

**Proyecto de grado**

Maestría en Gerencia de Operaciones

**Aligning the supply chain to business strategy  
Alineando la cadena de abastecimiento con el entorno de negocio**

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**Resumen:** Para enfrentar el desafiante ambiente competitivo actual es primordial la correcta alineación de la estrategia funcional de la cadena de abastecimiento con el entorno de negocio. En la literatura se presentan diversos modelos genéricos de estrategias de cadena de abastecimiento, sin embargo, para las organizaciones se dificulta asegurar la correcta selección y alineación de estos modelos genéricos a su propia realidad de negocio.

Este proyecto pretende responder a la pregunta, ¿Cómo validar el alineamiento y pertinencia de la estrategia funcional de la cadena de abastecimiento con respecto al entorno de negocio de una organización industrial? mediante el desarrollo de: (1) un método para *caracterizar* la estrategia de la cadena de abastecimiento de una organización industrial y (2) un método que *identifique la pertinencia* de la estrategia de la cadena de abastecimiento con el entorno de negocio de la organización. La metodología de investigación es soportada en técnicas como el “análisis cruzado de casos” y el “meta análisis”, basada en el análisis de: casos existentes en la literatura, teorías de otros autores, análisis con expertos y la experiencia del autor. Se pretende desarrollar un método que sea aplicable por las organizaciones industriales.

**Palabras clave:** Estrategia de cadena de abastecimiento, Supply Chain Roadmap.

**Abstract:** Proper alignment of functional supply chain strategy with business framework is essential to address the current challenging competitive environment. In the literature there are various generic models of supply chain strategies, however, it is difficult for organizations to assure the proper selection and alignment of these generic models with their own business situation.

This project aims to answer the question, "How to evaluate the alignment and relevance of the supply chain functional strategy with respect to the business strategy of an industrial organization? By developing: (1) a method to characterize supply chain strategies of an industrial organization and (2) a method to identify the relevance of supply chain strategy with business framework of an organization. Research methodology is supported in techniques as “Cross-case synthesis” and “Meta Analysis” based on the analysis of: cases in the literature, theories of other authors, expert analysis and experience of the own author. It hopes to develop a method that will be understandable and applicable by supply chain professionals for their own organizations.

**Keywords:** Supply Chain Strategy, Supply Chain design, Supply Chain configuration, Supply Chain Roadmap.

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*“The formulation of great strategies is an art, and it will always remain so. But the description of strategy should not be an art. If people can describe strategy in a more disciplined way, they will increase the likelihood of its successful implementation”*

*Kaplan & Norton*

## Foreword

*In a challenging competitive environment, where industrial companies are faced against worldwide and global-scale competitors, proper alignment of functional supply chain strategy with business framework is essential to maintain competitiveness. But a big question appears:*

***How to validate the alignment and relevance of the supply chain functional strategy with respect to the business environment of an industrial organization?***

*This is precisely the value proposition of "Supply Chain Roadmap", a three-step method for understanding, mapping and redesign of your supply chain strategy, assuring linkage with business strategy by understanding market forces and company's competitive positioning.*

*As is explained by Kaplan & Norton, "The formulation of great strategies is an art, and it will always remain so. But the description of strategy should not be an art. If people can describe strategy in a more disciplined way, they will increase the likelihood of its successful implementation", this is just the positioning of "Supply Chain Roadmap", "Supply Chain Roadmap" is not a new type of supply chain strategy, "Supply Chain Roadmap" is a method supported in the most important and recognized theories and practices about supply chain strategy, its contribution resides in the development of a simple and easy method to characterize and identify the relevance of the supply chain strategy with business framework of an organization by a three-step method: Assessment, Map and Rethink.*

*"Supply Chain Roadmap" method is supported in two main pillars, the characterization method and the gap analysis, which compares any supply chain strategy with five reference supply chain models.*

*"Supply Chain Roadmap" is not a quantitative method with a unique or predefined solution, "Supply Chain Roadmap" is a method where supply chain strategy could be gathered and reviewed in a systematic and organized approach supported by several team discussions where is analyzed current supply chain strategy compared against reference supply chain models, in order to define gaps and/or inadequate alignment between supply chain strategy and business strategy.*

*Research was developed by a "Qualitative method", due that, it was necessary to do extensive reviews (crossed analysis) and iterative refining of the method, which are developed in six sections:*

*Section 1 presents an understanding about difficulties experienced by companies when they are outlining supply chain strategy; a literature review about supply chain strategy, understanding approaches defined by several authors and case studies, finding a gap between current state of the art and industry needs. Finally is proposed a research methodology for defining a new model that allows companies to characterize their supply chain strategy and verify the relevance of supply chain strategy with business framework.*

*Section 2 presents understanding and crossed analysis of current theories about supply chain strategy, based on that, is developed the first pillar of "Supply Chain Roadmap" model, the method to characterize supply chain strategies of an industrial organization.*

*Section 3 develops the second pillar of "Supply Chain Roadmap" model, the Reference "Generic Supply Chain models", which are obtained after the characterization and crossed*

*analysis of generic supply chain models, proposed by several authors as Fisher, Lee, Gattorna, Christopher.*

*Section 4 applies the “Supply Chain Roadmap” method in four cases developed by other authors, in order to adjust method based on an iterative refining. After that, method is applied in two own developed cases, in order to verify method relevance and adjust method deployment.*

*Section 5 verifies method deduction based on the research methodology defined in Section 2, and presents conclusions.*

*Section 6 presents a “How to apply” method’s guide.*

*Welcome to “Supply Chain Roadmap”!!!*

## **Section 1: Introduction, literature review and methodology**

*Chapters 1 and 2 present an understanding about difficulties experienced by companies when they are outlining supply chain strategy, and based on this opportunity are defined objectives of this project. Chapter 3 presents a literature review about supply chain strategy, understanding approaches defined by several authors and case studies, finding a gap between current state of the art and industry needs. Finally Chapter 4 shows a proposed methodology for defining a new model that allows companies to define their supply chain strategy aligned to business framework.*

# 1. Problem Statement

## 1.1 Context

Competition in diverse industrial and service sectors has increased to unimaginable levels in the past years. Factors such as product technological maturity, a greater number of suppliers in the market, free trade agreements and the advantage of scale that competitors with global reach have, are approximating diverse industrial sectors to product “commoditization” (loss of differentiation).

In order to face this challenging competitive environment, organizations are developing several approaches for the business strategy, such as innovation, advantages in costs, the development of value-added services or a mix thereof, among others. At the same time, in the last ten years, the Supply Chain function has become a key element for competing and differentiating itself in the markets given that within its functional role it is in charge of coordinating the flow of information, products and money from the suppliers, passing through the manufacturing and transformation processes to then reaching the Customers, thus strongly affecting the organization’s competitiveness factors such as product cost, working capital, the speed with which it reaches the market and service perception, among others. The importance of these competitiveness factors has garnered the attention of many authors in respect of how one can approach organizations’ supply chain strategy so as to adequately support the business strategy and propose generic supply chain models, in accordance with several criteria.

The first approach to these supply chain strategy design models was developed by **Hill (1995)**, who focuses on the manufacturing field and introduces concepts such as order qualifiers and order winners and on which the proposal to define an organization’s manufacturing strategy is based, a work which he later perfected and evolved, but maintaining his approach towards manufacturing (**Hill & Hill 2009**). The first widely recognized proposal of a segmented model for a supply chain strategy arises from **Fisher (1997)**, who in his classic article “*¿What is the right supply chain for your product?*” suggests that the design of the supply chain must be being defined with respect to the *product type*: for functional products he recommends efficient chains and for innovative products he recommends agile chains. **Martin Christopher (2000, 2002)**, adds the lead-time criteria to Fisher’s product type criteria for the selection of the supply chain model by developing a 2x2 matrix and introduces agile, lean and lean agile supply chain concepts. Alongside, **Lee (2002)** develops the “uncertainty framework” concept, in which starting from the interaction between the uncertainty of demand and the uncertainty of sourcing, he introduces four types of supply chains as follows: Efficient, Agile, Rapid Response and Risk Coverage. Later, Christopher and Gattorna (**p 119 2005**) define the concept of “alignment of supply chains with the Customer’s needs” and introduce four generic supply chains: Collaborative, Efficient, Rapid Response and Innovative. **Gattorna (2006)** subsequently evolved this concept to “dynamic supply chains”, where he presents four types of supply chains: Agile, Efficient, Continuous Replenishment and Flexible. In the interim, the “Best Value Supply Chain” (**Ketchen & Hult 2007**) arises, which is a hybrid approach combining elements of the generic chains proposed previously by other authors. It is important to highlight that the authors use similar terminology for naming the generic supply chains, but develop different concepts in the modus operandi and in these generic chains’ applicability criteria, constituting a first element of confusion, thus making it difficult for supply chain professionals to understand concepts so they can correctly select and align the adequate supply chain model to their own business reality.

In addition, discussions with people responsible for the supply chain function in several industrial sectors and those in professional and teaching practices in areas related to Supply Chain management, have allowed observing other factors contributing to the misalignment of the supply chain strategy with the business environment, in which the following stand out:

- Non-existence of a supply chain strategy.
- Organizations where the strategy has been defined informally without due technical discipline.
- Lack of knowledge in “how to” formulate the functional strategy and its alignment with the business environment.
- Gaps between the theoretical concepts of existing methodologies and the real world.

From these factors arises the opportunity to develop a method for validating the *supply chain functional strategy “geared towards implementation”*, in which the needs of the productive sector are satisfied in regards to aligning the theoretical concepts to business realities, concepts that are understandable by people in different levels and with different training, and ensuring ease in implementation and deployment. This project intends to: (1) *develop a method for characterizing supply chain framework factors affecting the supply chain strategy of an industrial organization*, (2) *develop a method for characterizing the supply chain strategy of an industrial organization* (3) *characterize and define the applicability of supply chain generic models reported in literature* and (4) *develop a method that identifies the coherence of the supply chain strategy with an organization’s business environment, based on the applicability of supply chain generic models*. In this manner, a correct definition and execution of the supply chain strategy is sought in such a manner that will allow ensuring the organization’s key competitive factors such as product cost, working capital, the speed with which it reaches the market and service perception.

## **1.2 Research Statement**

How to validate the alignment and relevance of the supply chain functional strategy with respect to the business environment of an industrial organization?

## **1.3 General Objective**

Develop a methodology for characterizing and validating the applicability of an industrial organization’s supply chain functional strategy, verifying its alignment to the business environment and identifying the gaps that must be adjusted in order to increase the performance of the key competitive factors.

## **1.4 Specific Objectives**

- Develop a method for characterizing an organization’s supply chain functional strategy.
  - Define the variables that characterize an industrial organization’s supply chain functional strategy.
  - Define the supply chain framework factors that affect an industrial organization’s supply chain functional strategy.
- Develop a method that identifies the coherence of the supply chain functional strategy with the business environment of an organization, based on the applicability of supply chain generic models.
  - Define the relationship between the supply chain framework factors and the supply chain profile for the supply chain generic models, identifying applicability ranges and events of inconsistency for each generic model.

- Validate the proposed methodology through the application in at least one real case, with the purpose of analyzing its relevance in industrial organizations.

## 2. Justification

Despite how new this topic is, literature and the evidence of cases is extensive, with a diversity in criteria and methods, thus generating a lack of consensus among supply chain professionals regarding which method is the most appropriate, reducing the dissemination of existing evaluation models in academia to the productive sector. This project is suitable for industrial organizations, regardless of their size, industrial sector and geographic coverage, given that it will analyze the theory and evidence of existing cases and after some fine-tuning will seek a convergence towards a method “*geared towards implementation*” for evaluation regarding the relevance of the supply chain strategy with the business’s strategic approach.

## 3. Literature Review

There are many proposals of supply chain generic models, which are developed starting from **Fisher’s** concepts (1997), and then evolve in the last fifteen years, as detailed in the timetable presented in Figure 1.

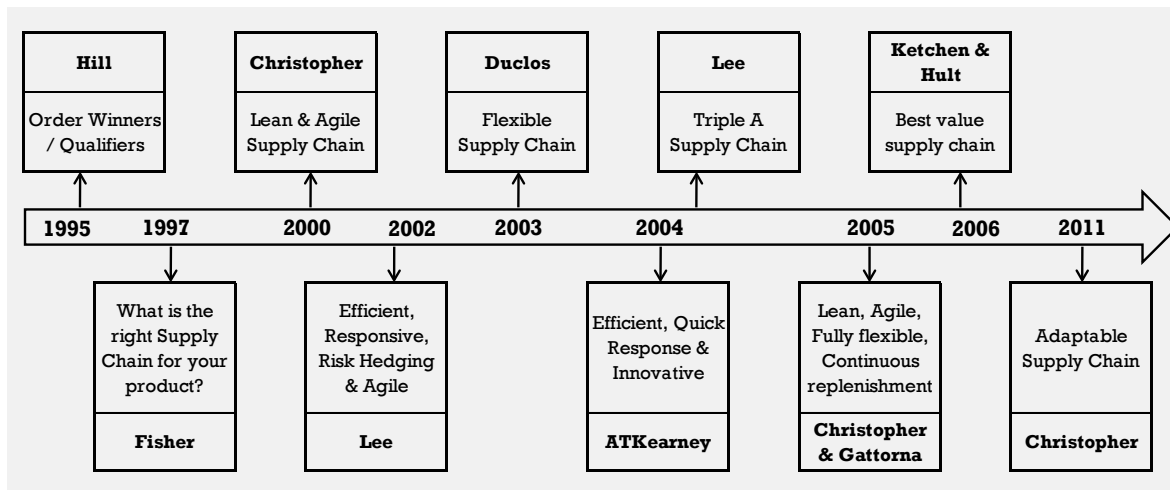


Figure 1, Chronological development of Generic Supply Chain  
 Source: own elaboration

The analysis of contributions made in supply chain strategy allow classifying the principal works in four main currents: (1) *Proposals of supply chain generic models*, (2) *Methodologies for supply chain design*, (3) *Report of quantitative case studies*, (4) *Report of qualitative case studies*, the latter two being geared towards evaluating success or failure factors in the implementation of supply chain models.

In order to select the principal *proposals of supply chain generic models*, it is necessary to dig deeper in the design criteria of the supply chain strategy, such criteria being grouped in five sets of factors in accordance with their nature, as follows: (1) *Product Flow*, whereby in accordance with the flow of materials and information on the plant floor, criteria for designing the manufacturing model is designed. (2) *Product, business differentiation*: models in which the supply chain is designed in accordance with several factors regarding the product’s behavior in the market and the



business environment. (3) *Supply/demand uncertainty*: where internal and external factors involving the stability of supply and demand in the supply chain define the most appropriate generic model. (4) *Organizational competencies*: models in which the development of functional competencies in the supply chain is promoted in order to create a competitive advantage. (5) *Customer Segmentation*: where the relative importance and the opening towards Customer collaboration define the generic model to be applied to each group of Customers. (6) *Hybrid Models*: combine several of the previous dimensions. Table 1 presents a summary of the main contributions in the development of supply chain strategy concepts and the corresponding supply chain generic models.

Table 1, Evolution of supply chain design criteria  
Source: own elaboration

Generic name	Author	Year	Criteria for supply chain design	Representative dimension	Author's original name
No apply	Umble & Srikanth	1990	<b>Product flow</b> : plants A, V and T	Product flow	They are oriented to operations management.
	Hill	1995	<b>Order Winners &amp; Order Qualifiers</b>	Product differentiation	
Dinamic Supply Chain	Fisher	1997	<b>Product type</b> : Functional or Innovative	Product differentiation	Efficient / Responsive
	Christopher	2000	<b>Product variety, demand uncertainty and volume</b>	Sourcing / demand uncertainty	Lean / Agil / Leagile
	Lee	2002	<b>Uncertainty Framework</b> : Sourcing / demand uncertainty	Sourcing / demand uncertainty	Efficient / Responsive / Risk Hedging / Agile
	Christopher & Gattorna	2005	<b>Customers segmentation</b>	Customers segmentation	Lean / Agile / Fully flexible / Continuous replenishment
	Gattorna	2006	<b>Demand uncertainty and customers relationship</b>	Sourcing / demand uncertainty and customers segmentation	Lean / Agile / Flexible / Continuous replenishment
Flexible Supply Chain	Duclos	2003	<b>Flexibility</b> in business processes	Organizational competences	Flexible Supply Chain
	Gunasekaran	2007	<b>Hybrid</b>	Hybrid	Responsive Supply Chain
ATKearney	ATKearney	2004	<b>Customers / product segmentation</b>	Sourcing / demand uncertainty	Efficient, Quick Response & Innovative
Triple A	Lee	2004	<b>Agility, Adaptability and Aligment</b>	Organizational competences	Triple A Supply Chain
	Gattorna	2008	<b>Use segmentación, value proposal, organizational competences</b>	Hybrid	Triple A Supply Chain revisited
Best Value	Ketchen & Hult	2006	<b>Agility, Adaptability and Aligment</b>	Organizational competences	Best value supply chain
Adaptable	Christopher	2011	<b>Supply Chain Volatility Index</b>	Sourcing / demand uncertainty and organizational competences	Adaptable Supply Chain

From the previous table it is evident that some models have progressively evolved, reason why we have selected the proposals that are currently valid, having decide do six proposals. These *proposals for supply chain generic models* can be classified according to the number of proposed supply chain generic models, with the following two classifications: (1) *Sole model proposals*, where the respective author proposes a sole generic model, supported by multiple functional competencies, which level of development is defined with respect to the organization's competitive environment as well as its business strategy, and (2) *Multiple chain model proposals*, in which there are several supply chain generic models, which selection depends on the design criteria (representative dimension) applicable to the case being studied. Each generic model defines a typical approximation for the management of processes and the development of some specific supply chain competencies. Table 2 lists the supply chain generic models along with their respective author. The second current in literature is geared towards defining *methodologies for selecting the supply chain strategy*, which are classified according to the design approach, in: (1)

*Specific design processes*, in which the focus is the preparation of specific designs in accordance with the business situation and the environment of the organization being studied.

Table 2, Main generic supply chain models  
Source: own elaboration

Author	Generic model type	Generic supply chain model
Duclos	Unique and adaptable to each organization	Flexible Supply Chain
Lee		Triple A Supply Chain
Christopher		Adaptable Supply Chain
Ketchen & Hult		Best Value Supply Chain
Christopher	Multiple, according to design criterias	Lean, Agile, Fully flexible, Continuous replenishment
AT Kearney		Efficient, Quick Response & Innovative

Among these authors, we highlight the following: **Hill (1995 and 2009)**, who developed a step-by-step approach for strategic planning that focuses on operations, **Chandra (2007)**, whose approach is complemented with the use of simulation tools, **Schnetzler (2007)**, who developed the SCDD (Supply Chain Design Decomposition), the Supply Chain 2020 Project (**MIT 2006**), which develops a strategic planning methodology based on the diagnosis and reformulation of the strategy by means of the “controlled convergence” technique, and finally, the SCOR Method, which standardizes supply chain taxonomy, emphasizing the diagnosis of the situation and how to increase performance through the application of better practices proven by the program’s members. The latter is probably the method with greatest dissemination in the industry and emphasizes the phases for carrying out the dissemination and implementation of the strategy within the organization. (2) *Refinement of supply chain generic models*, where the supply-chain design for the organization being studied stems from the supply chain generic models. In this group one can highlight the work of **Huang(2002)**, who relates process factors with the generic chains defined by Fisher, and **Stavrulaki and Davis (2010)**, who integrate contributions from Fisher, Lee, Hau and other renowned authors, with concepts regarding the order entry point and the configuration of the productive process, giving a step forward in integrating generic models to practical concepts, thus becoming the closest referent to the objective this project intends to develop, but limiting themselves to developing their methodology under an eminently conceptual approach.

The third and fourth currents are geared towards the level of implementation analysis, seeking to understand the reasons why different models succeed or fail, some of them by means of qualitative analysis and others by means of *quantitative analysis*, among the latter we highlight the works of: (1) **Power (2001)**, who developed the relations between success factors and agile chains, based on a 1994 survey in the Australian industry, (2) **Yusuf (2003)**, who validated the competitiveness of industries operating under agile chains in the United Kingdom, (3) **Lo & Power (2010)**, in which work they validate, by means of a survey in the Australian industry, the relationship of product type with the supply chain model proposed by Fisher, (4) **McKone (2009)**, whose research develops a taxonomic supply chain model based on factors regarding environment, competitive priorities and performance. Finally, there is (5) **Li (2009)**, whose work validates the main factors an agile supply chain requires, through a study conducted on a group of North American companies associated to a university in the United States Midwest. At a *qualitative analysis level*, several *case study reports*,

are highlighted, both single organizations and sectorial, some of which are the most representative and applicable for the project's methodology, are detailed in Table 3:

Table 3, Supply chain strategy cases  
Source: own elaboration.

Author	Companies	Sector	Focus
Sahay (2003)	Several	India	Indian Supply Chain
Landel (2003)	Bacardi	Liquours	Migrating from push to agile
Bay (2004)	Seagate	Electronics	Supply chain strategy reconfiguration
Lee (2005)	Toyota	Automotive	Business strategy
Collin (2006)	Nokia	Telecoms	Agile supply chain
Nueno (2006)	Zara	Apparels	Agile supply chain
Hoyt (2007)	Crocs	Apparels	Agile supply chain
Chopra (2007)	Wills	Apparels	Lean Supply Chain
Godsell (2010)	BAT	FMCG	Supply chain strategy reconfiguration
Wee (2009)	Ford	Automotive	Lean Supply Chain
Koskinen (2009)	Paper company	Paper	Aligning supply chain strategy with business strategy

Literature offers an abundant availability of *supply chain generic models, methodologies for selecting the supply chain model and reports of case studies*, all of which confirm the opportunity of refining available information and developing a method that unifies the concepts for the characterization and evaluation of the relevance of the supply chain strategy with respect to the business environment, thus contributing with an integrating method, which closest development are: (1) the work of **Stavrulaki and Davis (2010)**, but evolving from the conceptual design to practical development, by means of the contribution of case analysis and the integration of other design concepts and criteria. (2) **Martinez and Shulk's (2006)** approach, where supply chain strategy is defined by some "segments" as: the decoupling point, process type, product type and process flow, based on these segments, company may to define alignment between supply chain strategy and business strategy. Despite the model has several variables that are relevant for characterizing a company's supply chain, the model is too complex, doesn't have a graphic tool in order to facilitate strategy understanding and deployment and it's supported in a mathematical framework more than in a managerial model, which is more adequate for understanding and deployment purposes.

## 4. Methodology

### 4.1 Selection of the research methodology

The research statement "*How to validate the alignment and relevance of the supply chain functional strategy with respect to the business environment of an industrial organization?*", is an open question that guides the development of a conceptual model based on refining existing theories and supported in qualitative research (p 50 **Jonker 2010**), which is corroborated in accordance with **Yin (p 10 2009)** and **Meredith (p 445 1998)**, who define that "How"-type research questions are geared towards case analyses, stories or experiments. This is confirmed in the field of Operations Management, according to works developed by: (1) Stuart, who describes that research questions focused on process mapping and the identification of relationships between these variables, must be resolved with research structures based on case analysis (p 422 **Stuart 2002**),

and (2) Voss, who describes the use of cases analyses for developing theories and for refining existing theories, among others (pp 197, Voss, et al. 2002).

The development of theoretical models deduced from case analyses is methodologically based on the Grounded Theory, which objective is the development of theories supported by practice (p 84 Jonker 2010), by means of the coding of information gathered in categories, the characterization of said categories and the identification of relationships among the different categories, nonetheless, case analysis has two great limitations: (1) the impossibility of covering a large number of cases due to cost and time limitations, which reduces the possibility of generalizing results (p 355 Lewis 1998) (p 340 Boyer, Swink 1998) and (2) the possibility of bias presented in the researcher (p 104 Jonker) given that it is a qualitative research method, in which the researcher's interpretation contributes to the development of the theory. Both limitations are corrected with a research method specifically developed for Operations Management (OM), which is based on the Grounded Theory and is called "Iterative Triangulation" (Lewis 1998). This method corrects both limitations in the following manners: (1) a larger number of cases is analyzed, by using cases developed by other authors and (2) systematic iterations are conducted in order to triangulate the data among the literature revision, case analyses and the researcher's intuition.

