local company in Asia to obtain low-labor costs, an alliance with a competitor to acquire Low-Cost manufacturing skills or maybe an strategic alliance with its suppliers to acquire economies of scale, achieving raw materials with lower costs or less time to market. Hence, each of these cooperative strategies will involve extremely diverse decisions within manufacturing strategy of the company.

In order to facilitate and , the author proposed the next model to study and analyze the , giving the answer to the second research question proposed.



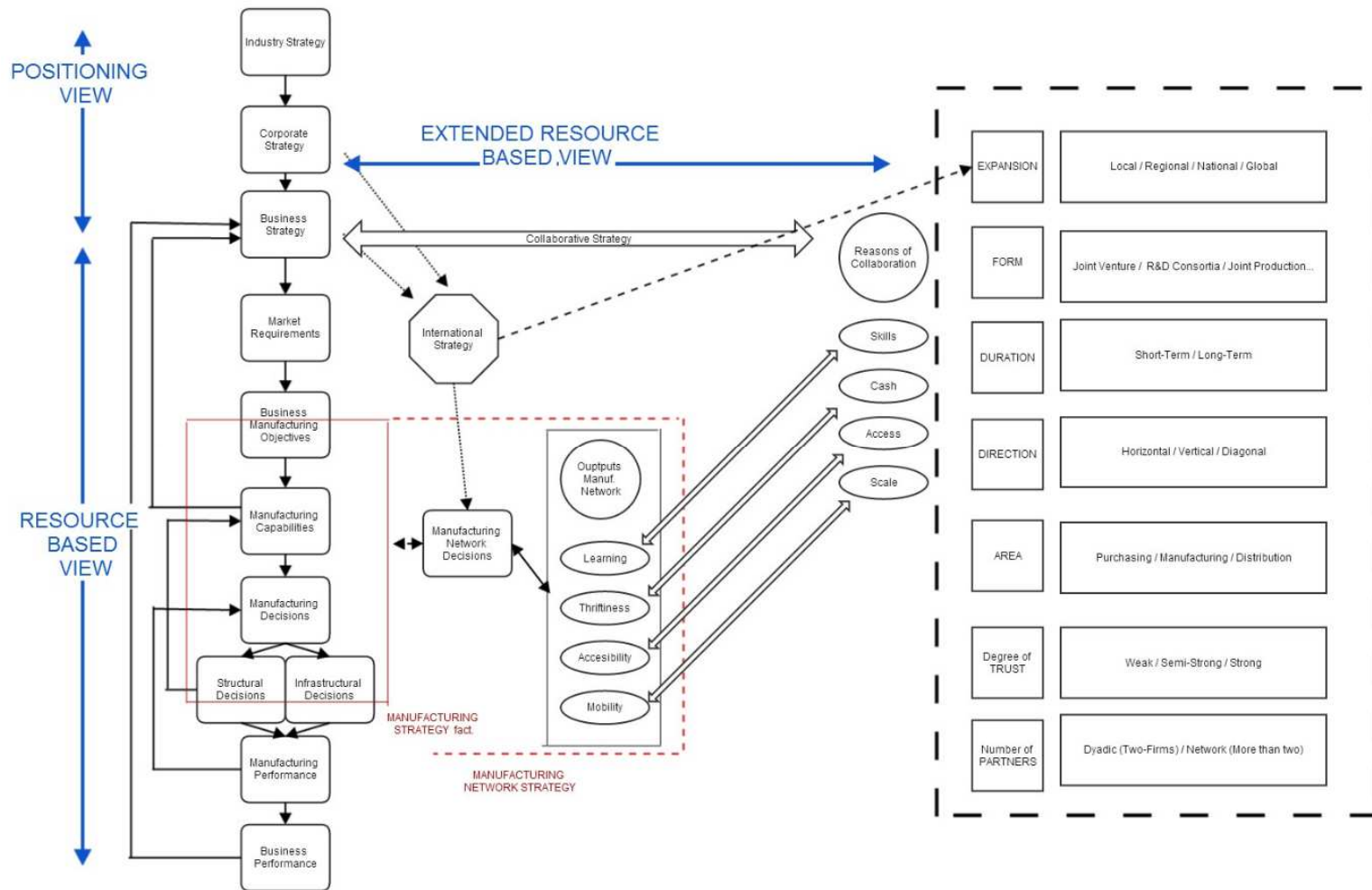
3 Why are these strategic manufacturing decisions undertaken related with the nature of the collaboration agreement ?

Following the theoretical part studied from the point of view of different researchers, the author considers to provide his own model of the collaboration agreement context, which is summarized in the next scheme, and provides the answer to this research question with the next and final model proposed by the author.



## 6. FINAL MODEL OF THE PROJECT

The author proposes a final model to synthesize all the ideas, information and theories gathered during the project.





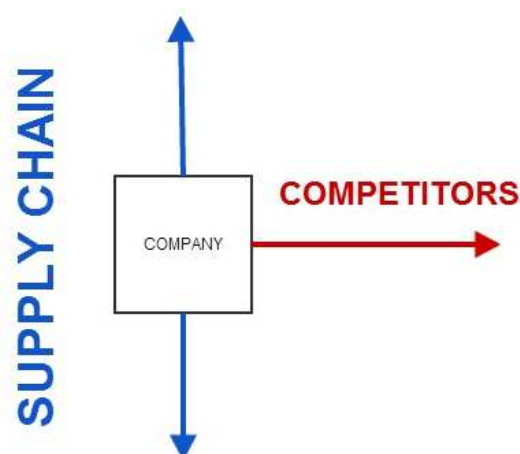
## 7. CONCLUSIONS

The different variety of industry, corporation, business and functional strategies made the author difficult to synthesize the main patterns of decisions in each of the possible situations. This fact, together with the broad range of possible choices of collaborative agreements, became very complex to synthesize. The variety of decisions involved in this sense are exemplified by the factors that affect them, which are represented in the model proposed before.

As it can be seen in the literature provided and the study case, partnerships can help a company to overcome the slower and more costly process of building capabilities internally. Often, strategic alliances are the quickest way to acquire that strategic capabilities and resources, as occurs in the case of the joint venture developed by GM and Toyota, NUMMI case. But a necessary clarification must be done in this aspect, *“an alliance is an option for extending competitive advantage, not a means for sustaining it. Companies must not let alliances distract them from this important task of developing their internal sources of competitive advantage”*.

Strategic alliances are no longer a strategic option but a necessity in many markets and industries. Dynamic markets for products and technologies, coupled with the increasing costs of doing business, have resulted in a significant increase in the use of alliances. (Isoraite,2009)

As a general note of strategic alliances, is that there is no fixed patterns in strategic decisions related to manufacturing strategy. The resume would be that every alliance is undertaken due to the strategic needs of both sides of the linkage, and the pooling of strategic skills and resources to the linkage in order to get the maximum profit or benefit of the collaboration agreement. According to the information and data gathered, and taking into account that each collaboration agreement is different and varies significantly due to its nature and the high number or elements that could interfere in the process and agents involved, the author observed a great majority of horizontal partnerships with competitors in terms of R&D fields and learning proposals, and vertical collaborations and partnerships in terms of cost savings, time-to-market decisions and product development stages.



It will depend very largely the differences in business configurations and strategies to the manufacturing strategy of each firm. This affirmation is confirmed with the results released in the research study seen before, in which the different choices of configurations has its consequences in the decisions adopted in the functional level strategies.





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