The use of cases developed by other authors is also mentioned by Yin (2009), who is one of the most cited authors in research methodology geared towards cases analyses. Yin mentions five analytical techniques used for case analyses, the fifth of which he calls "Cross-Case Syntheses", which "can be applied when individual case studies have been previously carried out as independent research studies (written by different people) or as part of one predesigned study", likewise he mentions that if there is a large number of individual cases available, the synthesis can incorporate a goal-analysis, as proposed by Lewis (1999). In addition, Yin reports researches he developed based on "cross-case syntheses". Other authors (Voss, et al. 2002) also mention the use of "case retrospectives" for the development and/or refining of theories in Operations Management, highlighting the possibility of "sampling by theoretical replication", which is also mentioned by Yin as a key element for developing multiple cases. We can conclude that works geared towards both OM and SCH from Lewis (1998) and Voss (2002), as well as works with a more general orientation from Yin and Lewis (1999), provide relevance to the use of third-party case analyses supported in the goal analysis (Lewis' iterative triangulation or goal triangulation) for developing and/or refining theories. Table 4 summarizes the project's general methodological framework, based on the general process proposed by Yin (2009) and enriched with contributions from Lewis (1998, 1999) in regards to analytical techniques.

Table 4, Methodological framework  
 Source: own elaboration based on Yin (2009).

Form of research question	Method	Case study design	Analitics strategy	Analitics technics
"How...?"	Case study	Multiple cases	descriptive framework	(1) Cross case synthesis + (2) Meta analisis

## 4.2 Analytical technique

The analytical technique selected according to the model proposed by Yin is a combination of “Cross-case Syntheses” and “Meta analysis”, which allow contrasting the analysis of multiple cases developed by other authors with other sources of evidence. As was previously explained, this analytical technique coincides with Lewis’ proposal in “Iterative Triangulation” in some aspects, a technique that Lewis subsequently migrated to a concept with greater scope called “Metatriangulation” (Lewis 1999, personal communication with Lewis 2011), which bases the development of the theoretical models on the iterative refining of the researcher’s deductions on (1) *existing literature* (2) *cross-synthesis of cases previously developed by other researchers regarding the issue being discussed* and (3) *other sources of data*. Based on Lewis and Yin’s contributions, the analytical technique model to be used in the research process is developed, which process is detailed in Figure 2 (adapted from Lewis 1998 and enriched with Yin 2009 concepts).

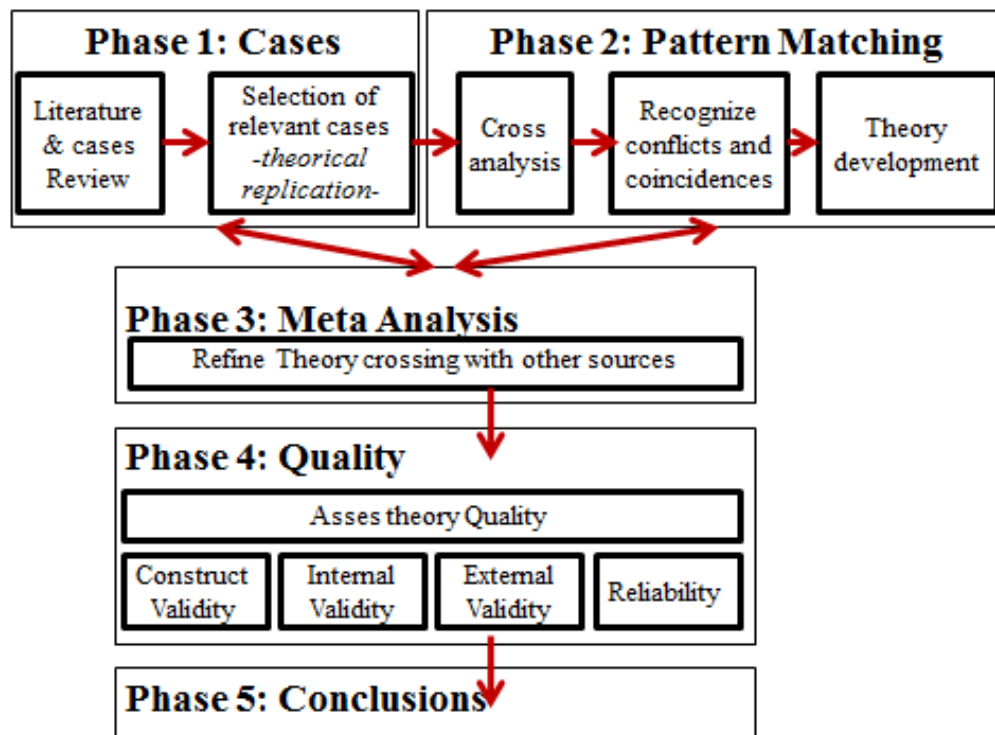


Figure 2, Cross case synthesis + Meta analysis  
Source: own elaboration based on Lewis (1998) and Yin (2009).

## 4.3 Applicability of the selected technique

By means of the systematic iteration of the information sources: (1) Existing theory in literature, (2) Cross-case synthesis, (3) the author’s experience and (4) other sources of evidence, the project intends to:

- *Develop a method for characterizing an organization’s supply chain functional strategy.*
- *Develop a method that identifies the relevance of the supply chain functional strategy with an organization’s business environment, based on the applicability of supply chain generic models.*

By crossing the previous objectives with the principles of the selected technique, it can be concluded that: the purpose of the project, the sources of information to be used and the applicability criteria satisfy the methodological requirements, as detailed in Table 5.

Table 5, Validation of requirements of selected technique  
 Source: own elaboration based on Lewis (1998).

	"Cross case synthesis + Meta analysis" Adapted from Lewis (1999), enriched by contributions from Yin (2009)	Research project
<b>Object</b>	Refinement of theoretical frameworks	It aims to develop a theoretical model for characterizing the strategy of the supply chain and identifying gaps with the business framework.
<b>Information sources</b>	Existing theory in the literature	Theories of several authors as Gattorna, Hill, Christopher, Fisher, Hau, and so on., Which are fragmented into multiple investigations and documents.
	Multiple cases	Multiple cases in the literature report the applicability and results of various models of supply chain strategy.
	Other data sources	Case developed by the author.
	Researcher interpretation	Interpretative non-neutral position, based on their experience.
<b>Aplicability criterias</b>	(a) there are sufficient cases availables in the literature	Numerous authors have developed cases and literature on supply chain strategies
	(b) need to redefine and / or alignment of concepts	There are different theories proposed by several authors to define supply chain models
	(c) search for the integration of multiple fragmented research	Integrating a model that brings together: fragmented theories, author's contribution and discard contradictory theories
	(d) search for relationships between conflicting theories and / or disposal of contradictory theories	

#### 4.4 Verification of design quality

Yin mentions four tests that are necessary for determining the quality of a case research design:

- Validity of the Construction: Questions if there is a relationship and/or subjective effect between the manner in which the researcher has gathered the data sources and has constructed the concepts s/he is trying to study. (Adams 2007).
- Internal validity: Define causality relationships, where certain conditions are taken into consideration, other conditions rule.
- External validity: Define the domain in which the study's findings can be generalized.
- Reliability: Demonstrate that the operations of a study can be repeated with the same results.

In this research, design quality shall be supported by tactical actions detailed in Table 6, which are adapted from Yin (2009).

Table 6, tactical actions to assure research quality  
 Source: own elaboration based on Yin (2009).

Test	Tactics applied to case studies	Phase of research where the tactic is applied	Application to research
Construct validity	Multiple sources of evidence	Data collection	Selecting multiple cases and theory reported since 1997
	Establish chain of evidence	Data collection	Matrix of relationships between questions, data and conclusions
	Key informants review the draft case study	Composition	Validation of questions and made some of the authors of the cases
Internal validity	Pattern matching	Data analysis	Cross case synthesis
	Explanation building	Data analysis	
	Use logic models	Data analysis	
External validity	Use replication logic in multiple case studies	Own case	
Reliability	Use case study protocol	Data collection	Detailed description of the protocol analysis of individual cases and synthesis of cross case
	Develop case study database	Data collection	Database cross-case synthesis

#### 4.5 Stages and methodology

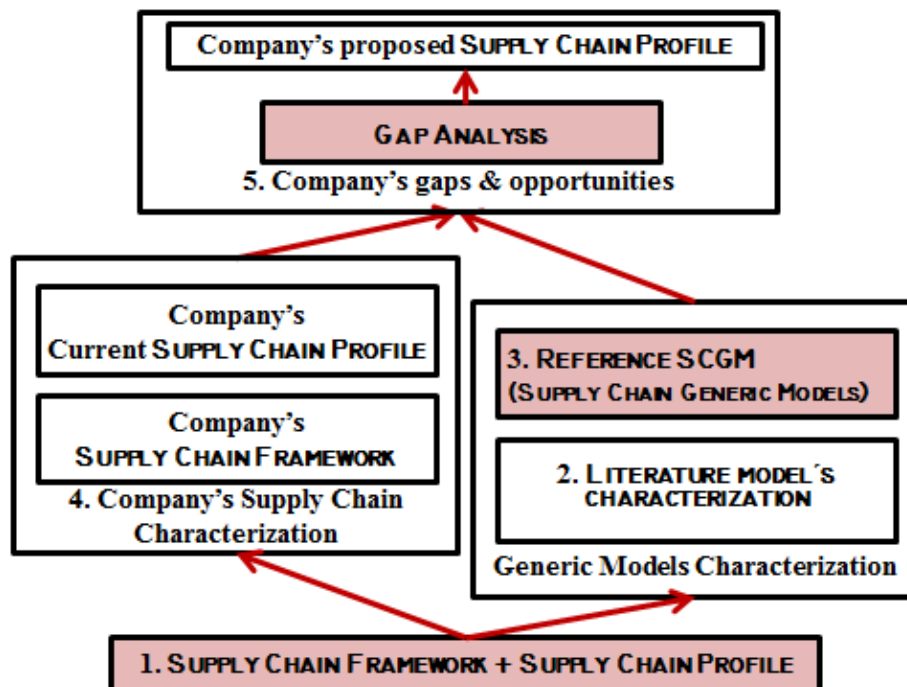


Figure 3, Conceptual model.  
 Source: own elaboration.

The conceptual research model is comprised of five elements: (1) the definition of a model for characterizing the environment (Business Framework) and the organization’s supply chain profile (Supply Chain Profile), (2) the characterization of supply chain generic models (SCGM) presented in the literature, (3) definition of the “Reference SCGM”, which will be the “role models” for verification of the alignment between the environment and the supply chain profile of a company’s supply chain), (4) the characterization of the environment and the supply chain profile of the organization being studied, and (5) the search of gaps and opportunities for improving the organization’s supply chain strategy based on the “Reference SCGM”. The conceptual model is presented in Figure 3. The research is developed in five stages one after the other, which are detailed in Figure 4.

	Phase	Objective	Methodology	Deliverable
1	<b>Model for characterization</b> of the business framework and supply chain profile	Identify: (1) business framework factors that affect performance and design of the supply chain and (2) variables that characterize the functional supply chain strategy of an organization.	Cross case analysis. Meta analysis with literature and author's experience.	Supply Chain Framework ®, Supply Chain Profile ®
2	<b>To characterize generic supply chain models</b> , using the model developed in phase 1	Identify Generic supply chain models reported in the literature, and to characterize the environment and profile of these generic models.	Cross case analysis. Meta analysis with literature and author's	Characterization of generic supply chain
3	<b>Reference Models</b>	Define applicability ranges of supply chain generic models with the business framework, based on theoretical assumptions of models defined in the literature, author's own experience, and analysis of cases reported in the literature.	Cross case analysis. Meta analysis with literature and author's experience.	Reference Models
4	<b>Gap Analysis</b> of supply chain model with the business framework.	Develop a matrix that identifies the relevance of the functional supply chain strategy of an organization's business environment, based on the applicability of the generic models of supply chain.	Parallel view of reference models	Reference Models Matriz
5	<b>Application of the model in an organization</b>	Applying the model to evaluate the alignment of supply chain functional strategy with business framework in an organization and identify gaps.	Model validation based on case analysis.	Case study.

Figure 4, Stages and methodology  
 Source: own elaboration.



The first four stages are geared towards the development of a method for *evaluating the relevance of the supply chain functional strategy to the business environment*. Stage (1) *Characterization Model*, intends to define: (a) the factor of the business's environment that affect the design of the organization's supply chain strategy and (b) the variables that define the organization's supply chain strategy. This stage is conducted by means of a cross analysis of the literature and the author's experience. This stage defines the first two components of the proposed method: Business Framework and Supply Chain Profile.

Stage (2) intends to characterize supply chain generic models in accordance with the model defined in the previous stage and is based on the interpretation of the theoretical models defined by the authors who developed the supply chain generic models. Stage (3) aims to find the applicability zone of the supply chain generic models in the different business environments. In this case, we shall use the cross-case synthesis based on the analysis of cases developed by third parties and literature that is relevant to the topic. This stage defines the third component of the proposed method: Reference Models.

Stage (4) develops a matrix that allows evaluating the alignment of the supply chain profile with the business environment, based on the applicability of the supply chain generic models defined in the previous stage, which constitutes the fourth component of the proposed method: Reference models Matrix.

Finally, stage (5) develops a case in which the method deduced in the previous stages is applied, with the purpose of validating and making the pertinent adjustments.

## Section 2: Development of “Supply Chain Roadmap”<sup>TM\*</sup>,

*Supply Chain Roadmap provides a method to characterize an organization’s supply chain strategy, in order to identify in a single drawing called “Supply Chain Roadmap”<sup>TM</sup>: business framework factors, supply chain profile elements and relationship among them. Based on “Supply Chain Roadmap”<sup>TM</sup>, is possible to identify proper alignment between supply chain strategy and business strategy. “Supply Chain Roadmap”<sup>TM</sup> could be implemented in several industrial and services sectors, following a general method oriented to gather information about business environment and current organization’s supply chain profile.*

*Chapters 5 and 6 cover theory development of “Supply Chain Roadmap”, chapter 5 presents a brief definition about Strategy concepts applied to Supply Chain, based on contributions of the most important thinkers about strategy in the fields of business, operations and supply chain as Porter, Skinner, Metzger and Hill, among others. In chapter 6 is developed “Supply Chain Roadmap” model, which is based on a core concept “business framework and organization capabilities regulates design and performance of the supply chain”. Units 6.1 to 6.4 are oriented to define relationship between Business framework and Supply Chain profile. Unit 6.5 presents business framework components and how to assess them. Unit 6.6 shows supply chain profile elements and relationship among order cycle, production cycle and order penetration point, which are considered as “key profile elements” because them define critical aspects of a supply chain strategy. Units 6.7 to 6.8, introduce “unique value proposal” concept, which is the core of company’s strategy based on “winners” and “qualifiers” concepts introduced by Hill.*

*To close this section, Unit 6.9, presents a final view of “Supply Chain Roadmap” model and instructions about how to characterize an organization’s supply chain.*

*Section three is focused in applying characterization to “Generic Supply Chain models” and several case studies oriented to find general rules about relationship among business framework and supply chain profile, in order to support alignment analysis between current supply chain strategy and business strategy.*

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\* “Supply Chain Roadmap”<sup>TM</sup> is a “service mark” under registration.

“Supply Chain Roadmap”<sup>TM</sup> method and system to characterize and design an organization's supply chain strategy is under patent pending in USPTO and other countries.

## 5. Defining Strategy

### 5.1 What is strategy?

Michael Porter, in his well-known article titled “*What is strategy?*” (Porter, 1996), defines the following: “*Competitive strategy consists in being different. It means deliberately choosing a set of different activities in order to provide a unique combination of value*”. It is this unique combination of value that constitutes an organization’s *strategic positioning*, which is based on the mix of three basic positioning:

- *Positioning based on variety*, in which the source of value is concentrated in offering a supply of products or services for different Customer segments, and is considered appropriate when the organization can produce these products or services better than its competitors, but probably cannot satisfy all the needs of a specific group of Customers.
- *Positioning based on needs*, it is present when the source of value is concentrated on attending the largest portion of needs of a specific group of Customers.
- *Positioning based on access*, despite the fact that the needs of a group of Customers is similar, a positioning based on Customer segmentation can be offered in accordance with the manner of accessing them.

The focus of the basic positions is a more advanced approach of the *generic strategies* presented by Porter in 1985, which represented three basic strategic positioning: leadership in costs, differentiation and access.

Strategy does not end with the definition of the strategic positioning, since it is necessary to define the manner in which the activities and functions inside the organization are articulated by means of a “*fit*”. The fit defines the manner in which activities connect, complement and reinforce among them. The *fit* is, in a few words the assurance of the business’s alignment from top to bottom, including outside the organization’s limits. Porter defines three types of fit:

- *Simple compatibility*, when the competitive advantages of the organization’s activities and functions accumulate throughout the value chain. For example, an organization that is focused on a cost-based leadership strategy based on the reduction of costs in each one of the individual activities.
- *Enhanced compatibility*, when the competitive advantages of the organization’s activities and functions mutually reinforce themselves, generating value added and a competitive advantage greater than the sum of the individual competitive advantages. For example, an organization geared towards a cost-based leadership strategy, based on the coherence among the different activities, thus ensuring that product design, manufacturing setup, inventory policies and organizational structure are geared towards low cost production and that the actions within a process or activity reinforce the strategy in activities that come before or after the value chain. Following the previous example, product design is not only focused on generating cost savings within the activity in itself, but also on having manufacturing and distribution operations reduce cost due to an optimized product design and not only to individual improvement activities in each one of these areas.
- *Effort optimization*, when redundancies are eliminated and waste is minimized in activities and functions throughout the value chain, supported in both internal activities and activities carried out by the members of the value network. For example: an organization focused on a rapid response to the market, which administers the unified

inventory of the entire network, with the purpose of minimizing arrival time to the consumer, and additionally, optimizing operative and capital costs associated to excess inventory in the chain.

The sustainability of strategic positioning is stronger when the fit of the activities and functions throughout the value network is founded on *enhanced compatibility* and/or *effort optimization* connections, since these connections are more difficult to be interpreted and replicated by competitors.

Finally, we can conclude that: *“While operative efficacy deals with reaching excellence in individual activities or functions, the strategy is in charge of defining the connection and combination of activities and functions throughout the value chain, in order to achieve a unique combination of value under Customer’s perception” (own development based on Porter, 1996).*

### **5.2 What is an operations strategy?**

One of the most detailed revisions regarding the definition of the *“operations strategy”* is developed by Anderson, Cleveland and Schroeder (**Anderson et al 1989**), who highlight that it is difficult to obtain consensus in respect of the definition of *“operations strategy”*, but highlight that most authors refer to *“long term actions, integrated with the business strategy and implemented by the operations area”*. A more concrete definition is given by Wickham Skinner, one of the most renowned authors in topics concerning operations strategy, who in his article titled *“The productivity paradox”* (**Skinner, 1985**) defines the operations strategy as *“the required competitive leverage and made possible by the production function, in order to produce structural definitions such as: Buying or Doing, installed capacity, manufacturing network, process technology, quality assurance system, information systems, policies involving the administration of the work force and organizational structure.”*

On the other hand, Terry Hill, another one of the prominent authors in operations strategy, makes an additional and significant contribution, when he introduces the concepts of *“order winners”* and *“order qualifiers”*, so as to ensure an operations strategy oriented towards the market, and that in Hill’s words *“creates the essential interface between marketing and operations in order to understand markets from the point of view of both functions .....Helping companies move from the vague understanding of the market to a new, essential level of knowledge.”* (**Hill & Hill, 2009**). While Hill emphasizes the alignment of the operations strategy with market requirements, Skinner, defines the structural elements that comprise the operations strategy in a precise manner, both of them constituting complementary approaches regarding the operations strategy.

### **5.3 From the operations strategy to the supply chain strategy**

Literature after year 2000 does not show great contributions in *“operations strategy”*, as a consequence of migration to the wider concept of *“Supply Chain Management (SCM)”*. While the concept of operations focuses mainly on infrastructure aspects surrounding the manufacturing process, the SCM concept focuses on defining activities and connections surrounding processes related to product flow, information flow, and financial transactions inside and outside the organization.

According to Mentzer (**Mentzer, et al, 2001**), the concept of *“Supply Chain Management (SCM)”* has become more popular since 1995, but there is still much confusion regarding its

meaning. The confusion lies in the conceptual differences among the different approaches for defining supply chain management (SCM). The three main approaches are:

- *SCM as a set of activities geared towards implementing a management philosophy*, this approach is focused on defining the corporate competencies that companies must develop in order to be a competitive supply chain.
- *SCM in terms of process management*, by virtue of this SCM perspective, this is defined as the synchronization of business functions geared towards the management of flows of money, materials, and information from the suppliers to the Customers, focused on fulfilling a Customer's requirement.
- *SCM as a management philosophy*, is geared towards defining SCM as competitive strategy, where companies create connections throughout its supply chain, enhancing and optimizing efforts so as to create differentiated value proposals.

The first two approaches focus on defining SCM in tactical terms, while “*SCM as a management philosophy*” focuses on defining the orientation and strategic approach of the company's supply chain.

It is on this basis that I propose a definition of “*supply chain strategy*”, as “*the connection and combination of activities related to the flow of products, information and financial transactions within and among the organizations, in order to achieve a unique combination of value in the competitive environment where the company operates.*”

## 6. General vision of the model for characterizing a supply chain

### 6.1 The structure of a supply chain adapts to the business's environment

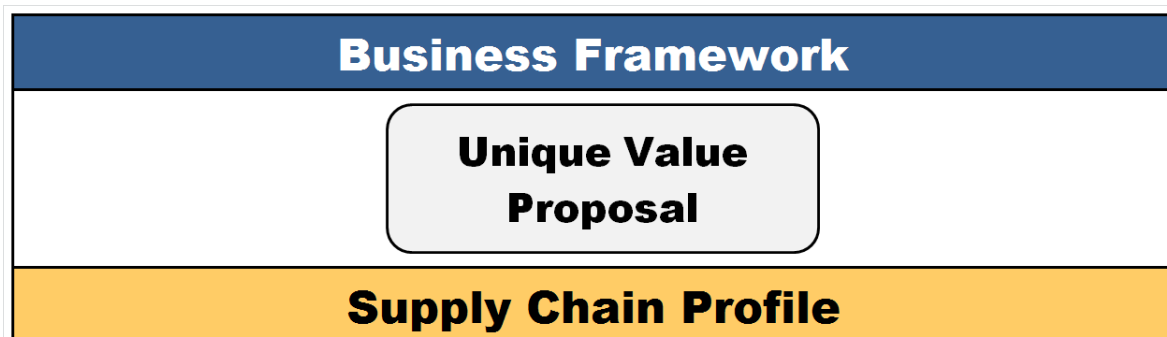


Figure 5, Business Framework and Supply Chain Profile  
Source: own elaboration.

The supply chain strategy of an organization is determined by the interrelation between *internal structure of the supply chain* and *business environment* where the organization operates, thus converting the business environment in the “*framework of reference*” for defining the “*profile*” of the supply chain structure, as presented in figure 5. It is clear that in open economies with a high level of competition, the understanding of the business environment and its interaction with the supply chain profile is a key factor for designing a *unique value proposal* to the market, and the value proposal can only be satisfied with an adequate design and operation of the company's supply chain.

### 6.2 Business Environment = Business Framework

The environment of the business where an organization competes has multiple components, but which of them influence the design and performance of the supply chain?

Porter's model speaks of five forces that regulate competition in any industrial sector, as shown in Figure 6. Two of these forces, *the power of Customers* and *the power of supplier*, are related to the natural members of the supply chain of any company, reason why they must be considered as key elements in the supply chain design, and in addition, we must go beyond what Porter proposes and introduce some new elements inside these forces, which are the key to supply chain management, such as, product and information flows, the relation of logistics costs on total costs and the variability of demand, among others. *Substitute products or services*, the *struggle among current competitors* and the *entrance of new competitors*, rather than independent forces, must be considered as components of the Customers' power and of the suppliers' power, given that these are elements that modify the power relationship and the desire for collaboration among the parties. This extensive vision regarding the effect of suppliers and Customers leads us to the redefinition of the concept in a broader manner and naming them as *relations with Customers* and *relations with suppliers*.

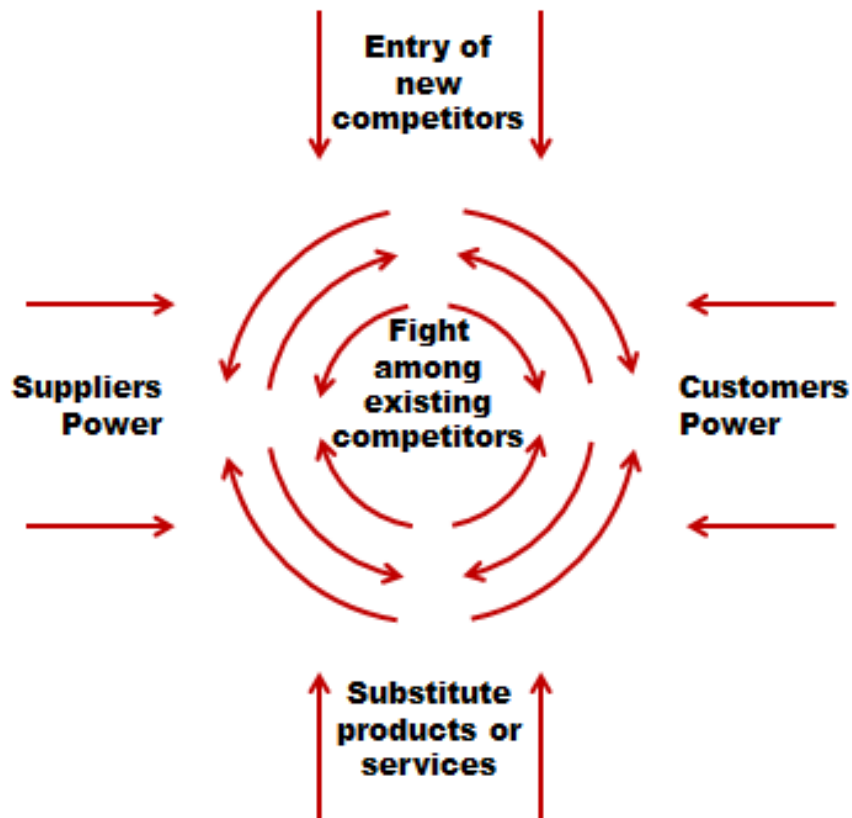


Figure 6, Forces governing competition in an industry  
Source: Porter 1979

On the other hand, the other fundamental force in any supply chain are the technological and economic components related to the transformation process (understood as the production process of the good or service), since they affect structural decisions related to the production process and therefore affect the design and performance of the supply chain.

Figure 7 represents the three forces of the business environment that regulate the design and performance of the supply chain: Relations with Suppliers, Relations with Customers and technological-economic aspects associated to the transformation process. These three forces have different technological, economic, power relations, collaboration and competitiveness relation factors that affect key variables in Supply Chain design and performance. We will name this set of forces and its factors such as “*Business Framework*”.

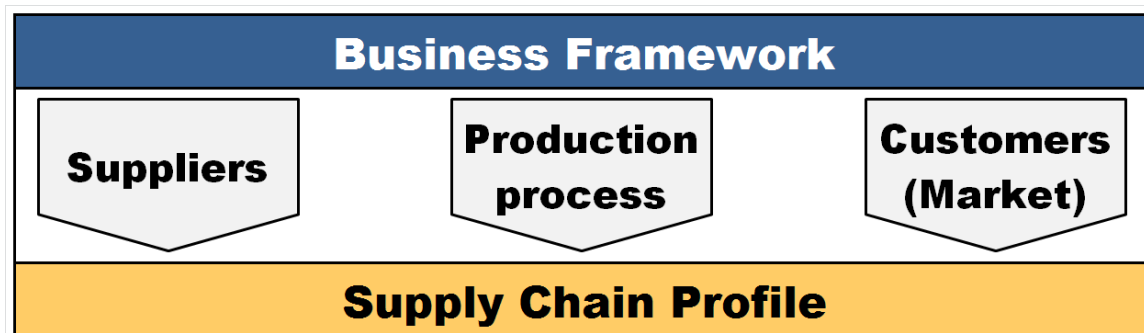


Figure 7, Business framework forces governing supply chain profile  
Source: own elaboration.

### 6.3 Supply Chain Profile

The structure of a supply chain is comprised of three macro processes: Supply, Transformation and Distribution. The latter process must involve a redefinition of the traditional vision, since the growing trend of introducing value-added services that accompany the product in the companies' *value proposal*, has forced developing an infrastructure inside the organizations for the production of products and for the delivery of value-added services, which leads us to reconsider the traditional supply chain structure, modifying the traditional concept of “order winners / qualifiers” introduced by Hill, to a concept that is more focused on the current value proposal, which we shall call “Product winners / qualifiers” and “Service winners / qualifiers”. This approach intends to differentiate the competencies and infrastructure that must be developed for each one of the aspects of the value proposal and ensure that both the product and the service have the importance required by the market in the organization's supply chain strategy.

It's important to clarify that some authors describe “product” as the combination of physical goods and services accompanying and supporting commercial transaction, but, in order to differentiate competences required under a manufacturing perspective (oriented to physical goods) and competences required under a supply chain perspective, we'll be using “Product” concept as a definition for “Physical goods features” and “Service” as a definition of “Other features supporting company's value proposal”.

Figure 8 represents the profile of an organization's supply chain, defined by the interrelation from the supply, passing through the transformation process and the delivery of the value proposal to the Customer, comprised by the product and the service. We will define this infrastructure and its factors as the “*Supply Chain Profile*”.

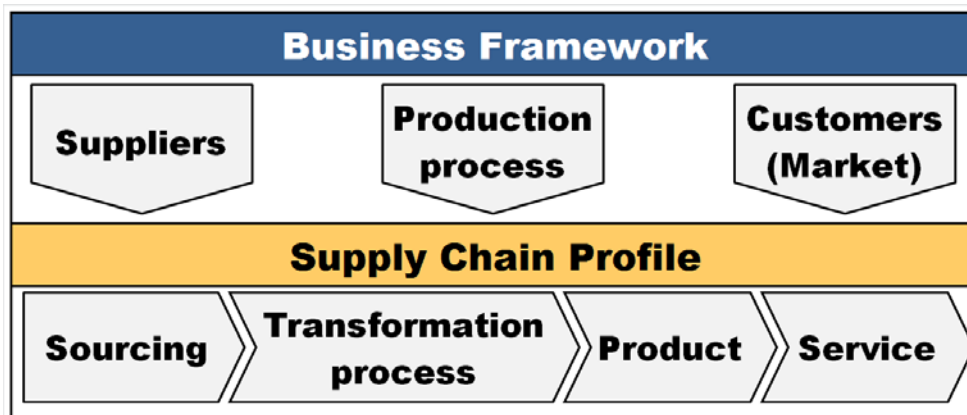


Figure 8, Elements of supply Chain profile  
 Source: own elaboration.

#### 6.4 Supply chain strategy

As was defined in numeral 5.3, an organization’s supply chain strategy is defined by “the connection and combination of the activities related to the flow of products, information and financial transactions within and among the organizations, in order to achieve a unique combination of value in the competitive environment where the company operates”.

Figure 9 presents the roadmap for the design of the supply chain, where the “Activities related to the flow of products, information and financial transactions” interrelate with the “competitive environment”, which, in the terms previously introduced in numerals 6.2 and 6.3, are “Supply Chain Framework” and “Supply Chain Profile” respectively. Based on the interaction between them is defined the “unique value proposal”. The complete model is designated as “Supply Chain Roadmap™”, as presented in figure 9.

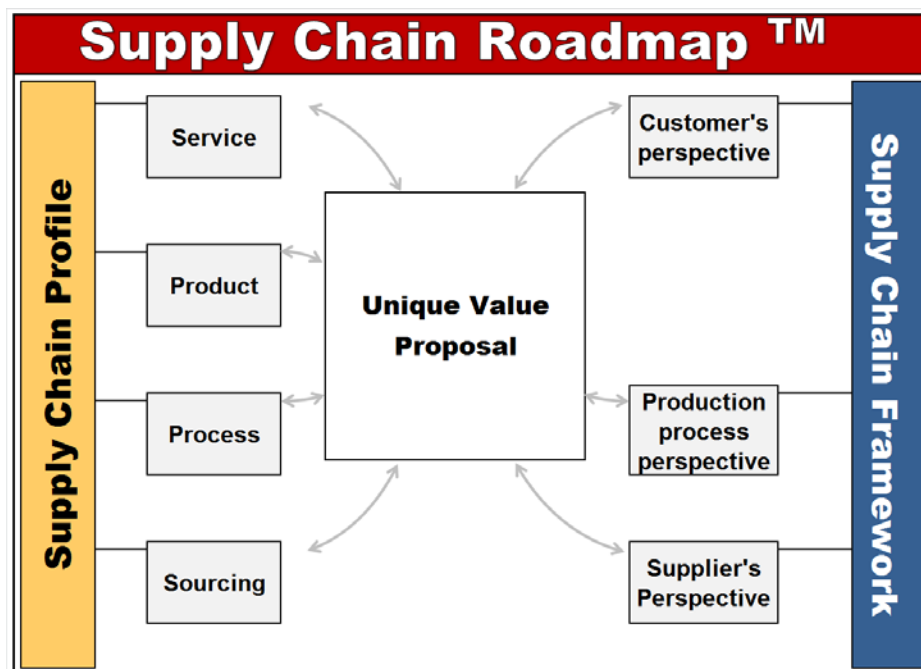


Figure 9, Supply Chain Roadmap model  
 Source: own elaboration.



## 6.5 Supply Chain framework factors

The three forces of the “Supply Chain Framework”, *Customers, Process and Suppliers*, must be assessed in accordance with the different factors of the environment where the business is executed. In order to define the main components of the factors of the three forces, we make reference to comparative analysis of relevant authors in issues regarding business strategy, manufacturing strategy and supply chain strategy, where the main elements of the environment that characterize the development of the theoretical models proposed by these authors are presented in the columns under author’s name. Later, the elements presented by the authors are classified and clustered under “strategic factors” according to similarities among definitions developed by the authors for each factor.

Table 7, Business framework factors affecting supply chain strategy  
Source: own elaboration.

Strategic Factor	Authors										
	Supply Chain					Manufacturing				Business Strategy	
	Fisher 1998	Lee 2002, 2010	AT Kearney 2004	Gattorna 2008	Christopher 2006, 2010, 2011	Stavroulakis and Davis 2010	Hill & Hill, 2009	Cox 1998 & Schragenheim 2001	Liebeck, Meyer & Abele 2008	Porter 1980, 1996	Kaplan & Norton 1992, 2000,
Cost	Physical costs, Market mediation cost	Cost efficiency, Trade off cost / responsiveness							Labor Cost & Cost of Capital	Economies of scale, Cost disadvantages	Financial perspective
Product life cycle	*Short life cycle increases unpredictability*	Shorter life cycle pressures supply chain				Product life cycle					
Sourcing uncertainty		Stable / Evolving supply	Supply volatility		Supply Chain Volatility Index (SCVI)	Bullwhip effect					
Demand uncertainty	Functional or Innovative Products	Uncertainty Framework	Predictability & order size / timing		Standard or Special Products, SCVI	Bullwhip effect					
Order Winners	Innovation, Mass Customization	Strategic objectives dictated by marketplace	Product attributes	Customer's buying behavior perspective	Integration of marketing and supply strategies		Order Winners		Local expectations	Strategic positions	Customer perspective
Order Qualifiers			Service requirements: Fill rate & Order lead time				Order Qualifiers				
Product/ Process lead time		Dependable / Variable Lead time			Replenishment lead time						
Process / Product Structure						Production Process	Types of manufacturing processes	Logycal Product Structure VAT			
Process Technology							General Purpose / Dedicated		Unit volume and flexibility		
Substitute products										Substitute products	
Alternative distribution channels / suppliers										Customers / Suppliers Power	
Sourcing complexity									Global / Local Sourcing		
Collaboration level	Cooperative model manufacturer retailer	Design collaboration			Demand collaboration activities	Suppliers relationship				Strategy insertion	

Table 7 presents, authors, strategic elements and their classification in “strategic factors”, as was explained previously. With the purpose of ensuring the focus on key elements, some important second-level elements present in the works of these authors are omitted.

According to the previous table is determined that the three forces of the business environment, *Customers, Process and Suppliers*, must be assessed in accordance with the different technological, economic and demand-pattern factors. In addition, in the case of *Customers view*, the *minimum requirements for competing in the sector* (qualifiers) and the *differentiated characteristics versus the competitors* (Winners) must be assessed both at the service and the product level, so as to define the company’s *differentiated value proposal* (*Unique Value Proposal*), which constitutes the essence of the company’s business strategy. Figure 10 presents a preliminary vision of “Supply Chain Framework”, where the groups of factors that must be taken into consideration in each one of the forces are detailed.

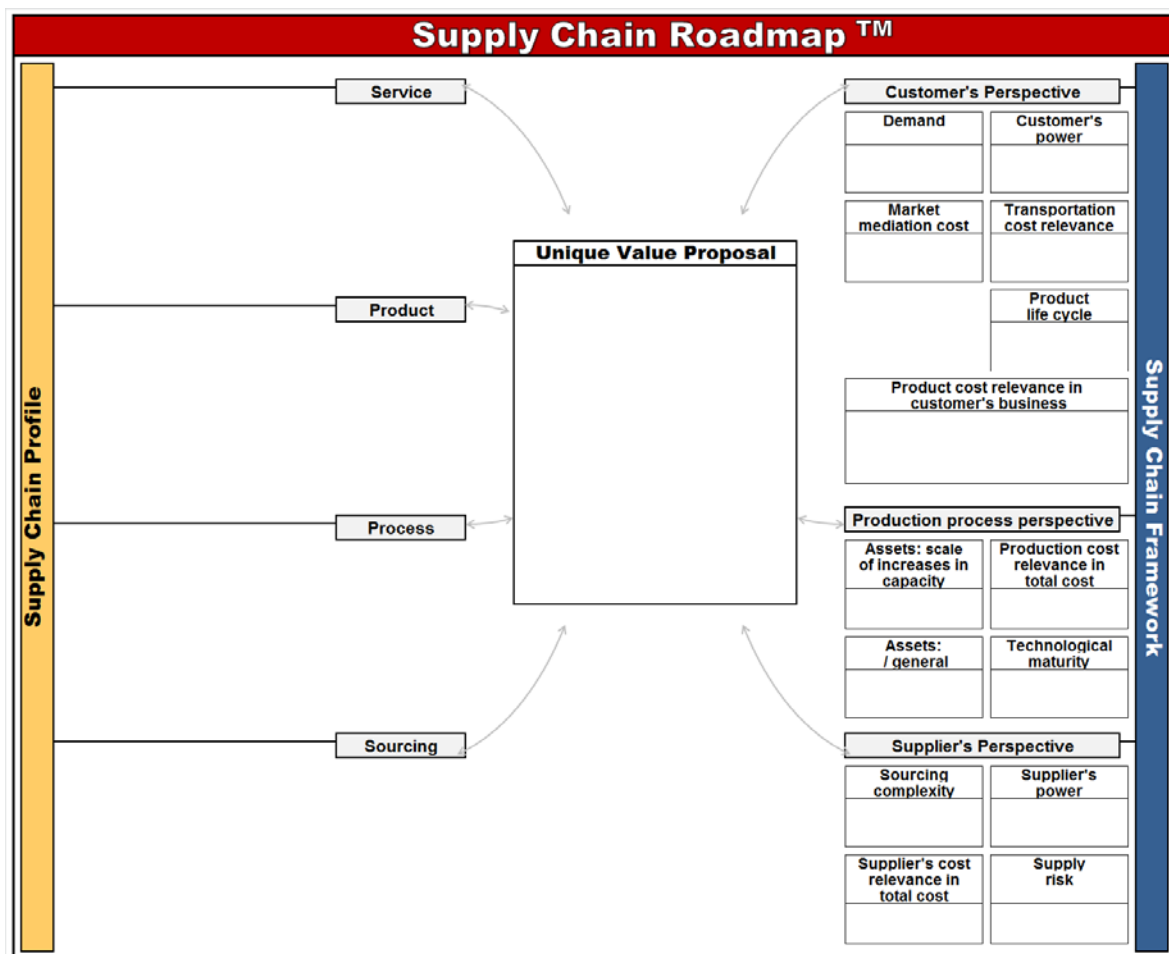


Figure 10, components of three framework forces  
 Source: own elaboration.

In order to determine how to assess the different *technological, economic and demand-pattern* factors, the different attributes in each one of the perspectives must be evaluated and it must be cautious in conducting the evaluation in accordance with the general perspective of the sector where company is competing, over the perspective of the company itself, thus avoiding preconceptions or

maintaining previously defined paradigms. Likewise, the evaluation of each force must be conducted under the perspective of the entities that comprise each one of the forces, in other words, “How does a supplier of the sector where I compete evaluate these factors?”, “What is the status of the development of the technologies associated to the internal transformation processes?”, “What are the Customers’ needs regarding the products and the services offered by the sector?”.

Table 8 presents the attributes that must be considered in the evaluation of each one of the views of the environment.

Table 8, Framework forces evaluation  
Source: own elaboration.

View	Factor	Attributes
<b>Customers: Service</b>	<b>Cost</b>	Physical cost: Transportation/Logistics cost relevance in total cost. Market mediation Cost: Obsolescence, Working Capital, Lost sales.
	<b>Demand</b>	Demand uncertainty / Customer's power
	<b>Winners</b>	What are the differentiated services features in order to create an unique value proposal in the market?
	<b>Qualifiers</b>	What are the minimum required services features in order to compete in the market?
<b>Customers: Product</b>	<b>Cost</b>	Physical cost: Product/Service cost relevance in Customer's business.
	<b>Technological</b>	Product life cycle.
	<b>Winners</b>	What are the differentiated product specifications/features in order to create an unique value proposal in the market?
	<b>Qualifiers</b>	What are the minimum required product specifications/features in order to compete in the market?
<b>Process</b>	<b>Cost</b>	Manufacturing cost relevance in total cost.
	<b>Technological</b>	Process technological maturity.
	<b>Fixed Assets</b>	Assets: Magnitude of the increases in capacity. General purpose or dedicated assets?
<b>Suppliers</b>	<b>Cost</b>	Product/Service cost relevance in manufacturer's business. Economies of scale.
	<b>Sourcing</b>	Sourcing uncertainty (Risk). Supplier's power. Sourcing complexity (SKUs / Suppliers, Local / Global sourcing)

## 6.6 Supply chain profile

The four components of the supply chain profile, *Service, Product, Process and Suppliers*, must be defined in accordance with the elements that characterize the flow of the supply chain. In order to define the elements of the four components, we refer to a comparative analysis of the relevant authors in issues concerning supply chain design and strategy, using a similar methodology as was used in Table 7, which is presented in table 9. With the purpose of ensuring the focus on key elements, some important second-level elements present in the works of these authors are omitted.

Table 9, Supply chain profile elements.  
Source: own elaboration.

Strategic Factor	Authors							
	Seuring 2009	Fisher 1998	Lee 2002, 2010	AT Kearney 2004	Huang 2002	Christopher & Towill 2000, 2009	Stavrulaki and Davis 2010	Hill & Hill, 2009
<b>General Framework</b>	Five Ps: Products, Partners, Plants, Processes and Planning	Supply chain focus	A portfolio approach to supply chain design	Customer, Value Add focus, Suppliers, Capacity, Assets	Manufacturing supply chain	Supply chain segmentation	Integrated perspective of how products, and processes should be aligned	Manufacturing Strategy
<b>Focus</b>		Manufacturing Focus / Lead Time Focus		Value Add Focus			with strategic	Order Winners / Qualifiers
<b>Products</b>	Portfolio, Performance (Quality / Cost)	Product design Strategy	Portfolio design / Portfolio Mix			Standard or Special	Product Variety	Product Variety / Volume
<b>Services</b>	Speed, Flexibility	Lead time focus	Supply Chain design "Speed"		Lead time focus	Customer Service Strategy: Order Cycle, Frequency of delivery, etc.	Order Lead Time	Order Speed, Order On time Compliance
<b>Buffering</b>	Stocking holding points, inventories	Inventory Strategy	Order fulfillment location / Inventory optimization	Capacity use & leverage, Stock points	Inventory strategy	Strategic Inventory		Inventory strategy
<b>Footprint</b>	Plant network		Regional Network optimization	Assets deployment				
<b>Processes</b>	Decoupling point, Postponement	Manufacturing Focus	Inventory Stocking Model (decoupling point)		Manufacturing focus (utilization rate or excess capacity)	Order decoupling point	Decoupling points, Production Flow	Decoupling point, Process flow
<b>Suppliers</b>		Approach to select suppliers		Cost, Lead time, Service, Flexibility	Approach to select suppliers		Opportunistic or Collaborative	
<b>Collaboration</b>	Information Sharing			Customer & Supplier integration				

The comparative analysis of the supply chain characterization allows identifying some common elements in the definition of most authors, such as: *Range of the product portfolio, cycle from order up to the delivery, inventory strategy, order's penetration point and suppliers' selection model*. Other equally important elements are also mentioned, but which are considered by a small group of authors, such as: *Fulfillment of the delivery promise, delivery frequency, places where the inventory is located, manufacturing network, process flow and collaborative relations*.

It's important to clarify difference between "order penetration point" and "divergence point", the first one is oriented to define the interrelation between customer's order and supply chain flow, while the last one is oriented to define the stage in the supply chain where the product take features that are exclusive for an specific customer or group of customers. In a well-designed supply chain both are located at the same point of the supply chain, but due to that, it's important to understand difference between them, in order to find cases where they are located in different stages of the supply chain.

It is important to highlight the elements associated to the "flow of the order", which despite the fact that some authors consider them as tactical elements, their definition and interaction among themselves have strategic implications in the operation of the supply chain, with both Customers and suppliers. These elements are: *the order's penetration point*, *the order's cycle (lead time or fixed cycle and the time beginning with the order until receiving)* and *the size of the order*. Additionally, *the order's penetration point*, associated with the *Manufacturing Cycle (the time it takes for the process to cover all of the portfolio's references)* have implications on the inventory strategy and in the customer service time, given that they define both inventory requirements by quantity, as well as inventory processing status and the type of production process (continuous process, lots, processes, assembly, among others.). Figure 11 presents the schematic relationship among these elements.

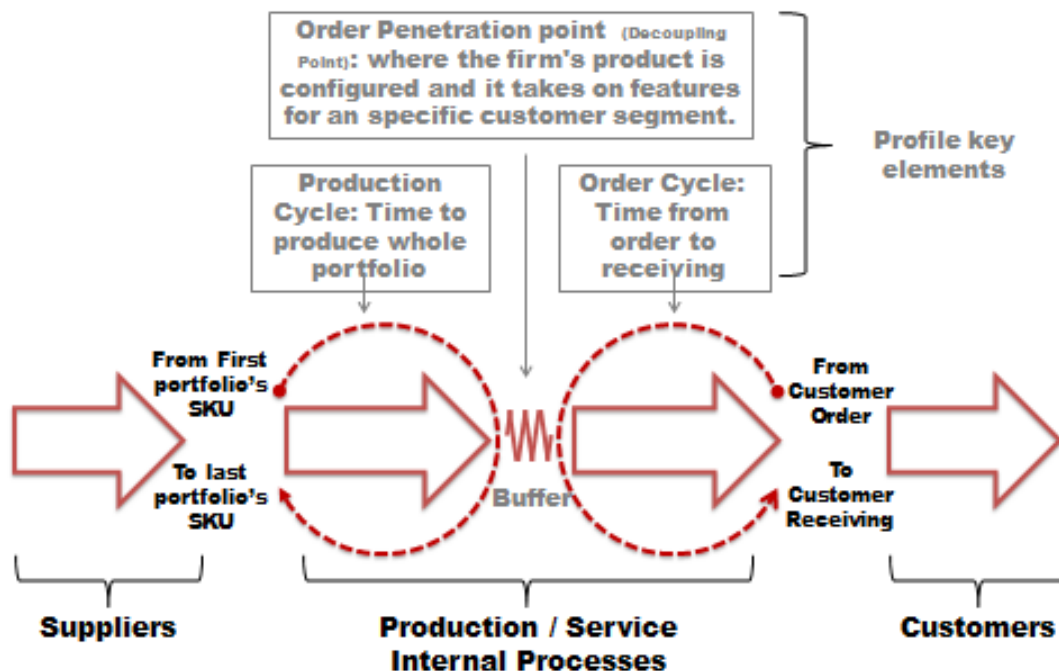


Figure 11, Relationship among order cycle, production cycle and order penetration point  
 Source: own elaboration.

The *order's penetration point*, *production cycle* and *order cycle*, are defined as *key elements of the supply chain profile*, since these govern one of the main strategic elements of the supply chain design: *variability buffering*, as presented in figure 12. The term *Buffering* is widely used, given that it covers diverse elements used for buffering variability, such as inventory strategy, capacity strategy and pooling.

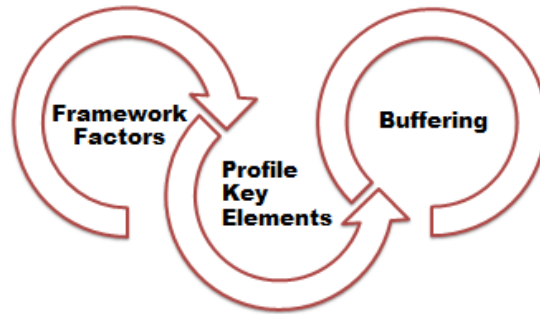


Figure 12, Relationship among framework factors, profile key elements and buffering  
 Source: own elaboration.

Figure 13 presents a first approach to “Supply Chain Roadmap™”, where the elements that characterize the supply chain profile in its four components and the three perspectives of the framework’s factors are introduced.

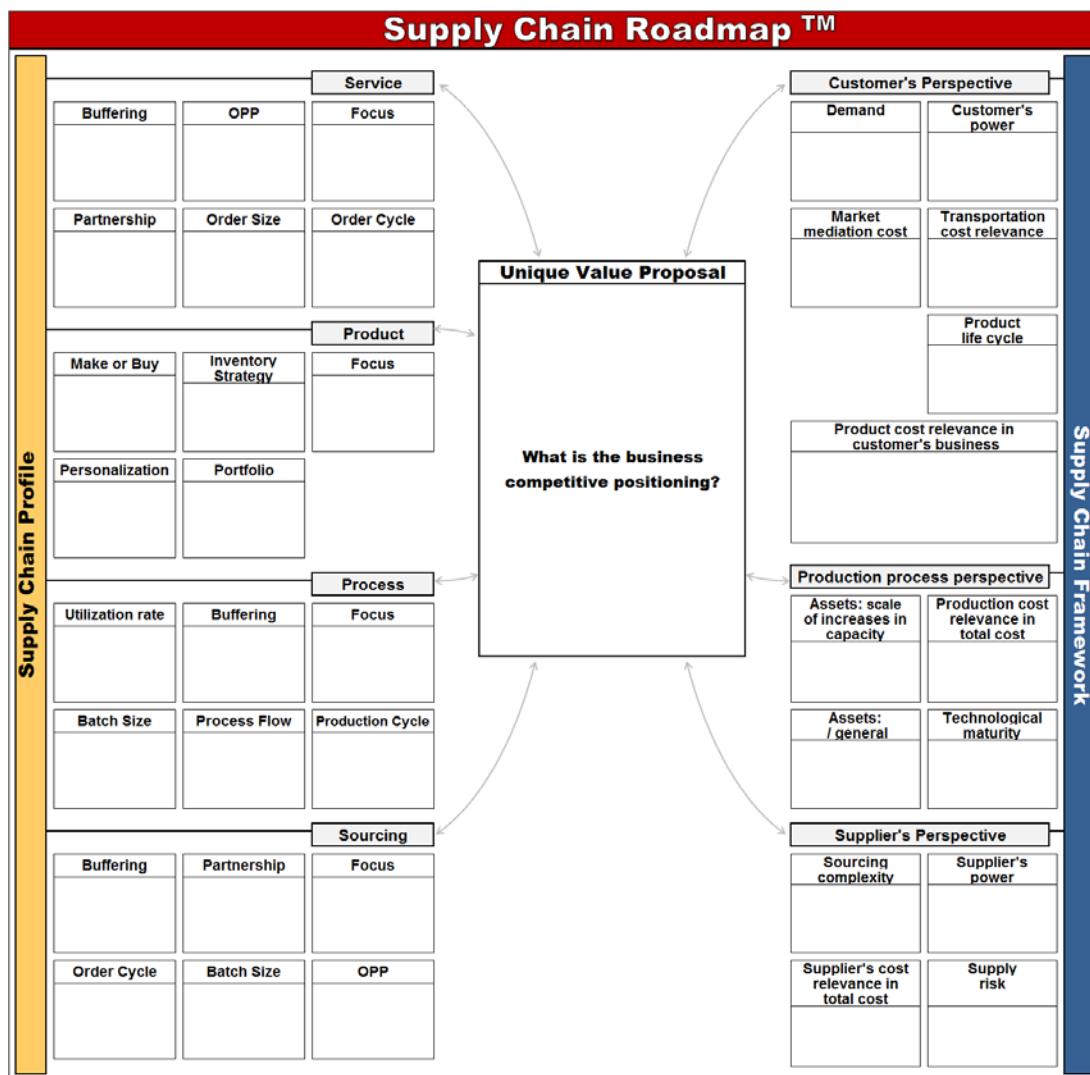


Figure 13, Supply Chain Roadmap profile and framework  
 Source: own elaboration.

### 6.7 Unique value proposal

The unique value proposal is the organization's differentiated offer to the market in terms of product and service, which is determined according to the alignment between *the organization's understanding of the market's needs* and the *organization's key competencies*.

There are many needs and manners of satisfying the market, the important thing is to select which of these needs can be satisfied better than other market players, supported in the organization's competencies and strengths. As presented in figure 14, the unique value proposal is the intersection between the understanding of the market's needs and the organization's competencies, which means that it is necessary to understand which of the market's needs can be satisfied in a differentiated manner, supported in the company's current competencies or which competencies must be developed in order to satisfy the market's needs, which until now have not been exploited by sector players.

The "Unique value proposal" is a mixed view of the "strategy based on resources" and "strategy based on market", because combines aspects of both models, looking for a balance between market needs and company's capabilities.

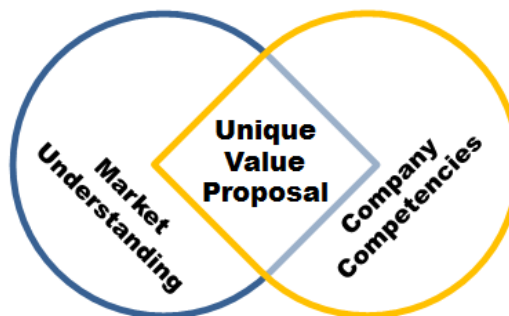


Figure 14, Unique Value Proposal  
Source: own elaboration.

### 6.8 Winners and Qualifiers: essence of the unique value proposal

As was explained previously, Product & Service Winners and Qualifiers are essence of the unique value proposal which is core of company's business strategy, as is shown in Figure 15.

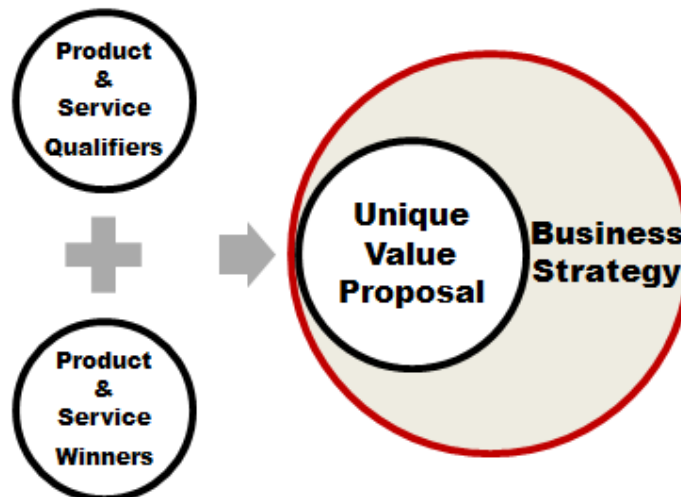


Figure 15, Winners & Qualifiers = Unique Value Proposal  
Source: own elaboration based on Hill.

Figure 16 presents the company's offering level with respect to the industrial sector where the company is competing. The company must develop competencies at a level similar to that of the industry (Qualifiers) and competencies with a high level of performance and experience so as to differentiate itself from its competitors (Winners).

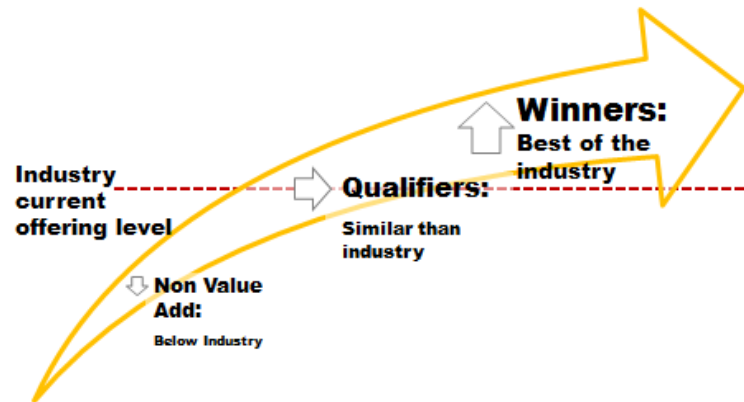


Figure 16, Unique value proposal levels  
 Source: own elaboration based on Hill.

The typical competencies to be developed in each supply chain component are defined in Table 10, which also presents a relationship among the main components of the unique value proposal and the components of the supply chain profile. As was explained by Skinner (1986) and Porter (1980), strategy focus is a key element in order to assure alignment among company objectives (winner/qualifier) and business execution.

Table 10, Supply Chain profile elements focus, according to unique value proposal  
 Source: own elaboration, based on Hill & Hill (2009).

		Focus				
Winner / Qualifier	Market oriented to...	Service	Product	Process	Sourcing	
Product	Price	Low cost products	Efficiency	Design oriented to low cost manufacturing	High utilization rate, Efficiency	Low total cost suppliers
	Performance	A product's primary operating characteristics		Quality conformance	Quality conformance	Quality conformance
	Features	High performance and differentiated characteristics		High Performance Product Design	"state of the art"	Innovative suppliers
	Product portfolio	Multiple products variety		Product Range	Assets flexibility, short set-up times	
	Customized Products	Fulfill specific customer needs		Collaborative Design	Postponment	Small order size (if there are exclusive materials for customized products)
	Time to market (Innovation)	Innovative products		Innovative Product Design	Assets flexibility	Fast time to market
Service	Delivery reliability	Service promise conformance (Perfect orders)	Perfect Orders			Reliable suppliers
	Delivery speed	Short "Customer order to receiving" cycle	Order Management		Extra capacity (high responsiveness)	
	Minimum order size	Small order size (packages or LTL dispatches)	Transportation flexibility	Product Range (packaging)	Assets flexibility, short set-up times	Small order size (if there are "low quantity" materials)
	Transactional effort	Automatized transactions	Electronic Data Interchange			
	Agility to demand changes	Fast response to demand changes	Buffering, Visibility		Assets flexibility, short set-up times	Agile Sourcing (Multiple Buffering)
	Cash Flow	Low inventories (working capital requirements)	Collaborative Planning		Assets flexibility, short set-up times	Short lead time (lower working capital)



Figure 17 presents “Supply Chain Roadmap™” model for characterizing an organization’s supply chain strategy, where the detailed elements of the unique value proposal are introduced together with the supply chain profile in its four components and the three perspectives of the supply chain framework.

Table 11 presents “Supply Chain Roadmap™” model under a “Parallel-Table” view, which is recommended to use for multiple supply chain analysis under a parallel view, while “graphic view” presented in figure 17 is recommended for a single supply chain analysis and for training and divulgation purposes.

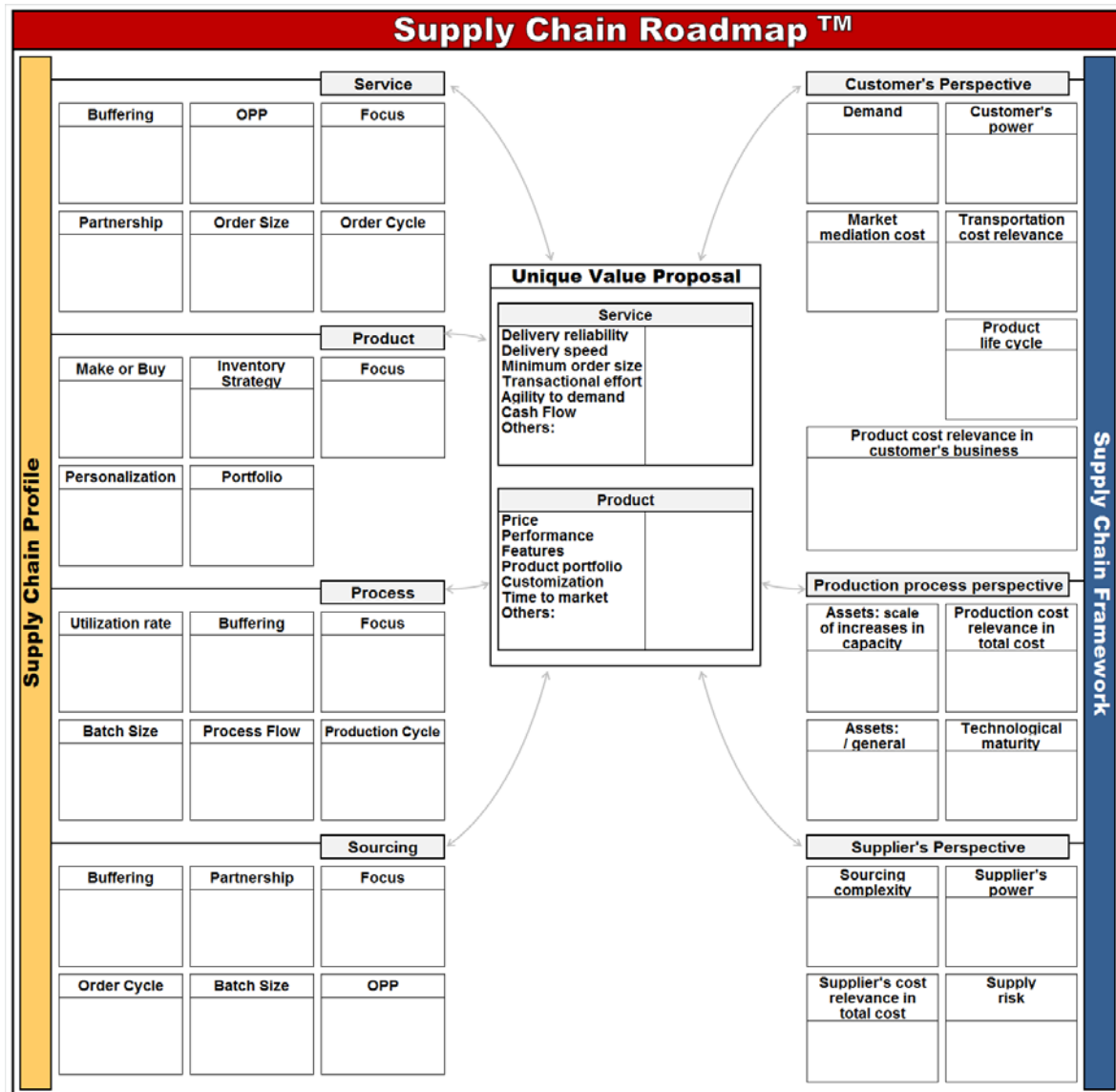


Figure 17, “Supply Chain Roadmap™” “Graphic view”  
 Guidelines for characterizing an organization’s supply chain  
 Source: own elaboration.

Table 11, “Supply Chain Roadmap™,” “Parallel-Table” View  
 Guidelines for characterizing an organization’s Supply Chain  
 Source: own elaboration.

		Factors/ Elements	Criteria	Supply Chain XX	Supply Chain YY	
Unique Value Proposal	Service	Winners	What are the differentiated services features in order to create an unique value proposal in the market?			
	Qualifiers	What are the minimum required services features in order to compete in the market?				
Product	Winners	What are the differentiated product specifications/features in order to create an unique value proposal in the market?				
	Qualifiers	What are the minimum required product specifications/features in order to compete in the market?				
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	Physical cost: Transportation/Logistics cost relevance in total cost. Market mediation Cost, Obsolescence, Working Capital, Lost sales.			
		Demand uncertainty	Is demand predictable, unpredictable or unexpected?			
		Customer's power	Customer's power based on alternatives (distribution channels, suppliers, substitutive products) and demand/offer ratio.			
		Technological - Product life cycle-	Product life cycle.			
	Process	Cost relevance in customer's business	Physical cost: Product/Service cost relevance in Customer's business.			
		Fixed Assets	Assets: Magnitude of the increases in capacity. General purpose or dedicated assets?			
		Technological Maturity	Process technological maturity.			
	Suppliers	Transformation cost relevance in total cost	Manufacturing cost relevance in total cost.			
		Supply risk	Are there risks associateds to supply disruptions?			
		Supplier's power	Supplier's power based on alternatives (distribution channels, suppliers, substitutive products) and demand/offer ratio.			
		Sourcing complexity	Global sourcing/ Local sourcing / Strategic partnership? High number SKUs/Suppliers? Markets Volatility?			
			Suppliers cost relevance in total cost	Product/Service cost relevance in manufacturer's business. Economies of scale.		
	Supply Chain Profile	<b>Supply Chain Focus</b>		Supply chain strategy is focused in...		
		Service	Focus	What are the relevant factors for customers service?		
OPP			Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.			
Order Size			In units (FTL, LTL, packages) and relevance compared against customers requirements (Large, normal, Small)			
Order Cycle			Fixed or variable? How many days? Relevance (Long, Medium, Short)?			
Partnership			Are Collaborative relationships used in a strategic/systematic way?			
Buffering			How/Where is demand buffered? (Inventory, Capacity, Pooling, other?)			
Product		Focus	What is the product focus? -minimize cost, postponment design, top performance, etc.-			
		Inventory Strategy	What is the inventories strategy?			
		Personalization	Are products personalized according to customer's specific needs? (Yes or Not)			
		Make or buy?	Are Transformation processes made or bought (outsourced)?			
Process		Product Segments	How many product segments are? (High, Medium, Low)			
		Focus	What is the focus of assets utilization?			
		Process Flow	What is the dominant process flow type? (Batch, Job Shop, Assembly line, continuous line)			
		Batch Size	Relevance compared against inventories policy (Large, normal, Small)			
		Production Cycle	Fixed or variable? How many days? Relevance (Long, Medium, Short)?			
		Utilization rate	What is the asset's utilization rate?			
Sourcing		Buffering	How/Where is process buffered? (Inventory, Capacity, Pooling, other?)			
		Focus	What are the relevant factors for suppliers selection?			
		OPP	Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.			
		Order Size	In units (FTL, LTL, packages) and relevance compared against inventory policy requirements (Large, normal, Small)			
		Order Cycle	Fixed or variable? How many days? Relevance (Long, Medium, Short)?			
		Partnership	Are Collaborative relationships used in a strategic/systematic way?			
		Buffering	How/Where is supply buffered? (Inventory, Capacity, Pooling, other?)			

## 6.9 “Supply Chain Roadmap™” model

An advantage of this method is that organization’s supply chain strategy can be gathered together, reviewed in a systematic and organized approach. This means that an organization can understand current status of supply chain strategy and to define gaps and/or inadequate alignment between supply chain strategy and business strategy. Supply Chain Strategy could be updated according to changes in business framework factors.

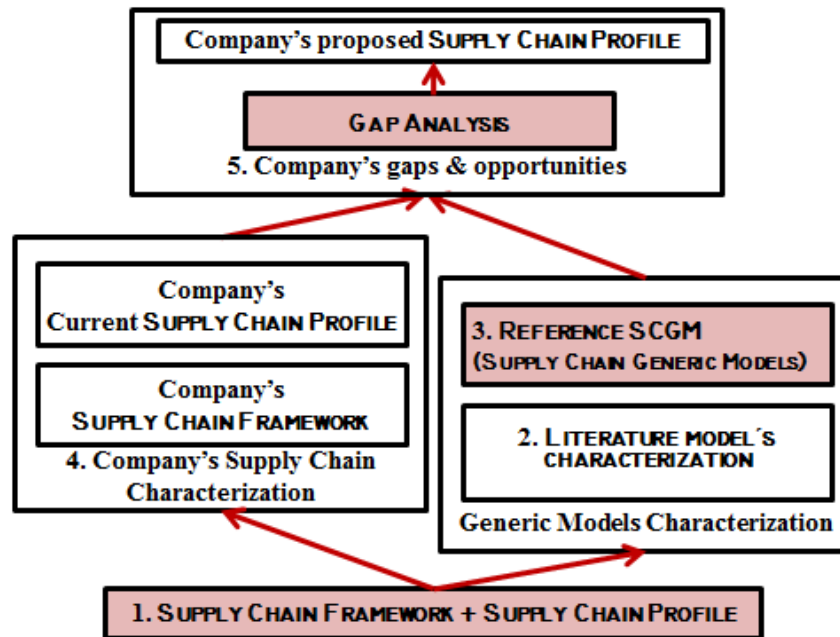


Figure 18, “Supply Chain Roadmap™” model  
Source: own elaboration.

“Supply Chain Roadmap™” uses two different tools for applying the method:

- “Supply Chain Framework + Supply Chain Profile”, which conform a “map” where in a single and simple view is characterized a supply chain strategy, for an own company and for “generic supply chain models”, these last, used as parameter of “generic approaches”.
- “Reference SCGM”, which develops a “general guidelines” about compatibility among business framework and supply chain profile elements, based on “generic supply chain models”, which are supported by findings grounded in models developed by recognized authors, case studies and experience of experts.

Based on both tools, method could be applied to any organization, first, doing an organization’s supply chain characterization using “Supply Chain Framework + Supply Chain Profile”, and after that, doing a verification of alignment supported by “Reference SCGM”.

An alternative use of “Supply chain roadmap™” is to avoid use of “Reference SCGM”, and to do an analysis of organization’s supply chain strategy based on experts open discussion of current organization’s supply chain strategy, supported by characterization done in “Supply Chain Framework + Supply Chain Profile”.

## **Section 3: Reference “Generic Supply Chain models”**

*Supply Chain Roadmap provides a method oriented to gather information about business environment and current organization’s supply chain profile, in order to characterize an organization’s supply chain strategy under a single drawing called “Supply Chain Roadmap<sup>TM</sup>”, which contains business framework factors, supply chain profile elements and relationship among them. Based on “Supply Chain Roadmap<sup>TM</sup>”, is possible to identify proper alignment between supply chain strategy and business strategy.*

*This section pretends to characterize “Generic Supply Chain models” under “Supply Chain Roadmap<sup>TM</sup>” characterization model, aiming for understanding under a unique method differences and similarities among the proposal of the most renowned authors as Fisher, Lee, Ketchen, Gattorna and Christopher. After that, a crossed analysis among the SCGM proposed by the authors, and author’s own experience, will be used to define “Reference SCGM”, which will be used as “role model” in order to fin gaps in a company’s supply chain strategy.*

## 7. Characterization of the supply chain generic models

### 7.1 Fisher's approach

One of the most widely known models for "Supply Chain strategy", was developed by Marshall Fisher in his very recognized article "What is the right supply chain for your product?" (1997), in this article Fisher introduces two "generic supply chain models": "Responsive" and "Efficient" and presents main characteristic of them. Table 12 presents Fisher's description of both models.

Table 12, Fisher's Efficient and Responsive Supply Chains.  
Source: What is the right supply chain for your Product? (Fisher 1997).

		Functional Products, Efficient Supply Chain	Innovative Products, Responsive Supply Chain
<b>Demand Features</b>	Product life cycle	more than 2 y	3 m to 1 y
	Contribution margin	5% to 20%	20% to 60%
	Product variety	Low	High
	Average margin of error in the forecast at the time production is committed	10%	40% to 100%
	Average stockout rate	1% to 2%	10% to 40%
	Average forced end of season markdown as percentage of full price	0%	10% to 25%
	Lead time required for made to order products	6 months to 1 year	1 day to 2 weeks
<b>Supply Chain Features</b>	Primary purpose	Supply predictable demand efficiently at the lowest possible cost	Respond quickly to unpredictable demand in order to minimize stockouts, forced markdowns and obsolete inventory
	Manufacturing focus	Maintain high average utilization rate	Deploy excess buffer capacity
	Inventory Strategy	Generate high turns and minimize inventory throughout the chain	Deploy significant buffer stocks of parts or finished goods
	Lead Time Focus	Shorten lead time as long as it doesn't increase cost	Invest aggressively in ways to reduce lead time
	Approach to choosing suppliers	Select primarily for cost and quality	Select primarily for speed, flexibility and quality
	Product design strategy	Maximize performance and minimize cost	Use modular design in order to postpone product differentiation for as long as possible

Based on Fisher's description, we apply "Supply Chain Roadmap <sup>TM</sup>" model for characterizing both supply chains, and define more relevant features of these models, which are highlighted and presented in Table 13.

Table 13, Fisher's Efficient and Responsive Supply Chains characterized under "Supply Chain Roadmap™" model.  
Source: Own elaboration.

		Factors/ Elements	Criteria	Fisher		
				Efficient	Responsive	
Unique Value Proposal	Service	Winners	What are the differentiated services features in order to create an unique value proposal in the market?	According to specific industry's characteristics	Agility to demand changes	
		Qualifiers	What are the minimum required services features in order to compete in the market?	Delivery reliability, lowest transactional effort	Delivery speed	
	Product	Winners	What are the differentiated product specifications/features in order to create an unique value proposal in the market?	Low Price	Product Features (innovation)	
		Qualifiers	What are the minimum required product specifications/features in order to compete in the market?	Product Performance	Product Performance	
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	Physical cost Transportation/Logistics cost relevance in total cost. Market mediation Cost. Obsolescence, Working Capital, Lost sales.	According to specific industry's characteristics	According to specific industry's characteristics	
		Demand uncertainty	Is demand predictable, unpredictable or unexpected?	Predictable demand	Unpredictable	
		Customer's power	Customer's power based on alternatives (distribution channels, suppliers, substitute products) and demand/offer ratio.	According to specific industry's characteristics	According to specific industry's characteristics	
		Technological - Product life cycle-	Product life cycle.	Long life cycle	Short life cycle	
	Process	Cost relevance in customer's business	Physical cost Product/Service cost relevance in Customer's business	According to specific industry's characteristics	According to specific industry's characteristics	
		Fixed Assets	Assets Magnitude of the increases in capacity. General purpose or dedicated assets?	According to specific industry's characteristics	According to specific industry's characteristics	
		Technological Maturity	Process technological maturity.			
	Transformation cost relevance in total cost	Manufacturing cost relevance in total cost.				
	Suppliers	Supply risk	Are there risks associated to supply disruptions?	Low risk to disruptions	Low risk to disruptions	
		Supplier's power	Supplier's power based on alternatives (distribution channels, suppliers, substitute products) and demand/offer ratio.	According to specific industry's characteristics	According to specific industry's characteristics	
		Sourcing complexity	Global sourcing/ Local sourcing / Strategic partnership? High number SKUs/Suppliers? Markets Volatility?			
		Suppliers cost relevance in total cost	Product/Service cost relevance in manufacturer's business. Economies of scale.			
	Supply Chain Profile	<b>Supply Chain Focus</b>		Supply chain strategy is focused in...	Lowest possible cost	Agility
		Service	Focus	What are the relevant factors for customers service?	Perfect orders, Information sharing	Order management
OPP			Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.	According to specific industry's characteristics	According to specific industry's characteristics	
Order Size			In units (FTL, LTL, packages) and relevance compared against customers requirements (Large, normal, Small)	According to lowest transportation cost	Smallest possible in order to reduce obsolete	
Order Cycle			Fixed or variable? How many days? Relevance (Long, Medium, Short)?	Fixed, looking for lowest transaction cost	Shortest possible in order to avoid stockouts	
Partnership			Are Collaborative relationships used in a strategic/systematic way?	Maybe	No	
Buffering			How/Where is demand buffered? (Inventory, Capacity, Pooling, other?)	Finished product looking for scale economies	Inventory before divergence point	
Product		Focus	What is the product focus? -minimize cost, postponment design, top performance, etc.-	Minimize cost at standard performance	Postponment design	
		Inventory Strategy	What is the inventories strategy?	Reduce working capital w/o affect product cost	Minimize market mediation cost (obsoletes and lost sales)	
		Personalization	Are products personalized according to customer's specific needs? (Yes or Not)	No apply	Not necessary, but highly possible	
		Make or buy?	Are Transformation processes made or bought (outsourced)?	According to specific industry's characteristics	According to specific industry's characteristics	
		Product Segments	How many product segments are? (High, Medium, Low)	Low	High	
Process		Focus	What is the focus of assets utilization?	High utilization rate	Assets flexibility, short set-up times	
		Process Flow	What is the dominant process flow type? (Batch, Job Shop, Assembly line, continuous line)	According to specific industry's characteristics	According to specific industry's characteristics	
		Batch Size	Relevance compared against inventories policy (Large, normal, Small)	Largest possible for increasing utilization rate	Smallest possible in order to reduce obsolesce risk	
		Production Cycle	Fixed or variable? How many days? Relevance (Long, Medium, Short)?	Balance between low inventory / asset utilization	Shortest possible in order to increase delivery speed	
		Utilization rate	What is the assets' utilization rate?	Probably High	According to specific industry's characteristics	
		Buffering	How/Where is process buffered? (Inventory, Capacity, Pooling, other?)	Inventory, smallest as possible	Excess capacity	
		Sourcing	Focus	What are the relevant factors for suppliers selection?	Low total cost supplier. Cost & Quality	Agile Sourcing (multiple buffering)
OPP			Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.	According to specific industry's characteristics	According to specific industry's characteristics	
Order Size	In units (FTL, LTL, packages) and relevance compared against inventory policy requirements (Large, normal, Small)		According to lowest transportation cost	Smallest possible in order to reduce obsolesce risk		
Order Cycle	Fixed or variable? How many days? Relevance (Long, Medium, Short)?		Fixed, looking for lowest transaction cost	Shortest possible in order to increase delivery speed		
Partnership	Are Collaborative relationships used in a strategic/systematic way?		It's important	It's possible		
Buffering	How/Where is supply buffered? (Inventory, Capacity, Pooling, other?)		Inventory, smallest as possible	Several suppliers		

Fisher’s model is easy to understand and very practical, and today 15 years after its introduction, is used as reference by supply chain experts and it could be enough for a first approach to supply chain strategy, but, could be restricted to simplest situations.

### 7.2 Lee’s “Uncertainty Framework”

After Fisher’s approach, one of the most widely known models for “Supply Chain strategy”, was developed by Hau Lee in 2002, called “Uncertainty Framework”, this model recognized Fisher’s works, but introduced an additional element: “Supply uncertainty”, which is defined by Lee in two levels “Stable supply” and “evolving supply”. According to Lee “A stable supply is where the manufacturing process and the underlying technology are mature and the supply base is well established. An evolving supply process is where the manufacturing process and the underlying technology are still under early development and are rapidly changing, and as a result the supply base may be limited in both size and experience”. Table 14 resumes supply characteristics of both supply levels.

Table 14, Stable vs. evolving supply  
 Source: Aligning supply chain strategies with product uncertainties (Lee 2002)

<b>Stable</b>	<b>Evolving</b>
Less Breakdowns	Vulnerable to breakdowns
Stable and higher yields	Variable and lower yields
Less quality problems	Potential quality problems
More supply sources	Limited supply sources
Reliable suppliers	Unreliable suppliers
Less process changes	More process changes
Less capacity constraints	Potential capacity constrained
Easier to changeover	Difficult to changeover
Flexible	Inflexible
Dependable lead time	Variable lead time

Lee introduces four different “generic supply chain models”, based on the relationship between demand uncertainty and supply uncertainty, as is shown in Figure 19.

		<b>Demand Uncertainty</b>	
		<b>Low</b> -Functional Products-	-Innovative Products- <b>High</b>
<b>Supply Uncertainty</b>	<b>Low</b> -Stable process-	<b>Efficient</b>	<b>Responsive</b>
	<b>High</b> -Evolving process-	<b>Risk Hedging</b>	<b>Agile</b>

Figure 19, Lee’s “Generic Supply Chain Models”  
 Source: Aligning supply chain strategies with product uncertainties (Lee 2002)

Main characteristics of these models, according to Lee (2002), are:

- Efficient: Oriented to high efficiencies in the supply chain, eliminating non value add activities and pursuing high utilization rates and scale economies. Inventory is reduced as smallest is possible taking care of doesn't affect cost.
- Responsive: Oriented to responsiveness to demand changes and diverse needs of customers. Uses postponement design looking for reducing inventory and increasing delivery speed.
- Risk Hedging: Uses pooling and sharing resources so that the risks in supply disruptions could be shared among supply chain members or inclusive among competitors.
- Agile: Combines "Hedging" and "responsiveness" in order to maintain supply continuity. They have the capability to be responsive to unpredictable demands, while minimizing sourcing risks.

Based on Lee's description, we apply "Supply Chain Roadmap™" model for characterizing all four supply chains, and define more relevant features of these models, which are highlighted and presented in Table 15. A comparison between Lee's and Fisher's models according to "Supply Chain Roadmap" characterization model permits to deduct some important findings:

- Lee's efficient supply chain and Fisher's efficient supply chain have several common points, and, the most relevant differences are that Lee's model emphasizes in continuous replenishment and information sharing as key elements for assuring higher efficiencies.
- Greatest difference between Lee's responsive supply chain and Fisher's responsive supply chain is that Lee highlights importance of "mass customization" as key element of "value proposal" to customers, based on that, two elements are relevant, a BTO (Build to order) order penetration point, looking for increasing agility to customer needs, and, suppliers hub nearest to assembly site, in order to assure fastest response to demand changes.
- Risk Hedging supply chain in Lee's model, is characterized by a demand with high levels of uncertainties, and due that, product availability became in a key factor of success. Lee proposes inventory pooling and capacity pooling as buffer system, and emphasizes importance of inventory visibility among supply chain partners in order to assure fast movement of inventory between them.
- Agile supply chain in Lee's model is the most complex supply chain, because is affected by uncertainties and variability in both edges, demand and supply. Lee recommends a mix among Risk Hedging and Responsive supply chains, taking elements from both of them. According to that, an agile Supply Chain combines information sharing, inventory visibility, inventory pooling, capacity pooling and a supplier's hub, in order to assure fast response for customized demands.

Lee's approach is a most refined view of generic supply chain models, and constitutes the basis for further developments realized by several authors in the last decade. Maybe, Fisher's article is most widely known and it is recognized as the breaking point from manufacturing strategy to supply chain strategy, but Lee's article should be recognized as the most complete base of today's supply chain strategy.



Table 15, Lee's proposal characterized under "Supply Chain Roadmap™" model.  
Source: Own elaboration.

		Factors/ Elements	Lee				
			Efficient	Responsive	Risk Hedging	Agile	
Unique Value Proposal	Service	Winners	Information sharing for cost improvement	Agility to demand changes	Information sharing for assuring availability	Agility / information sharing for fulfill demand	
		Qualifiers	Delivery reliability, lowest transactional effort	Delivery speed, Order accuracy	Delivery reliability, lowest transactional effort	Delivery speed, Order accuracy	
	Product	Winners	Low Price	Product Features (innovation)	Low Price	Product Features (innovation)	
		Qualifiers	Product Performance	Product Performance	Product Performance	Product Performance	
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Demand uncertainty	Predictable	Unpredictable	Predictable	Unpredictable	
		Customer's power	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Technological - Product life cycle-	Long life cycle	Short life cycle	Long life cycle	Short life cycle	
		Cost relevance in customer's business	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
	Process	Fixed Assets	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Technological Maturity	Mature	Immature	Mature	Immature	
		Transformation cost relevance in total cost	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
	Suppliers	Supply risk	Low risk of disruptions.	Low risk of disruptions.	High risk of disruptions.	High risk of disruptions.	
		Supplier's power	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Sourcing complexity					
		Suppliers cost relevance in total cost					
	Supply Chain Profile	<b>Supply Chain Focus</b>		Highest cost efficiency	Flexible to customers requirements	Sharing resources to protect against supply disruptions	Responsiveness to unpredictable demands and supply disruptions
		Service	Focus	Information sharing for assuring lowest total cost	Agility, Order accuracy (for customization)	Information sharing for assuring availability	Agility, information sharing, for fulfill demand
OPP			According to specific industry's characteristics	BTO (build to order)	According to specific industry's characteristics	BTO (build to order)	
Order Size			According to lowest transportation cost	Smallest possible in order to reduce obsolete	According to lowest transportation cost	Smallest possible in order to reduce obsolete	
Order Cycle			Fixed, looking for lowest transaction cost	Shortest possible in order to avoid stockouts	Fixed, looking for lowest transaction cost	Shortest possible in order to avoid stockouts	
Partnership			Maybe	No	No	No	
Buffering			Stock of finished product	Inventory before divergence point	Inventory/ capacity pooling	Inventory before divergence point / Inventory pooling	
Product		Focus	Minimize cost at standard performance	Postponment design (mass customization)	Minimize cost at standard performance	Postponment design (mass customization)	
		Inventory Strategy	Reduce working capital w/o affect product cost	Minimize market mediation cost (obsoletes and lost sales)	Balance inventory cost / risk by inventory sharing	Inventory reconfiguration / pooling	
		Personalization	No apply	Not necessary, but highly possible	No apply	Not necessary, but highly possible	
		Make or buy?	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Product Segments	Low	High	Low	High	
Process		Focus	High utilization rate	Extra capacity to increase responsiveness	High utilization rate	Extra capacity to increase responsiveness	
		Process Flow	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Batch Size	Largest possible in order to increase utilization rate	Smallest possible in order to reduce obsolesce risk	Largest possible in order to increase utilization rate	Smallest possible in order to reduce obsolesce risk	
		Production Cycle	Longest possible, in balance with low inventory	Shortest possible in order to increase delivery speed	Longest possible, in balance with low inventory	Shortest possible in order to increase delivery speed	
		Utilization rate	Probably High	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Buffering	Inventory, smallest as possible	Excess capacity	Inventory, smallest as possible	Excess capacity	
Sourcing		Focus	Continuous Replenishment, Cost & Quality	Suppliers hub nearest to assembly site	Inventory visibility	Suppliers hub/pooling, inventory visibility	
		OPP	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Order Size	According to lowest transportation cost	Smallest possible in order to reduce obsolesce risk	According to lowest transportation cost	Smallest possible in order to reduce obsolesce risk	
	Order Cycle	Fixed, looking for lowest transaction cost	Shortest possible in order to increase delivery speed	Variable, looking for increasing availability	Shortest possible in order to increase delivery speed		
	Partnership	It's important	It's possible	It's possible	It's possible		
	Buffering	Inventory, smallest as possible	Several suppliers	Several sources	Several suppliers		

### 7.3 Lee’s “Triple A Supply Chain”

“All those companies and initiatives persistently aimed at greater speed and cost effectiveness - the popular grails of supply chain management-. Of course, companies’ quests changed with the industrial cycle: When business was booming, executives concentrated on maximizing speed, and when the economy headed south, firms desperately tried to minimize supply costs....

.... As time went by, however, I observed one fundamental problem that most companies and experts seemed to ignore: Ceteris paribus, companies whose supply chains became more efficient and cost-effective didn't gain a sustainable advantage over their rivals. In fact, the performance of those supply chains steadily deteriorated.” (Lee, 2004)

Two years after introduction of “uncertainty framework” model, Lee presents a new approach for Supply Chain Strategy: “The triple A Supply Chain”, as it is explained by Lee (see previous paragraph), when companies are looking for speed and efficiency, they lost competitive advantage against his peers. “Triple A Supply Chain” focus companies in a most balanced supply chain strategy, whose could be applied to today’s business framework, which is characterized by high volatility levels in demand and supply. Table 16 shows main characteristics of Lee’s “Triple A Supply Chain”.

Table 16, Lee’s “Triple A Supply Chain”.  
Source: Adapted from “The Triple A Supply Chain” (Lee 2004).

	<b>Agility</b>	<b>Adaptability</b>	<b>Alignment</b>
<b>Definition</b>	React speedily to sudden changes in demand or supply	Adapt overtime as market structures and strategies evolve	Align the interests of all the firms in the supply network so that companies optimize the chain's performance when they maximize their own interests.
<b>Objective</b>	Respond to short-term changes in demand or supply quickly; handle external disruptions smoothly.	Adjust supply chain's design to meet structural shifts in markets; modify supply network to strategies, products, and technologies.	Create incentives for better performance.
<b>Methods</b>	Promote flow of information with suppliers and customers.	Monitor economies all over the world to spot new supply bases and markets,	Exchange information and itnowledge freely with vendors and customers.
	Develop collaborative relationships with suppliers.	Use intermediaries to develop fresh suppliers and logistics infraestructure.	Lay down roles, tasks, and responsibilities clearly for suppliers and customers.
	Design for postponement.	Evaluate needs of end consumers, not just immediate customers/shoppers.	Equitably share risks, costs, and gains of improvement initiatives
	Build inventory buffers by maintaining a stockpile of inexpensive but key components.	Create flexible product designs.	
	Have a dependable logistics system or partner.	Determine where companies' products stand in terms of technology cycles and product life cycles.	
	Draw up contingency plans and develop crisis management teams.		

“The Triple A Supply Chain” could be characterized according to “Supply Chain Roadmap” characterization model, as is shown in Table 17, where is clear the similarity with “Agile Supply Chain” defined by Lee under “Uncertainty Framework” model. “Triple A Supply Chain” is reloaded versus an “Agile” supply chain with two main features: (1) Collaborative relationships with customers/ suppliers, in order to assure free information exchange and objectives alignment along chain, which is base for risks / gains sharing among supply chain members. (2) Multiple supply chains for one company, this concept is revolutionary for that moment, and demystify several paradigms, inviting companies to create parallel supply chains, one for each different market framework, under a unique umbrella supply chain.

Table 17, Lee's "Triple A Supply Chain", Ketchen's "Best Value Supply Chain" characterized under "Supply Chain Roadmap™" model.  
 Source: Own elaboration.

		Factors/ Elements	Lee	Ketchen & Hult	
			Triple A Supply Chain	Best Value Supply Chain	
Unique Value Proposal	Service	Winners	Agility / information sharing for fulfill demand	Agility / information sharing for fulfill demand	
		Qualifiers	Delivery speed, Order accuracy	Delivery speed, Order accuracy	
	Product	Winners	Ratio Price/ Features	Ratio Price/ Features	
		Qualifiers	Product Performance	Product Performance	
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	According to specific industry's characteristics	According to specific industry's characteristics	
		Demand uncertainty	Both, Predictable / Unpredictable	Both, Predictable / Unpredictable	
		Customer's power	According to specific industry's characteristics	According to specific industry's characteristics	
		Technological - Product life cycle- Cost relevance in customer's business			
	Fixed Assets				
	Technological Maturity				
	Process	Transformation cost relevance in total cost	According to specific industry's characteristics	According to specific industry's characteristics	
		Supply risk			
	Suppliers	Supplier's power	According to specific industry's characteristics	According to specific industry's characteristics	
		Sourcing complexity			
		Suppliers cost relevance in total cost			
	Supply Chain Profile	<b>Supply Chain Focus</b>		Supply Chain as competitive advantage, optimizing chain's performance	Supply Chain as core element of strategy, to deliver superior total value to the customers.
		Service	Focus	Collaborative relationships (exchange information, align objectives, share risks/gains)	Collaborative relationships (exchange information, align objectives, share risks/gains)
OPP			BTO (build to order)	According to specific industry's characteristics	
Order Size			Smallest possible in order to reduce obsolete and avoid pricedown	Smallest possible in order to reduce obsolete and avoid pricedown	
Order Cycle			Shortest possible in order to avoid stockouts	Shortest possible in order to avoid stockouts	
Partnership			Highly possible	Highly possible	
Buffering			Inventory of inexpensive key components	Inventory / Capacity, optimized by information sharing	
Product		Focus	Postponement design (mass customization)	Early supplier involvement in product development	
		Inventory Strategy	Small inventory of inexpensive parts that are often the cause of bottlenecks	"Positioning inventory" to achieve time/place/possession benefits at lowest practical cost.	
		Personalization	Not necessary, but highly possible	Not necessary, but highly possible	
		Make or buy?	According to specific industry's characteristics	According to specific industry's characteristics	
Process		Product Segments	According to specific industry's characteristics	According to specific industry's characteristics	
		Focus	Agility: Extra capacity to increase responsiveness	Agility: Extra capacity to increase responsiveness	
		Process Flow	According to specific industry's characteristics	According to specific industry's characteristics	
		Batch Size	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	
		Production Cycle	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	
		Utilization rate	According to specific industry's characteristics	According to specific industry's characteristics	
		Buffering	Excess capacity / Pooling capacity	Excess capacity / Pooling capacity	
Sourcing		Focus	Collaborative relationships (exchange information, align objectives, share risks/gains)	Early supplier involvement & Collaborative relationships	
		OPP	According to specific industry's characteristics	According to specific industry's characteristics	
		Order Size	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	
		Order Cycle	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	
		Partnership	It's important	It's important	
		Buffering	Several suppliers, Pooling suppliers	Inventory / Capacity, optimized by information sharing	

## 7.4 Best Value Supply Chain

Ketchen and Hult introduced in 2007 “Best Value Supply Chain”, which, are “*further distinguished from other chains by how they approach issues of agility, adaptability, and alignment, and by their ability to pursue competitive priorities: speed, quality, cost and flexibility*”.

“Best Value Supply Chain” build an updated version of Lee’s “Triple A Supply Chain”, because is supported in Lee’s three “A”, and introduce two additional concepts: (1) “Competitive priorities”, whose, are: Speed (cycle time), Quality, Cost and Flexibility (Responsiveness), and (2) “Four key areas”, which are: strategic sourcing, Logistics management, Information systems and Relationship management, where are present Lee’s main concepts, as: information systems (information sharing, transactional effectiveness, decision analysis), buffer management and relationship management (focusing collaboration with key partners).

Table 18 shows a parallel between “Best Value Supply Chain” and Traditional Supply Chains. “Best Value Supply Chain” characterization under “Supply Chain Roadmap <sup>TM</sup>” model is presented in Table 17, where is shown a parallel view with “Triple A Supply Chain”.

Table 18, A comparison of best value and traditional supply chains  
 Source: Bridging organization theory and supply chain management:  
 the case of Best Value Supply Chains. (Ketchen & Hult, 2007)

Issue	Best value supply chains	Traditional supply chains
<b>View of supply chain management</b>	“Strategic supply chain management”—chains are a strategic weapon	Chains are a method to move products in order to support strategy
<b>Agility</b>	Strong ability to be proactive as well as responsive to changes	Modest ability to respond to changes
<b>Adaptability</b>	Maintain a limited set of multiple chains to ensure distribution	Often limited to single chains or a large number of chains
<b>Alignment</b>	Interests of participants coincide (or is developed to be synergistic)	Participants forced to choose between own and chain's interests
<b>Competitive priorities</b>	Total value across speed, quality, cost, and flexibility	Emphasize one of the four competitive priorities

## 7.5 Gattorna “Dynamics Supply Chain”

*“The secret to designing a superior supply chain is to start by re segment our customers by their purchasing habits, and then design the chain in reverse from there ... in fact, something we have known for some time, but we’ve been denying, is that customers are ultimately our frame of reference.” Gattorna (2006)*

A paper developed in conjunction by Martin Christopher and John Gattorna (2004), presents a method for supply chain segmentation based on customer’s dominant buying behaviors. In 2008 Gattorna reinforces his own theory in a review about “Triple A Supply Chain”, introducing an additional concept to Lee’s approach: “the cultural perspective”. In own Gattorna words: “...in my experience, over 40% of strategies written into business plans fail to be implemented, and it’s all due to a ‘misalignment’ between those strategies and the ‘values’ of the people inside the organization, and the partner organizations in the chain.”, and based on this concept, Gattorna segments customers behaviors and creates a new “Generic Supply Chain model”, which, come back to Lee’s first approach, and proposes four different supply chains, according to customers preferences and behaviors, whose are presented in Table 19.

Gattorna’s model is founded in “customer’s behaviors understanding”, and he is very critical about Porter’s strategy model, because “Porter’s philosophy seems to have convinced generations of managers that the key is to observe their competitors” instead customers understanding.

At this stage, could be present a confusion about similarity between Lee’s “uncertainty framework” and Gattorna “Dynamic Supply Chains”, which could be clarified according to Gattorna’s owns words (2006), “Lee proposed four types of supply chain strategies, whose are similar to my own taxonomy: Efficient Supply Chain (equivalent to my Lean), Risk Hedging Supply Chain (equivalent to my fully flexible), Responsive Supply Chain and Agile Supply Chain (taken together seem similar to my agile), and finally, Lee doesn’t suggest nothing about my continuous replenishment model. Maybe, some characteristics of this are found in his Efficient Supply Chain”.

Additionally, it is important to highlight, that Gattorna’s Lean supply chain is a market push model, where customer collaboration is not present, instead, continuous replenishment model, is a market pull model, a step forward supply chain, where customer collaboration is required.

Table 19, Buying behaviors  
 Source: Adapted from Christopher & Gattorna, 2004.

Buying behaviors				
	<b>Collaborative</b> Close working relationships for mutual gain	<b>Efficiency / Consistency</b> Consisten responde to largelly predictable demands	<b>Demanding / Quick Response</b> Rapid response to unpredictable supply and demand conditions	<b>Innovative Solutions</b> Supplier led development and delivery of new ideas
<b>Demand</b>	Mostly predictable	Predictable demand within contract	Unpredictable	Very unpredictable demand
<b>Order Cycle</b>	Regular delivery	Regular delivery	Time priority/ urgency	Flexible delivery response
<b>Focus</b>	Cash flow	Efficiency low cost focus	Opportunity focus	Innovation focus
<b>Supply</b>	Primary source of supply	Multiple sources of supply	Ad hoc source of supply	For specific services / cases
<b>Relationship</b>	Trusting relationship	More adversarial	Low loyalty	For specific services / cases
<b>Information Sharing</b>	Information sharing	Little sharing of information / Transactional oriented	No sharing information	Solutions oriented
<b>Price</b>	Price not an issue	Very price sensitive	Price aware	No price sensitivity

Supply Chain Strategy				
	<b>Continuous replenishment</b>	<b>Lean</b>	<b>Agile</b>	<b>Fully Flexible</b>
<b>Focus</b>	Focus on developing loyal customer relationship with trusty & reliable service	Focus on economies of scale, synergies and low cost production and delivery	Focus on responding rapidly & comercially to unpredictable supply/demand conditions	Hedging & deployment strategies used to improve responsiveness on a selective basis

Gattorna’s proposal contributes to understand that product segmentation –Fisher, Lee models- is not always a right approach to supply chain design, instead, proposes to understand customers behaviors and based on that, understand their implications for supply chain design and operation. In few words, Gattorna introduces “cultural perspective” as a key element that must be considered in supply chain design and operation. Table 20 presents “Dynamic supply chains” characterization according to “Supply Chain Road map<sup>TM</sup>” model.

Table 20, Gattorna's "Dynamic Supply Chains"  
characterized under "Supply Chain Roadmap™" model.  
Source: Own elaboration.

		Gattorna					
		Factors/ Elements	Continuous replenishment	Lean	Agile	Fully Flexible	
Unique Value Proposal	Service	Winners	Collaborative relationships efficiency oriented	Lowest total cost	Agility to unpredictable demand	Solutions proposal	
		Qualifiers	Order fulfillment (Perfect orders)	Order fulfillment (Perfect orders)	Delivery speed, Order accuracy	Agility to unpredictable requirements	
	Product	Winners	Product Features (innovation)	Lowest cost	Product Features (innovation)	Solutions proposal	
		Qualifiers	Product Performance	Product Performance	Product Performance	According to specific industry's characteristics	
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Demand uncertainty	Mostly predictable	Predictable demand within contract	Unpredictable	Very unpredictable demand	
		Customer's power	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Technological - Product life cycle- Cost relevance in customer's business	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Process	Fixed Assets	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
			Technological Maturity				
	Transformation cost relevance in total cost						
	Suppliers	Supply risk	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Supplier's power					
		Sourcing complexity					
		Suppliers cost relevance in total cost					
	Supply Chain Profile	<b>Supply Chain Focus</b>		Collaborative relationships for continuous improvement	Efficiency and lowest service cost	Quick response to unpredictable supply / demand conditions	Flexible to unpredictable crisis / requirements
		Service	Focus	Information sharing	Little sharing of information / Transactional oriented	No sharing information	No sharing information
			OPP	Typically MTS (make to stock)	Typically MTF (make to forecast)	Typically ATO/BTO (assembly / build to order)	Typically configured accorded to each case
			Order Size	According to replenishment needs	According to lowest transportation cost	Smallest possible in order to reduce obsolete	According to specific industry's characteristics
			Order Cycle	Regular delivery	Regular delivery	Time priority/ urgency	Flexible delivery response
Partnership			Highly possible	Maybe	No	No	
Buffering			Inventory	Inventory / distribution capacity	Inventory before divergence point / Inventory pooling	Capacity pooling	
Product		Focus	Minimize cost at standard performance	Minimize cost at standard performance	Postponment design (mass customization)	Customization	
		Inventory Strategy	High rotation to reduce working capital	Required for optimizing production batches	Minimize market mediation cost (obsoletes and lost sales)	Pooling for increasing responsiveness	
		Personalization	Not necessary, but highly possible	Not necessary, but highly possible	Not necessary, but highly possible	Not necessary, but highly possible	
		Make or buy?	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Product Segments	According to specific industry's characteristics	Low	According to specific industry's characteristics	According to specific industry's characteristics	
Process		Focus	High utilization rate	High utilization rate	Agility: Extra capacity to increase responsiveness	Assets flexibility, short set-up times	
		Process Flow	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Batch Size	Smallest in trade off with low production cost	One/few in production cycle to increase efficiency	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to increase delivery speed	
		Production Cycle	Shortest in trade off with low production cost	Longest possible, in balance with low inventory	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	
		Utilization rate	Probably High	Probably High	According to specific industry's characteristics	According to specific industry's characteristics	
		Buffering	Inventory, smallest as possible	Inventory, smallest as possible	Inventory before divergence point / Extra capacity	Inventory / Capacity pooling	
Sourcing		Focus	Collaborative relationships	Collaborative relationships	Agile response	Agile response / Risk management	
		OPP	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Order Size	Oriented to reduce transportation cost	Oriented to reduce transportation cost	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	
		Order Cycle	Oriented to reduce manufacturing cost	Oriented to reduce manufacturing cost	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	
	Partnership	It's important	It's important	It's important	No		
	Buffering	Primary source of supply	Multiple sources of supply	Multiple sources, Ad hoc source of supply	For specific services / cases		

## 7.6 Christopher’s “Global Supply Chain Strategies”

Martin Christopher (2006) proposes an alternative approach to supply chain segmentation, based on supply and demand characteristics, where demand predictability and replenishment lead time are the drivers used for selecting the generic supply chain model as is shown in figure 20.

		Demand Characteristics	
		Predictable	Unpredictable
Supply Characteristics -Lead Time-	Long	<p><b>Lean</b> Plan and Execute</p>	<p><b>LeAgile</b> Postponment</p>
	Short	<p><b>Lean</b> Continuous Replenishment</p>	<p><b>Agile</b> Quick Response</p>

Figure 20, Christopher’s “Generic Supply Chain Models”

Source: A taxonomy for selecting global supply chain strategies (Christopher, Peck, Towill, 2006)

Christopher proposes to locate as “Long lead times” products where order cycle time is in months rather than days, and, to locate predictability based on variation coefficient.

Although Gattorna and Christopher developed a paper in conjunction in 2005, there are some differences between both models. Both authors coincide in present similar characteristics to Lean and Continuous replenishment supply chains, but otherwise, Agile proposal from Gattorna comprises full characteristics from both Agile and LeAgile supply chains from Christopher, and additionally, Fully flexible model from Gattorna is not developed by Christopher.

Recently, Christopher theoretical approach has been refined based on DWV five market criteria (Duration of life cycle, time window for delivery, volume, variety and variability), as Christopher (2011) says “*Demand profiling at SKU level is a link between customer segmentation and product characteristics. It is the customer demand for a product and a natural bridge between the two. Understanding customer buying behavior may be useful to evaluate the reasons why a demand pattern occurs, but is not an essential aspect of developing supply chain strategy. It was the decision, not to pursue the more qualitative analysis of customer buying behavior, and to challenge its relevance in developing supply chain strategy that led to the development of demand profiling*”.

This recent approach from Christopher closes the theoretical gap with Gattorna, and highlights importance of both, customer segmentation and product profile, in the selection of the right supply chain, only persists a difference between them, the method used for customer segmentation, while Gattorna’s approach is oriented to perceived behaviors, Christopher looks quantitative evidence about customer, based on demand profiling, which is made based on DWV five market criteria.

In a paper of 2011, Christopher presents a case of a FMCG (Fast moving consumer goods) company, where product volume and variability are used for supply chain strategy segmentation, finding that low volume-high variability products require agile supply chain and lean supply chains are oriented to high volume-low variability products. Some supply chain consultancy firms as McKenzie are using a similar approach (demand profiling at SKU level) to define supply chain strategy. Table 21 presents Christopher’s supply chain model characterized under “Supply Chain Roadmap™” model.

Table 21, Christopher's "Generic Supply Chains" characterized under "Supply Chain Roadmap™" model.  
Source: Own elaboration.

		Factors/ Elements	Christopher				
			Continuous replenishment	Lean	Agile	LeAgile	
Unique Value Proposal	Service	Winners	Collaborative relationships efficiency oriented	Lowest total cost	Agility to unpredictable demand	Agility to unpredictable demand w/ long supply time	
		Qualifiers	Order fulfillment (Perfect orders)	Order fulfillment (Perfect orders)	Delivery speed, Order accuracy	Agility to unpredictable requirements	
	Product	Winners	Product Features (innovation)	Lowest cost	Product Features (innovation)	Product Features (innovation)	
		Qualifiers	Product Performance	Product Performance	Product Performance	Product Performance	
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Demand uncertainty	Predictable demand	Predictable demand w/ long supply time	Unpredictable	Unpredictable w/ long supply time	
		Customer's power	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Technological - Product life cycle-	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Cost relevance in customer's business	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
	Process	Fixed Assets	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Technological Maturity					
		Transformation cost relevance in total cost					
	Suppliers	Supply risk	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Supplier's power					
		Sourcing complexity					
		Suppliers cost relevance in total cost					
	Supply Chain Profile	<b>Supply Chain Focus</b>		Collaborative relationships for continuous improvement	Efficiency and lowest service cost based on planning	Quick response to unpredictable supply / demand conditions	Postponment
		Service	Focus	Information sharing	Little sharing of information / Transactional oriented	No sharing information	No sharing information
OPP			Typically MTS (make to stock)	Typically MTF (make to forecast)	Typically ATO/BTO (assembly / build to order)	Typically ATO/BTO (assembly / build to order)	
Order Size			According to replenishment needs	According to lowest transportation cost	Smallest possible in order to reduce obsolete	According to specific industry's characteristics	
Order Cycle			Regular delivery	Regular delivery	Time priority/ urgency	Time priority/ urgency	
Partnership			Highly possible	Maybe	No	No	
Buffering			Inventory	Inventory	Capacity	Inventory before divergence point	
Product		Focus	Minimize cost at standard performance	Minimize cost at standard performance	Postponment design (mass customization)	Postponment	
		Inventory Strategy	High rotation to reduce working capital	Required for optimizing production batches	Minimize market mediation cost (obsoletes and lost sales)	Generic inventory (Assy/configure/distribute)	
		Personalization	Improbable	Improbable	Not necessary, but highly possible	Not necessary, but highly possible	
		Make or buy?	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Product Segments	According to specific industry's characteristics	Low	According to specific industry's characteristics	According to specific industry's characteristics	
Process		Focus	High utilization rate	High utilization rate	Agility: Extra capacity to increase responsiveness	Extra capacity after divergence point	
		Process Flow	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Batch Size	Smallest in trade off with low production cost	One/few in production cycle to increase efficiency	Smallest possible in order to reduce obsolescence risk	Smallest possible in order to increase delivery speed	
		Production Cycle	Short lead time	Probably, Long lead time	Short lead time	Probably, Long lead time	
		Utilization rate	Probably High	Probably High	According to specific industry's characteristics	According to specific industry's characteristics	
		Buffering	Inventory, smallest as possible	Inventory, smallest as possible	Extra capacity / Capacity pooling	Inventory before divergence point / Extra capacity	
Sourcing		Focus	Collaborative relationships / Information sharing	Collaborative relationships / Information sharing	Agile response / Information sharing	Agile response / Information sharing	
		OPP	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Order Size	Oriented to reduce transportation cost	Oriented to reduce transportation cost	Smallest possible in order to reduce obsolescence risk	Smallest possible in order to reduce obsolescence risk	
		Order Cycle	Short lead time	Long lead time	Short lead time	Long lead time	
		Partnership	It's important	It's important	It's possible	Highly possible	
	Buffering	Primary source of supply	Multiple sources of supply	Multiple sources of supply	Multiple sources of supply		



### 7.7 Stavrulaki and Davis

This is a most recent theoretical approach (2010), where supply chain strategy is selected according to several factors associated to supply chain processes –product, manufacturing and logistics-, as is shown in Figure 21.

		Build to stock	Assemble to order	Make to order	Design to order
Supply Chain strategic capability		<b>Lean</b>		<b>Leagility</b>	
				<b>Agility</b>	
Product	Demand uncertainty, Profit Margin, Product Variety, Order Leadtime	Low		High	
	Product life cycle, Forecast accuracy, Volume	High		Low	
Manufacturing	Production process	Continuous, Large Volume, Assy / Batch	Assembly line	Small batch, Job Shops	Job Shops, Projects
	Product design	Low Cost oriented	Modular (postponment)		Specialized
	Manufactures has contact with end user	Uncommon			Common
	Manufacturing process focus	Efficiency	Efficiency before decoupling point, Flexibility after it		Flexibility
Logistics	Intermediaries between manufacturer and end customer	Large			Small
	Bullwhip effect	Prominent			Less likely
	Supplier relationship	Collaborative High information sharing			Oportunistic collaboration
	Logistic processes focus	Efficiency			Flexibility

Figure 21, Comparison of supply chain characteristics,  
Source: Aligning products with supply chain processes and strategy (Stavrulaki and Davis, 2010)

These proposal segments supply chain strategy according to “Order penetration point” - decoupling point in author’s words-. Additionally, they define the most important characteristics of product, manufacturing and logistics under each model. Main contribution of this paper is to introduce some tactical aspects into the consideration of supply chain strategy, but, criteria used for supply chain selection are generalized under a theoretical framework. Evidence of the above, is generalization of a specific order penetration point for each type of supply chain. There are several examples of agile supply chain under different OPP. Both, Toyota and Dell operate under ATO OPP, but Toyota is a Lean Supply Chain and Dell is an Agile Supply Chain. Zara is an agile supply chain operating under Make to forecast OPP.

## **8. Applicability of the supply chain generic models (SCGM)**

### **8.1 A unique set of “Supply Chain Generic Models”**

In the section 7 were studied several “Supply Chain Generic Models” under “Supply Chain Roadmap™” model, and based on this analysis and my own experience, a first set of conclusions are:

- Each author presents its own “Supply Chain Generic Model” under a unique and non-standardized perspective, which creates difficulties for understanding similarities, differences, features and application field of each “Supply Chain Generic Model”.
- “Supply Chain Generic models” are presented under a “reductionist” and very simple view, although subsequent literature developed by the same author or followers of the author’s theory could offer more details about models features, giving a deeper perspective, but offering difficulties to managers in order to find an “easy approach” to understand, select and apply “Supply chain generic models” in their own and real situations.
- “Supply Chain Roadmap™” offers a simple but a detailed view of a supply chain, enabling an unique and standardized view of whatever supply chain, in order to allow a easiest understanding of a supply chain under an unique reference model.
- There are similarities among some of the “Supply Chain generic models” presented by the several authors, which could offer an opportunity to present a unique set of “Supply chain generic models”, instead, a specific set of SCGM for each author.

In order to find a theoretical framework of reference for typical “Supply Chain Generic Models”, it’s necessary to compare similar SCGM under a “Supply Chain Roadmap™” table-view, finding which of them is the most recognized or, finding, a new model that could represent the most important features of them.

### **8.2 Efficient SCGM**

This SCGM is widely mentioned by several authors, some of them called this model as “lean”, which is a very recognized term in the industry, but misused, because the “real” lean model was developed by Toyota in 1950’s and is a mix between an agile and efficient models, while an efficient model uses a “make to forecast” order penetration point, Toyota Production System uses a “Assembly to order” order penetration point. Misunderstanding could be originated because both models are oriented to lowest total cost. But, a “lean supply chain” mustn’t confuse with “Lean Management” which should be understood as a “management model” that could be overlapped over any “supply chain model” in order to improve business performance.

Our “Efficient SCGM” is built based on efficient models of Fisher and Lee, and “Lean” models of Gattorna and Christopher. Main characteristics of a business framework in an “efficient SCGM” are predictable demands, long life cycle products, products/services highly representative in customer’s cost, assets utilization strongly impacts the total cost, highly competitive market with several companies fighting by the same group of markets, and principally customers oriented to low cost.

For this business framework, the focus of the supply chain profile is efficiency, which is supported in a high utilization rate of assets based on a “Make to forecast” model, in order to maintain production continuity and assure the best production sequence, reducing set up time.

In few words, in a “make to forecast” production is performed before orders are received based on a detailed planning of production activities in order to assure focus on efficiency.

Table 22 shows a parallel view among most recognized models and the “efficiency” reference SCGM, which is based on other authors models and own experience.

Table 22, Efficient Reference SCGM  
Source: Own elaboration.

		Fisher	Lee	Gattorna	Christopher	Reference SCGM		
		Efficient	Efficient	Lean	Lean	Efficient		
Unique Value Proposal	Service	Winners	According to specific industry's characteristics	Information sharing for cost improvement	Lowest total cost	Lowest total cost	Information sharing for cost improvement	
		Qualifiers	Delivery reliability, lowest transactional effort	Delivery reliability, lowest transactional effort	Order fulfillment (Perfect orders)	Order fulfillment (Perfect orders)	Order fulfillment (Perfect orders) / Lowest transactional cost	
	Product	Winners	Low Price	Low Price	Lowest cost	Lowest cost	Lowest cost	
		Qualifiers	Product Performance	Product Performance	Product Performance	Product Performance	Product Performance	
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Market mediation cost. Lowest possible	
		Demand uncertainty	Predictable demand	Predictable	Predictable demand within contract	Predictable demand w/ long supply time	Predictable	
		Customer's power	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Normally High	
		Technological - Product life cycle-	Long life cycle	Long life cycle	According to specific industry's characteristics	According to specific industry's characteristics	Long life cycle	
		Cost relevance in customer's business	According to specific industry's characteristics	According to specific industry's characteristics	Very price sensitive	According to specific industry's characteristics	Very price sensitive	
	Process	Fixed Assets	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Mainly dedicated Assets	
		Technological Maturity		Mature			Mature	
		Transformation cost relevance in total cost		According to specific industry's characteristics			According to specific industry's characteristics	
	Suppliers	Supply risk	Low risk to disruptions	Low risk of disruptions.	According to specific industry's characteristics	According to specific industry's characteristics	Low risk of disruptions	
		Supplier's power	According to specific industry's characteristics	According to specific industry's characteristics			According to specific industry's characteristics	According to specific industry's characteristics
		Sourcing complexity						
		Suppliers cost relevance in total cost						
	Supply Chain Profile	<b>Supply Chain Focus</b>			Lowest possible cost	Highest cost efficiency		
		Service	Focus	Perfect orders, Information sharing	Information sharing for assuring lowest total cost	Little sharing of information / Transactional oriented	Little sharing of information / Transactional oriented	Little sharing of information / Transactional oriented
			OPP	According to specific industry's characteristics	According to specific industry's characteristics	Typically MTF (make to forecast)	Typically MTF (make to forecast)	Typically MTF (make to forecast)
			Order Size	According to lowest transportation cost	According to lowest transportation cost	According to lowest transportation cost	According to lowest transportation cost	According to lowest transportation cost
Order Cycle			Fixed, looking for lowest transaction cost	Fixed, looking for lowest transaction cost	Regular delivery	Regular delivery	Fixed, looking for lowest transaction cost	
Partnership			Maybe	Maybe	Maybe	Maybe	Possible	
Buffering			Finished product looking for scale economies	Stock of finished product	Inventory / distribution capacity	Inventory	Finished product looking for scale economies / Distribution capacity	
Product		Focus	Minimize cost at standard performance	Minimize cost at standard performance	Minimize cost at standard performance	Minimize cost at standard performance	Minimize cost at standard performance	
		Inventory Strategy	Reduce working capital w/o affect product cost	Reduce working capital w/o affect product cost	Required for optimizing production batches	Required for optimizing production batches	Required for optimizing production batches, reduce working capital w/o affect product cost	
		Personalization	No apply	No apply	Not necessary, but highly possible	Improbable	Improbable	
		Make or buy?	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
		Product Segments	Low	Low	Low	Low	Low	
Process		Focus	High utilization rate	High utilization rate	High utilization rate	High utilization rate	High utilization rate	
		Process Flow	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Typically Continuous line	
		Batch Size	Largest possible for increasing utilization rate	Largest possible in order to increase utilization rate	One/few in production cycle to increase efficiency	One/few in production cycle to increase efficiency	One/few in production cycle to increase efficiency w/o affect working capital	
		Production Cycle	Balance between low inventory / asset utilization	Longest possible, in balance with low inventory	Longest possible, in balance with low inventory	Probably, Long lead time	Longest possible, in balance with low inventory	
		Utilization rate	Probably High	Probably High	Probably High	Probably High	Probably High	
		Buffering	Inventory, smallest as possible	Inventory, smallest as possible	Inventory, smallest as possible	Inventory, smallest as possible	Inventory, smallest as possible	
Sourcing		Focus	Low total cost supplier: Cost & Quality	Continuous Replenishment, Cost & Quality	Collaborative relationships	Collaborative relationships / Information sharing	Low total cost supplier: Cost & Quality	
		OPP	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Desirable MTS	
	Order Size	According to lowest transportation cost	According to lowest transportation cost	Oriented to reduce transportation cost	Oriented to reduce transportation cost	According to lowest transportation cost		
	Order Cycle	Fixed, looking for lowest transaction cost	Fixed, looking for lowest transaction cost	Oriented to reduce manufacturing cost	Long lead time	Fixed, looking for lowest transaction cost		
	Partnership	It's important	It's important	It's important	It's important	It's important		
	Buffering	Inventory, smallest as possible	Inventory, smallest as possible	Multiple sources of supply	Multiple sources of supply	Inventory, smallest as possible and multiple sources of supply		

### 8.3 Continuous replenishment SCGM

Table 23, Continuous Replenishment Reference SCGM  
Source: Own elaboration.

		Gattorna	Christopher	Reference SCGM		
Factors/ Elements		Continuous replenishment	Continuous replenishment	Continuous replenishment		
Unique Value Proposal	Service	Winners	Collaborative relationships efficiency oriented	Collaborative relationships efficiency oriented, automated transactions		
		Qualifiers	Order fulfillment (Perfect orders)	Order fulfillment (Perfect orders)		
	Product	Winners	Product Features (innovation)	Product Features (innovation)		
		Qualifiers	Product Performance	Product Performance		
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	According to specific industry's characteristics	According to specific industry's characteristics		
		Demand uncertainty	Mostly predictable	Predictable demand		
		Customer's power	According to specific industry's characteristics	According to specific industry's characteristics		
		Technological - Product life cycle-	According to specific industry's characteristics	According to specific industry's characteristics		
		Cost relevance in customer's business	Price not an issue	According to specific industry's characteristics		
	Process	Fixed Assets	According to specific industry's characteristics	According to specific industry's characteristics	Mainly dedicated Assets	
		Technological Maturity			Mature	
		Transformation cost relevance in total cost			According to specific industry's characteristics	
	Suppliers	Supply risk	According to specific industry's characteristics	According to specific industry's characteristics	Low risk of disruptions	
		Supplier's power			According to specific industry's characteristics	
		Sourcing complexity				According to specific industry's characteristics
		Suppliers cost relevance in total cost				
	Supply Chain Profile	Supply Chain Focus		Collaborative relationships for continuous improvement	Collaborative relationships for continuous improvement	
		Service	Focus	Information sharing	Information sharing	
			OPP	Typically MTS (make to stock)	Typically MTS (make to stock)	
			Order Size	According to replenishment needs	According to replenishment needs	
Order Cycle			Regular delivery	Regular delivery		
Partnership			Highly possible	Highly possible		
Buffering			Inventory	Inventory		
Product		Focus	Minimize cost at standard performance	Minimize cost at standard performance		
		Inventory Strategy	High rotation to reduce working capital	High rotation to reduce working capital		
		Personalization	Not necessary, but highly possible	Improbable		
		Make or buy?	According to specific industry's characteristics	According to specific industry's characteristics		
		Product Segments	According to specific industry's characteristics	According to specific industry's characteristics		
Process		Focus	High utilization rate	High utilization rate		
		Process Flow	According to specific industry's characteristics	According to specific industry's characteristics		
		Batch Size	Smallest in trade off with low production cost	Smallest in trade off with low production cost		
		Production Cycle	Shortest in trade off with low production cost	Short lead time		
		Utilization rate	Probably High	Probably High		
		Buffering	Inventory, smallest as possible	Inventory, smallest as possible		
		Focus	Collaborative relationships	Collaborative relationships / Information sharing		
Sourcing		OPP	According to specific industry's characteristics	According to specific industry's characteristics		
	Order Size	Oriented to reduce transportation cost	Oriented to reduce transportation cost			
	Order Cycle	Oriented to reduce manufacturing cost	Short lead time			
	Partnership	It's important	It's important			
	Buffering	Primary source of supply	Primary source of supply			

Our “Continuous replenishment SCGM” is built based on continuous replenishment models of Gattorna and Christopher. Main characteristics of a business framework in a “continuous replenishment SCGM” are predictable and stable demands, long life cycle products, low supply disruption risk, low market mediation cost, and principally customers oriented to process efficiency, especially low working capital.

For this business framework, the focus of the supply chain profile is collaboration, which is supported in two main features: information sharing and electronic transactions. Order penetration point is “Make to stock”, in order to assure medium-high utilization rates at high levels of perfect orders. “Make to stock” and “Make to forecast” could be understood as the same model, but the main difference between them is that in a MTF production is made according to sales expectations (forecast), in a MTS production is made for replenishing predefined stock levels. In both models high rate of assets utilizations is a key factor. In few words, a “Continuous replenishment” SCGM is a most mature model than “efficient” SCGM, and the main difference is the predictability of demand, which is highly dependent on customers collaboration. A “Continuous replenishment” SCGM is the natural improvement path to a company working in an “efficient” supply chain, both of them have a smoothed “workload”, for the efficient supply chain driven by the forecast and for the continuous replenishment driven by the market demand. Table 23 shows a parallel view among most recognized models and the “Continuous replenishment” reference SCGM, which is based on other authors models and own experience.

#### **8.4 Agile SCGM**

Our “Agile SCGM” is built based on responsive/agile models of Fisher, Lee, Gattorna and Christopher. Main characteristics of a business framework in an “Agile SCGM” are unpredictable demands, short life cycle products, supply disruption risk, high market mediation cost, and principally demanding customers oriented to fulfill unpredictable demand in short time.

For this business framework, the focus of the supply chain profile is agility, which is supported in two main features: extra capacity in production and products oriented to postponement design, as consequence of this, an “Make to order –order after divergence/postponement point-” order penetration point is used, looking for reducing order cycle time, but holding opportunity to customize products in the pending processes according to customers specific requirements.

In few words, production is partially performed before orders are received based on a detailed planning of production activities in order to maintain minimum levels of efficiency, but end processes (processes after divergence point) are made according to customer orders are received. In some cases is possible that processes can’t be done before customer orders arrival, due to technological limitations of the production process or because postponement design is not possible. Delivery speed is supported in extra-capacity in processes after divergence point. Table 24 shows a parallel view among most recognized models and the “agile” reference SCGM, which is based on other authors models and own experience.

Table 24, Agile Reference SCGM  
Source: Own elaboration.

		Fisher	Lee	Gattorna	Christopher	Reference SCGM		
Factors/ Elements		Responsive	Responsive	Agile	Agile	Agile		
Unique Value Proposal	Service	Winners	Agility to demand changes	Agility to demand changes	Agility / information sharing for fulfill demand	Agility to unpredictable demand	Agility to unpredictable demand	
	Product	Qualifiers	Delivery speed	Delivery speed, Order accuracy	Delivery speed, Order accuracy	Delivery speed, Order accuracy	Delivery speed, Order accuracy	
	Service	Winners	Product Features (innovation)	Product Features (innovation)	Product Features (innovation)	Product Features (innovation)	Product Features (innovation)	
	Product	Qualifiers	Product Performance	Product Performance	Product Performance	Product Performance	Product Performance	
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Market mediation cost: High	
		Demand uncertainty	Unpredictable	Unpredictable	Unpredictable	Unpredictable	Unpredictable	
		Customer's power	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Low-Medium
		Technological - Product life cycle-	Short life cycle	Short life cycle	Short life cycle	According to specific industry's characteristics	According to specific industry's characteristics	Short life cycle
	Process	Cost relevance in customer's business	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Price aware	According to specific industry's characteristics	Price aware, but not highly sensible
		Fixed Assets		According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Mainly General purpose assets
		Technological Maturity	According to specific industry's characteristics	Inmature	Inmature			According to specific industry's characteristics
	Transformation cost relevance in total cost	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics			
	Suppliers	Supply risk	Low risk to disruptions	Low risk of disruptions.	High risk of disruptions.	According to specific industry's characteristics	According to specific industry's characteristics	Low or high risk of supply disruption
		Supplier's power	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics			According to specific industry's characteristics
Sourcing complexity								
Suppliers cost relevance in total cost	According to specific industry's characteristics							
Supply Chain Profile	Supply Chain Focus		Agility	Flexible to customers requirements	Responsiveness to unpredictable demands and supply disruptions	Quick response to unpredictable supply / demand conditions	Quick response to unpredictable supply / demand conditions	Quick response to unpredictable supply / demand conditions
	Service	Focus	Order management	Agility, Order accuracy (for customization)	Agility, information sharing, for fulfill demand	No sharing information	No sharing information	Information sharing for fulfill demand, order accuracy (for customization)
		OPP	According to specific industry's characteristics	BTO (build to order)	BTO (build to order)	Typically ATO/BTO (assembly / build to order)	Typically ATO/BTO (assembly / build to order)	Make to order (order after postponment point)
		Order Size	Smallest possible in order to reduce obsolete	Smallest possible in order to reduce obsolete	Smallest possible in order to reduce obsolete	Smallest possible in order to reduce obsolete	Smallest possible in order to reduce obsolete	Smallest possible in order to reduce obsolete
		Order Cycle	Shortest possible in order to avoid stockouts	Shortest possible in order to avoid stockouts	Shortest possible in order to avoid stockouts	Time priority/ urgency	Time priority/ urgency	Shortest possible in order to avoid stockouts
		Partnership	No	No	No	No	No	No
		Buffering	Inventory before divergence point	Inventory before divergence point	Inventory before divergence point / Inventory pooling	Inventory before divergence point / Inventory pooling	Capacity	Inventory before divergence point / Inventory pooling / Capacity
	Product	Focus	Postponment design	Postponment design (mass customization)	Postponment design (mass customization)	Postponment design (mass customization)	Postponment design (mass customization)	Quick manufacturability, Postponment design (mass customization) when it could be possible
		Inventory Strategy	Minimize market mediation cost (obsoleses and lost sales)	Minimize market mediation cost (obsoleses and lost sales)	Inventory reconfiguration / pooling	Minimize market mediation cost (obsoleses and lost sales)	Minimize market mediation cost (obsoleses and lost sales)	Common components/materials (pooling), Inventory reconfiguration (postponment)
		Personalization	Not necessary, but highly possible	Not necessary, but highly possible	Not necessary, but highly possible	Not necessary, but highly possible	Not necessary, but highly possible	Not necessary, but in some cases could be possible
		Make or buy?	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
		Product Segments	High	High	High	According to specific industry's characteristics	According to specific industry's characteristics	Low-Medium
		Focus	Assets flexibility, short set-up times	Extra capacity to increase responsiveness	Extra capacity to increase responsiveness	Agility: Extra capacity to increase responsiveness	Agility: Extra capacity to increase responsiveness	Assets flexibility, short set-up times and extra-capacity
	Process	Process Flow	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	No a continuous line
		Batch Size	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk
		Production Cycle	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	Short lead time	Shortest possible in order to increase delivery speed
		Utilization rate	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
		Buffering	Excess capacity	Excess capacity	Excess capacity	Inventory before divergence point / Extra capacity	Extra capacity / Capacity pooling	Inventory before divergence point / Extra capacity / Capacity pooling
		Focus	Agile Sourcing (multiple buffering)	Suppliers hub nearest to assembly site	Suppliers hub/pooling, Inventory visibility	Agile response	Agile response / Information sharing	Agile response , Suppliers near to assy facility, Information sharing
	Sourcing	OPP	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	Desirable MTO for exclusive components/materials
Order Size		Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	
Order Cycle		Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed	Short lead time	Shortest possible in order to increase delivery speed	
Partnership		It's possible	It's possible	It's possible	It's important	It's possible	It's possible	
Buffering		Several suppliers	Several suppliers	Several suppliers	Multiple sources, Ad hoc source of supply	Multiple sources of supply	Multiple sources of supply	

### **8.5 LeAgile SCGM**

Our “LeAgile SCGM” is based on LeAgile SCGM of Christopher, which is the nearest model to Toyota Production Model, which is the real “Lean” model and is confused with an “Efficient” model by several authors. Main characteristics of a business framework in a “LeAgile SCGM” are unpredictable demands, medium level of supply disruption risk, long life cycle products, products/services highly representative in customer’s cost, assets utilization strongly impacts the total cost, highly competitive market with several companies fighting by the same group of markets and principally customers oriented to low cost and fulfill unpredictable demand in short time. It is the most demanding model, because requires agility with low cost. The most important differences between an “Agile” SCGM and a “LeAgile” SCGM are: “Agile” SCGM is MTO and extra-capacity is assigned before and after divergence point, and in some cases don’t apply postponement design, but always are used common components/materials, in the other hand, “LeAgile” model is ATO, extra-capacity is located only after “divergence point”, processes after divergence point are oriented to assembly and operations before “divergence point” operate under a “efficient” SCGM.

For this business framework, the focus of the supply chain profile are efficiency and order accuracy, the first one is supported in a mixed model: a MTF model before divergence point and a ATO model after divergence point, the first one driven by forecast and the second one driven by customized customers’ orders. Order accuracy is a relevant factor in order to assure fulfillment of customized orders.

This model is applied in several industries as apparel, computers and automobile, where customers orders are received before assembly processes and components for assembly where manufactured based on a forecast, due to their long production time.

Table 25 shows a parallel view among LeAgile Christopher’s model and the “LeAgile” reference SCGM, where main difference is service focus.

### **8.6 Flexible SCGM**

Our “Flexible SCGM” is totally based on Flexible SCGM of Gattorna. Main characteristics of a business framework in a “flexible SCGM” are unpredictable customer needs both in quantity and features, high supply disruption risk, solutions oriented, and principally customers oriented to pay whatever if their need is solved quickly.

For this business framework, the focus of the supply chain profile is capacity/inventory pooling and/or outsourced capacity, which is supported in sharing information of capacity and inventory with suppliers, customers and inclusive, competitors. Order penetration point is variable, according to each specific case. In few words, a “Flexible” SCGM is oriented to solve unexpected events, nearly to urgencies or emergencies. A typical example of these supply chains are companies oriented to corrective maintenance as flood control, in which own equipment could be insufficient and companies must share equipment with suppliers, customers or inclusive competitors.

Table 25, includes too, a view of the Gattorna’s “Flexible” SCGM, which is adjusted in some features and is used as reference model.

Table 25, LeAgile Reference SCGM and Flexible Reference SCGM

Source: Own elaboration.

		Factors/ Elements	Christopher	Reference SCGM	Gattorna	Reference SCGM
			LeAgile	LeAgile	Fully Flexible	Flexible
Unique Value Proposal	Service	Winners	Agility to unpredictable demand w/ long supply time	Order management for customized products	Solutions proposal	Solutions proposal
		Qualifiers	Agility to unpredictable requirements	Agility to unpredictable requirements	Agility to unpredictable requirements	Implementation time
	Product	Winners	Product Features (innovation)	Product Features (innovation)	Solutions proposal	Solutions proposal
		Qualifiers	Product Performance	Product Performance	According to specific industry's characteristics	Product Performance
Supply Chain Framework	Customers (Market)	Cost (market mediation / transport)	According to specific industry's characteristics	Transportation cost could be high	According to specific industry's characteristics	High
		Demand uncertainty	Unpredictable w/ long supply time	Unpredictable w/ long supply time	Very unpredictable demand	Very unpredictable demand
		Customer's power	According to specific industry's characteristics	Low	According to specific industry's characteristics	Very Low
		Technological - Product life cycle-	According to specific industry's characteristics	Mainly short life cycle	According to specific industry's characteristics	According to specific industry's characteristics
	Process	Cost relevance in customer's business	According to specific industry's characteristics	Very price sensitive	No price sensitivity	No price sensitivity
		Fixed Assets	According to specific industry's characteristics	Mainly dedicated Assets	According to specific industry's characteristics	Mainly General purpose assets
		Technological Maturity		According to specific industry's characteristics		According to specific industry's characteristics
		Transformation cost relevance in total cost		According to specific industry's characteristics		According to specific industry's characteristics
	Supply risk	Low or high risk of supply disruption		High risk of supply disruption		
	Suppliers	Supplier's power	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
		Sourcing complexity				
		Suppliers cost relevance in total cost				
	Supply Chain Profile	Supply Chain Focus		Postponment	Postponment	Flexible to unpredictable crisis / requirements
Service		Focus	No sharing information	Agility, Order accuracy (for customization)	No sharing information	No sharing information
		OPP	Typically ATO/BTO (assembly / build to order)	Typically ATO/BTO (assembly / build to order)	Typically configured according to each case	Typically configured according to each case
		Order Size	According to specific industry's characteristics	According to customer's needs	According to specific industry's characteristics	According to customer's needs
		Order Cycle	Time priority/ urgency	Variable order cycle	Flexible delivery response	Flexible delivery response
		Partnership	No	Not necessary, but possible	No	Non usual
		Buffering	Inventory before divergence point	Inventory before divergence point	Capacity pooling	Capacity pooling
Product		Focus	Postponment	Postponment	Customization	Customization
		Inventory Strategy	Generic inventory (Assy/configure/distribute)	Generic inventory (Assy/configure/distribute)	Pooling for increasing responsiveness	Pooling for increasing responsiveness
		Personalization	Not necessary, but highly possible	Not necessary, but possible	Not necessary, but highly possible	Not necessary, but highly possible
		Make or buy?	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
		Product Segments	According to specific industry's characteristics	High	According to specific industry's characteristics	Undetermined
		Focus	Extra capacity after divergence point	Extra capacity after divergence point	Assets flexibility, short set-up times	Assets flexibility, short set-up times
Process		Process Flow	According to specific industry's characteristics	Assembly after divergence point	According to specific industry's characteristics	Indifferent
		Batch Size	Smallest possible in order to increase delivery speed	Smallest possible in order to increase delivery speed	Smallest possible in order to increase delivery speed	Smallest possible in order to increase delivery speed
		Production Cycle	Probably, Long lead time	Probably, Long lead time	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed
		Utilization rate	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
		Buffering	Inventory before divergence point / Extra capacity	Inventory before divergence point / Extra capacity	Inventory / Capacity pooling	Inventory / Capacity pooling
		Focus	Agile response / Information sharing	Agile response / Information sharing	Agile response / Risk management	Agile response / Risk management
Sourcing		OPP	According to specific industry's characteristics	Desirable MTO for exclusive components/materials	According to specific industry's characteristics	Desirable MTS for generic items
		Order Size	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk	Smallest possible in order to reduce obsolesce risk
		Order Cycle	Long lead time	Long lead time	Shortest possible in order to increase delivery speed	Shortest possible in order to increase delivery speed
		Partnership	Highly possible	Highly possible	No	Non usual
		Buffering	Multiple sources of supply	Multiple sources of supply	For specific services / cases	Multiple sources of supply



### 8.7 Other SCGM

In previous numerals were deducted “reference” Supply Chain Generic Models, which are based on cross analysis among several authors and own experience, however, three important approaches weren’t consider, Triple A Supply Chain, Best Value Supply Chain and Stavrulaki and Davis. About “Triple A Supply Chain” and “Best Value Supply Chain”, they must be considered more than as a SCGM, as a Supply Chain Management Philosophy, where main concepts are: *Alignment*, as an element to assure coordination of purposes and rewards in the supply chain, *Adaptability* as a “multiple supply chains under a same company” in order to fit supply chain with specific market requirements, and *Agility* as a responsiveness concept. Specifically, Alignment and Adaptability are concepts that could be superposed over any supply chain strategy, regardless of which SCGM models are applied by the company. About Stavrulaki and Davis, their model is similar to Christopher’s model, due to introduces three of the four SCGM presented by Christopher: Lean, Agile and Leagile, which were considered in our reference models.

### 8.8 Reference SCGM

Table 26, Full view of “Reference SCGM”  
Source: Own elaboration.

Unique Value Proposal		Service Winners	Information sharing for cost improvement	Collaborative relationships	Agility to unpredictable demand	Order accuracy (for customization)	Solutions proposal
		Service Qualifiers	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time
		Product Winners	Lowest cost		Product Features (innovation)		Solutions proposal
		Product Qualifiers	Product Performance				
Supply Chain Framework	Market Mediation Cost	Low			middle		High
	Demand Uncertainty	Low			middle		High
	Customers power	High			middle		Low
	Cycle life	Long			middle		Short
	Cost sensitivity	High			middle		Low
	Assets	Mainly dedicated			middle		Mainly General Purpose
	Supply risk	Low			middle		High
Supply Chain Profile	Focus	Supply Chain	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events
		Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information
		Product	Lowest cost at standard performance		Quick manufacturability	Postponment	Customization
		Production	High utilization rate		Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
		Sourcing	Low total cost supplier	Collaborative relationships	Agile response		Agile response / Risk management
	Service	OPP	MTF	MTS	MTO	ATO	Configurable
		Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production bath	Customer's needs	Customer's needs
		Order cycle...	Fixed	Regular delivery	Shortest	Variable	Flexible
		Partnership	Possible	Required	Not necessary	Not necessary	Improbable
	Product	Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory / Capacity pooling
		Inventory Strategy	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness
		Personalization	Improbable	Improbable	Not necessary, but possible	Not necessary, but possible	Not necessary, but highly possible
		Product Segments	Low	Low - Medium	Low-Medium	High	Undetermined
	Production	Process Flow	Tippically Continuous line	Indifferent	No a continuous line	Assembly after divergence point	Indifferent
		Batch Size	Largest possible in order to increase efficiency		smallest possible looking for lowest obsolescence	smallest possible in order to increase delivery speed	
		Production Cycle	Longest possible	Shortest possible	Shortest possible	Probably, Long lead time	Shortest possible
		Utilization rate	Probably Very High		Probably Medium-High		Probably Low
	Sourcing	OPP	Desirable MTS	Desirable MTS	Desirable MTO for exclusive components/		
		Order size,	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk		
		Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed		
Partnership		It's important		It's possible	Highly possible	Non usual	
Buffering	Inventory and multiple sources of supply	Primary source of supply	Multiple sources of supply				
		<b>Efficient</b>	<b>Continuous Replenishment</b>	<b>Agile</b>	<b>LeAgile</b>	<b>Flexible</b>	

Reference models as shown in Table 26 are used for comparing a company's supply chain strategy with a "role model", in order to find gaps between supply chain framework and supply chain profile. "Reference SCGM" are nearly to Gattorna's and Christopher's proposals, but includes a more detailed characterization of the business framework and supply chain profile, in addition to that, "Reference model" presents five SCGM, three of them presented by Gattorna and Christopher (Efficient, Agile and Continuous replenishment) and two of them presented in an individual way for Gattorna (Flexible) and Christopher (LeAgile). "Reference" SCGM presents a wide spectrum of supply chain typologies which cover all the main supply chain strategies, not intended to be a straitjacket but a reference to typical characteristics of business framework and supply chain profile, allowing to supply chain professionals to verify their current strategies against the most recognized strategies.

## **8.9 Criterias for the Gap Analysis**

Gap analysis is supported by the "reference supply chain generic models" and some practical criterias, which are based on my own experience:

### **8.9.1 Product and Service factors**

*Order Entry Point (OPP):* Mainly affected by the level of uncertainty in demand and market mediation costs (obsolescence and cost of inventory). For portfolios involving a wide range of products, where the product's divergence point is located upstream the process (manufacturing or assembly), this allows improving the response to changes in demand or offering personalized product characteristics, without increasing inventory levels. Classic examples of this are the BTO (Build to order) model and Dell and the Toyota production system.

*Order cycle and size:* Order cycle and order size are affected by Customers' power and the relevance of transportation costs. In an industrial sector customers are powerful, when the combination of some of the following factors are present: (1) High number of suppliers, (2) excess capacity installed by the providers, (3) products with low differentiation, (4) products that do not influence greatly on the final quality of the Customer's product and (5) a high possibility of substitution. When the Customer has a lot of power on suppliers, there are high demands on a rapid response and smaller dispatch lots. An example of this in corrugated packaging industry, where demands in service time and smaller dispatch lots have increased in the past years. On the other hand, sectors where transportation cost is relevant in total cost, are obligated to define policies regarding order size, which avoid transportation by packages, with the purpose of ensuring a competitive price in the sector. An example of this is the disposable products industry for personal hygiene, where transportation cost is relevant in the total cost and policies regarding order size and delivery time based on fixed cycles –*consolidating deliveries to a same region on one day of the week* - instead of lead time, so as to increase the consolidation of cargo towards regions and thus optimize transportation cost.

*Buffering:* There are several manners of protecting the supply chain against fluctuations in demand and/or supply, inventory being the most familiar of them, but there are also others such as excess installed capacity and poly-functionality, among others. The level and type of buffering used in the supply chain depends on several factors: (1) high levels of uncertainty in demand and supply require greater buffering, (2) with a high relevance of product cost in the Customer's or consumer's cost structure comes an increase in buffering requirement, since the Customer wishes to have a lower level of product inventory, but wants the supplier to have the capacity to cover fluctuations in demand, (3) collaboration programs for joint planning of demand and supply, allow reducing the

buffering level, given that the level of demand uncertainty is reduced, and (4) products with a short life span require a higher level of buffering in installed capacity than inventory, with the purpose of reducing risks of obsolescence (a market mediation cost).

*Product segments/portfolio and personalization:* The scope of the product portfolio and its level of personalization is increased by: (1) products in their mature stage of their life span, given that it is necessary to present a greater variety of product to the market, so as to satisfy the Customers' specific needs, (2) sectors with a high Customer power require the development of broad portfolios, thus avoiding Customer migration to the competitors. On the other hand, products which cost is relevant for the Customer and with high-cost productive assets, pressure towards a smaller portfolio, with the purpose of having more efficient production lots.

On the other side, sectors where the product offered by the supplier is significantly important in the Customer's or the consumer's perception of the products' value, require a greater variety of portfolio, and even in personalized products. An example of this is institutional products for the restaurant sector, where Customers request the printing of their logos in the products and in some cases, personalized specifications.

### **8.9.2 Process factors**

*Production cycle:* as one of the "profile key elements" it is the most important element of process quadrant, as is defined as "*time required for production of whole products portfolio*". It depends of several factors as (1) portfolio size, expressed as number of SKUs, (2) setup time for changing from one product to another product, (3) economical batch size, which depends on assets utilization rate, because while organizations where assets cost is negligible or low are oriented to lower utilizations rates, organizations with high assets investment cost are oriented to high use rate in order to dilute fixed cost in a higher number of units produced.

Production cycle and variability domain buffering size, at longer production cycle greater buffering is required.

*Process flow* selection depends on volume/portfolio relationship and logical product structure, where product variety is high, are required flexible process flows as job shop, non-dedicated batches or non-dedicated assembly lines, instead, where product variety is low combined with high production volumes, high throughput flows are used, as continuous process, dedicated batches or dedicated assembly lines.

*Workload leverage* is an important element for understanding gap, which could be understood as the peaks and valleys of the workload on assets scheduled by the production/manufacturing plan. "Workload leverage" could be very smooth due to low demand variability (for example a continuous replenishment supply chain) or, could be smoothed by "artificial" methods, as in a MTF make to forecast OPP (in an efficient supply chain). A smoothed workload is required by: efficient supply chain, continuous replenishment supply chain and in a Leagile supply chain before divergence point.

### **8.9.3 Sourcing factors**

*Order Entry Point (OPP):* Mainly affected by the specialization of raw materials and supplier's power. For raw materials/ components produced by suppliers under exclusive specifications for the organization is very common a MTO (make to order) model, for raw materials / components produced by suppliers for several customers under common specifications is very used a MTS (make to stock) model, however, where supplier's power is high, suppliers pressure to transfer inventory holding to manufacturer, offering MTO models.

*Order cycle:* Mainly affected by transit time and “order entry point”. For having shorter order cycle is necessary to implement collaborative programs with suppliers, based on reducing time spent in transactional processes and increasing demand visibility.

*Buffering:* As was explained before, buffering size depends of order entry point, but additional to that sourcing risk is an important factor that must be considered when sourcing buffering is defined. Risk, associated to poor service level, critical materials or non-replaceable suppliers or materials, forces to increase buffering size or buffering by pooling as several suppliers, alternative materials, or shared buffering with competitors or affiliates among others.

## **Section 4: “Supply Chain Roadmap<sup>TM</sup>” method application**

*This section pretends to apply “Supply Chain Roadmap<sup>TM</sup>” method in several case studies in order to validate relevance of the method for characterizing a supply chain strategy and find gaps between supply chain strategy and business framework. Based on the application of the “Supply Chain Roadmap<sup>TM</sup>” method to several cases, the method will be adjusted and finally, the method will be used in a full case developed for the application of the “Supply Chain Roadmap<sup>TM</sup>”.*

## 9. Case Analysis

### 9.1 Crocs™: Revolutionizing an industry's supply chain model<sup>†</sup>

#### 9.1.1 Excerpts from the Crocs's case

Some excerpts from the case developed by Stanford University (Hoyt 2007):

*"The original Crocs shoe was a clog design. Visually, its two most distinctive features were large ventilatio holes and bold colors. The key to the shoe, however, was the croslite material. This proprietary closed-cell foam material molded to the shape of the wearers foot, providing an exceptionally comfortable shoe..... Croslite could be produced in any color...."*

*"In addition to a popular product and a global strategy, Crocs developed a supply chain that provided a competitive advantage. Traditional industry practice was for retail distributors to place bulk orders for each season's inventory many months in advance, with little ability to adjust to changes during the selling season. The Crocs model did not impose these limitations on retailers the company could fill new orders within the season, quickly manufacturing and shipping new product to retail stores."*

*"The raw material for the croslite in Crocs shoes are relatively inexpensive chemicals purchased in pellet form from suppliers such as Dow Chemical. These chemicals are then combined in a process called "compounding, in which they are converted into..... new pellets. As part of the compounding process, color dyes are added. The compounded pellets are then ready to be molded into croslite products. Croslite components for Crocs products are made by injection molding. This requires an injection molding machine, and molds for each style and size. After the parts are molded, they must be assembled. This might involve gluing croslite parts together. ....The finished products are then tagged and placed in boxes containing 24 pairs of shoes for distribution to retailers. Standard industry practice was for each pack of 24 to contain only one style and color. Crocs, however, would custom configure 24-packs to meet the needs of its smaller customers."*

*"Crocs early sales were to small retailers. These stores were willing to take more risk than the large chains, and work with a supplier that provided a high level of support and rapid shipment of product..... Crocs saw the small retailers as important to building the brand, and providing a brand presence, even after the majority of sales went to large retailers. After Crocs initial success in small stores, large retailers approached the company. Since the large retailers had seen the market acceptance of the Crocs shoes, Crocs was in a much stronger negotiating position than it would have been earlier in its development....."*

*"The footwear industry was oriented around two seasons: spring and fall. The standard practice was for footwear companies preparing for the upcoming fall season to take their products to shows around the world in January. Buyers would book orders for fall delivery following these shows (pre-books). The fall orders that were received at the beginning of the year would be planned for delivery in August, September, October, and November. These scheduled shipments would drive the production plan. The manufacturers would add some excess to the build, typically about 20 percent of the pre-booked orders, to take advantage of potential additional orders. A very aggressive company might add 50 percent to the build, but all the product would be manufactured before the season began. Most shoes were produced in Asia (primarily China and Vietnam), with some manufactured in South America. This production and supply model had obvious limitations. Retailers had to estimate what their customers would want well in advance of the selling season. If*

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<sup>†</sup> Based in: CROCS: Revolutionizing an industry's supply chain for competitive advantage. Stanford graduate school of business. Case GS-57. 2007

*they underestimated, they would have empty shelves and forego potential sales. If they overestimated, they would be stuck with unsold stock at the end of the season and be forced to have clearance sales in order to get rid of this excess stock at discounted prices. Making this even more difficult was the consideration that fashion was subject to trends that were difficult to predict history was of only limited value, particularly with new products that incorporated novel design elements that might either become wildly popular or fall flat.”*

*“Key Crocs executives were accustomed to producing what the customer needed, when it was needed, and responding rapidly to changes in demand. They decided to develop a model focused on customer needs when a customer needed more product, they would get it.....Under the Crocs model, retailers would not need to take a big risk in January by placing large orders for their fall season they could place smaller pre-booked orders, and order more when they saw how well the products sold.”*

*“We realized very quickly that third party [manufacturers] with our new model weren’t going to work [outside of Asia]. Third parties in Asia are absolutely great. They are very flexible. They can be both flexible and high volume. They move very quickly. They [contract manufacturers] take risks with us, where they buy equipment..... No [third party manufacturers in] other countries were willing to even entertain that. We’d have to give them long term forecasts, long term contracts...”*

*“Crocs took control of the compounding activity, creating state-of-the-art compounding facilities in Canada, China, and Mexico. Crocs could now ship raw materials to each of these plants. The plants could compound material as need for production, delaying the coloring decision until a specific color product was needed”*

*“The company added warehousing operations to each factory, including labeling and other value added activities such as installing hand tags and putting products into bags or boxes. For customers that ordered large quantities,.... the orders could be shipped directly from the Chinese warehouse..... small shops accounted for a much larger percentage of orders (although at much lower dollar levels) than the large retailers..... To meet the needs of small customers, product would be shipped to the company-owned warehouse in Colorado, where the orders were configured and shipped.”*

*“While these stores might send orders to Crocs by fax for small quantities to be delivered directly to their stores, the large retailers had an entirely different fulfillment model. These companies had their own distribution centers, and sent orders electronically.”*

*“Molds were frequently transferred between production locations. If they needed fast response to meet a growing demand in the U.S., they might move production to Mexico, which was closer to the customers. For products with lots of pre-booked orders, a relatively dependable forecast, and high volume, production might be shifted to China.”*

*“In order to be able to respond immediately to increases in demand, Crocs kept total manufacturing capacity at about 1 million pairs per month beyond the actual production plan. This capacity could be turned on at a moment’s notice. The company also planned its infrastructure (both systems and people) slightly ahead of demand, so that it could respond quickly.”*

*“While Crocs did not build inventory in excess of expected orders, the company did acquire excess capacity (sometimes as much as 2 to 3 times the expected capacity) in the form of molds and molding machines so that it could quickly ramp capacity in case a product took off.”*

*“Inventories turn over for Crocs was 3.5 times, compared with 5.6 times industry median.”*

9.1.2 Crocs 2007's: Supply Chain Roadmap™

Based on case information, Figure 22 shows Supply Chain Roadmap for Crocs, in which are defined several aspects about the situation at the case's time. Crocs made a industry's revolution because they understood demand behaviors and customer's needs and beyond a revolutionary product, Crocs create a new and radical value proposal conformed by shorter order cycle time (delivery speed), agility to changes in demand, inexpensive product, simple product design, and supported for a revolutionary and fashion product.

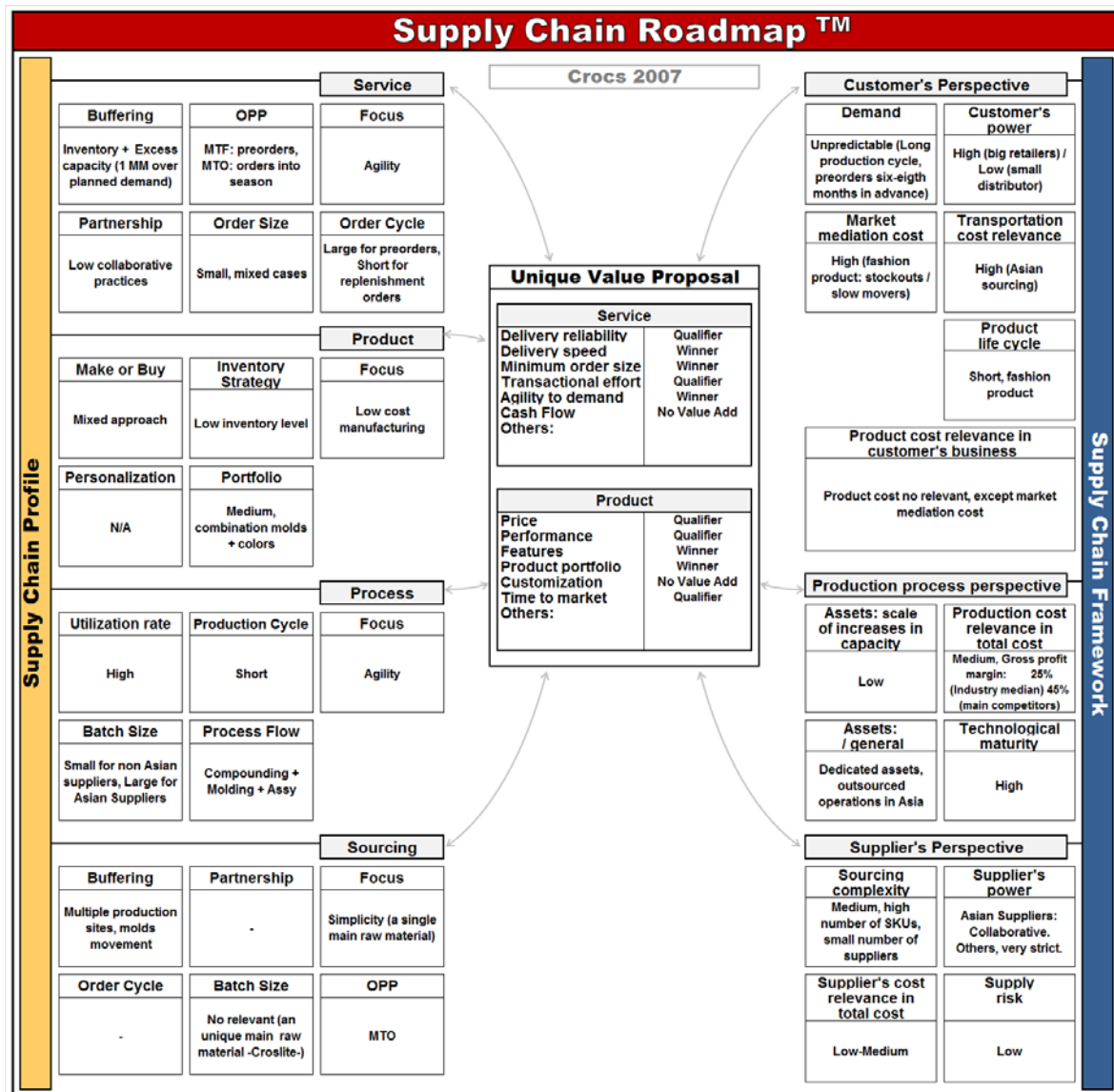


Figure 22, Crocs 2007: Supply Chain Roadmap  
 Source: Own elaboration



Crocs understood production complexity of traditional shoe's supply chain and designed a simple production process, with shorter production cycle –reducing capital investment-, and they found that traditional third party manufacturers outside of Asia, were not able to be agile, which could be a supply risk in their strategy to locate production hubs in Europe and America. Crocs discovered a big opportunity in the power relationships among traditional shoe's manufactures and small distributors, when customers were “obliged” to put orders in advance assuming high market mediation costs. Crocs create an “adaptable” supply chain, conformed by two chains: an “efficient” and a “Agile”, supported in a MTF order penetration point for “preorders” and a MTO order penetration point for “replenishment orders”. Agility was supported in two pillars: first, a company's policy “*Crocs kept total manufacturing capacity at about 1 million pairs per month beyond the actual production plan*”, and second, moving croslite compound coloring process from a global hub to each manufacturing facility. Efficiency was supported in using Asian third party manufactures for large preorders and dispatches to big retailers.

9.1.3 Crocs 2007's: gap analysis based on “Reference SCGM”

Table 28 presents gap analysis against reference SCGM, where is shown Crocs's dual strategy, a predominant agile supply chain, supported by an efficient supply chain. Crocs's agile supply chain meets all the requirements in terms of value proposal and supply chain profile, Crocs defined an agile supply chain in order to meet customer's main need: market mediation cost reduction, based on delivery speed (short order cycle). For assuring that, Crocs comply with the main requirements for an agile supply chain: excess capacity, production hubs near to customers in order to reduce transportation time, changed divergence point from raw material supplying to molding factories (when they moved coloring process from Croslite manufacturing site to molding sites), and capacity pooling across molding facilities (moving molds among them). But Cross didn't meet one of the most important requirements for an agile supply chain: low inventory level. When Crocs performance is compared against peers, inventory rotation was very poor, as is shown in Table 27.

Table 27, Crocs 2007: Financial ratios compared with peers  
 Source: (Hoyt 2007)

Financial ratio	Crocs	Dockers outdoor	Nike	Timberland	Industry Median
Gross Profit Margin	56,5%	46,4%	43,7%	47,3%	24,5%
Return on invested capital	51,1%	15,9%	18,4%	19,0%	4,7%
Inventory turnover	3,5	5,0	4,3	4,7	5,6

A quick view to financial statements at the end of 2007 shows 260 days of inventory (\$248 MM inventory for \$349 MM of COGS), this situation was very risky, but was underestimated by the management, according to 2007 annual report: “*Our inventories increased to \$248.4 million at December 31, 2007 from \$86.2 million as of December 31, 2006. During the quarter ended December 31, 2007, we increased our inventory positions in order to meet anticipated demand for the six months ending June 30, 2008 and, at the same time, made available production capacity for new product lines for delivery in the quarters ending March 31, 2008 and June 30, 2008*” One year later, in 2008, Crocs made an inventory write-off as consequence of a wrong execution of the supply chain strategy. It was reported in his 2008 annual report. “*Our write-down of inventories relates to certain products that were or are going to be discontinued of \$76.3 million, including core products in colors that have experienced substantial declines in consumer demand....*”

Table 28, Crocs 2007: gap analysis based on “Reference SCGM”  
Source: Own elaboration.

Unique Value proposal		Service Winners	Information sharing for cost improvement	Collaborative relationships	Agility to unpredictable demand	Order accuracy (for customization)	Solutions proposal	
		Service Qualifiers	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
		Product Winners	Lowest cost	Product Features (innovation)			Solutions proposal	
		Product Qualifiers	Product Performance					
Supply Chain Framework	Market Mediation Cost	Low		middle			High	
	Demand Uncertainty	Low		middle			High	
	Customers power	High		middle			Low	
	Cycle life	Long		middle			Short	
	Cost sensitivity	High		middle			Low	
	Assets	Mainly dedicated		middle			Mainly General Purpose	
	Supply risk	Low		middle			High	
	Supply Chain Profile	Focus	Supply Chain	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events
Service			Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information	
Product			Lowest cost at standard performance		Quick manufacturability	Postponment	Customization	
Production			High utilization rate			Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
Sourcing			Low total cost supplier	Collaborative relationships	Agile response		Agile response / Risk management	
Service		OPP	MTF	MTS	MTO	ATO	Configurable	
		Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production path	Customer's needs	Customer's needs	
		Order cycle...	Fixed	Regular delivery	Shortest	Variable	Flexible	
		Partnership	Possible	Required	Not necessary	Not necessary	Improbable	
Product		Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory / Capacity pooling	
		Inventory Strategy	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness	
		Personalization	Improbable	Improbable	Not necessary, but possible	Not necessary, but possible	Not necessary, but highly possible	
		Product Segments	Low	Low - Medium	Low-Medium	High	Undetermined	
Production		Process Flow	Tippically Continuous line	Indifferent	No a continuous line	Assembly after divergence point	Indifferent	
		Batch Size	Largest possible in order to increase efficiency		smallest possible looking for lowest obsolescence	smallest possible in order to increase delivery speed		
		Production Cycle	Longest possible	Shortest possible	Shortest possible	Probably, Long lead time	Shortest possible	
		Utilization rate	Probably Very High		Probably Medium-High		Probably Low	
Sourcing		OPP	Desirable MTS	Desirable MTS	Desirable MTO for exclusive components/			
		Order size,	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk			
		Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed			
	Partnership	It's important		It's possible	Highly possible	Non usual		
	Buffering	Inventory and multiple sources of supply	Primary source of supply	Multiple sources of supply				
		Efficient	Continuous replenishment	Agile	LeAgile	Flexible		

#### 9.1.4 Crocs 2007's: Conclusions

In an adaptable supply chain, as Crocs 2007, with a dual supply chain (efficient + agile), inventory policy could be contradictories, because efficient supply chain requires higher inventories level, while, agile supply chain requires low inventories level in order to avoid market mediation cost (obsolescence), this contradiction could be solved, assuring low inventory level for fashion products and high inventory level for products less oriented to fashion.

As was explained previously, Crocs supply chain strategy was revolutionary for that moment, but they failed in a key factor, an agile supply chain must maintain low inventories level in order to

avoid high market mediation cost. One year after the case was written Crocs did a write-off nearly to \$76 MM of obsolete products, which was originated by changes in customer's preferences. Crocs learned the lesson and in the following years, they switched to a low inventory strategy.

This case confirms that when a company has a hybrid strategy composed from two supply chains (agile + efficient), is important to assure high utilization rates without increase inventories level, especially in perishable products (as foods or fashion), where obsolescence is very high.

Crocs's case is a good example about the importance of the alignment between business framework and supply chain strategy, a very innovative supply chain strategy failed due to incoherence between supply chain objectives (high inventories looking for production efficiency) and demand behavior (short cycle products, fashion products).

## 9.2 Tamago-Ya of Japan: Delivering lunch boxes to your work<sup>‡</sup>

### 9.2.1 Excerpts from the case

Some excerpts from the case developed by Stanford University (Whang 2007):

“By 2007, Tamago-ya was unique in that:

1) Tamago-ya produced and delivered high-quality lunch boxes at low price ... to office workers in the Tokyo Metropolitan area.

2) It received orders at 9 a.m. until 10:30 a.m. every day, and delivered by noon....Tamago-ya hardly ever missed a delivery deadline, although demand was large and fluctuated from day to day (ranging between 60,000 to 75,000 deliveries).

3) Tamago-ya’s average loss ratio” (the disposal ratio due to over-production or returns) was only 0.06 percent... while the Japan’s industry average was 2 percent.”

“Tamago-ya offered only one menu per day. Each lunch box contained more than six items, most of which were made from organic and natural ingredients. Although it served only one menu a day, the menu changed daily.”

“Instead of disposable lunch boxes (US\$0.25 each), Tamago-ya used reusable ones (US\$4 each) that could be used for up to one year. The overall cost of using reusable boxes was slightly higher than that of disposable boxes, since it took up to nine hours a day to wash and clean all the lunch boxes using specialized equipment and specially-treated water. But reusable boxes offered multiple benefits to Tamago-ya..... Also, reusable boxes provided van drivers with more opportunities to talk to customers as they collected boxes after the lunches were finished. Valuable customer feedback could be obtained just after the meal”

“A typical delivery van could carry 200 to 250 industry standard boxes. Tamago-ya’s compartmented box was slightly narrower but deeper than the standard design, with rounded-off corners. The rounded corners made it easy to wash away any food stuck inside the boxes. Most importantly, the design allowed a van to load 430 boxes without reducing the amount of food in the box. This special design had improved profitability far beyond its break-even point, which was estimated to be around 200 boxes per van.”

“Each Tamago-ya lunch box, complete with food.....a COGS-to-price ratio of 53 percent. This ratio was high relative to the industry average of less than 40 percent. This was primarily because Tamago-ya used high-quality, and consequently expensive, ingredients. The company did not want to compromise the quality and taste of its lunches, which it viewed as its primary competitive advantage. Further.... believed that the company should keep the net income at 5 percent (healthy but not greedy) as a way of sharing the value with the community.”

“Tamago-ya’s primary customers were businesses or other groups in the Tokyo metropolitan area. Usually, someone in the office gathered orders from all the individuals in the office and placed one big order (e.g., 20 or 40 lunch boxes) on their behalf over the phone. The same person received the lunch boxes, distributed to individuals, and gathered back empty boxes for a later pickup between 1:30 p.m. and 2 p.m.”

“Tamago-ya’s basic sales criterion was to secure at least 10 lunch box orders per customer per day. However, Tamago-ya did not require customers to commit to a minimum number of orders, since it believed that flexibility in ordering is one of the most important drivers of customer satisfaction.”

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<sup>‡</sup> Based in: Tamago-Ya of Japan: Delivering lunch boxes to your work. Stanford graduate school of business. CASE: GS-60

*“Tamago-ya did not accept all potential customers. The company would accept a very small customer whose average daily order size could have been less than 10.... if the customer was in the same building as existing customers, or if its office was located along an existing delivery route. ...Tamago-ya might refuse to take orders .... if its location was on the opposite side of the existing van route and required time-consuming U-turns of delivery vans.”*

*“Every day, van drivers wrote a report including their own forecasts of the next day’s orders as well as customer feedback on today’s menu.....The driver also asked for an estimate of the number of orders the customer might have the next day.”*

*“...their empirical studies showed that they received more orders on rainy days or very hot/cold days since people did not want to go out..... Largest orders arrived on a snowy day especially when the previous night’s weather forecast failed to predict it..... they received more orders just before pay days or after national holidays.”*

*“Dual-response production: First, build a stock of lunches up to a low-end forecast of the demand, and later, build more (if necessary) based on the up-to-date estimate as actual orders arrive. Tamago-ya counted on five key suppliers who were both nimble and flexible. Tamago-ya committed to the low-end forecasted quantity of ingredients on the previous day and also carried an option to ask for more if necessary on the morning of production.”*

*“Time-phased prepositioning of stocks: Divide the entire market into two regions by distance from the factory. Dispatch the first batch of vans early to the remotest region well before the order closing hour, with each van carrying an estimated quantity of lunch boxes. After order receipts were completed, dispatch the last batch carrying the exact amount of orders to the nearest region. Transfer stocks across vans to fill any demand-supply gap within and across regions. Use standby vans to adjust any remaining gaps.”*

*“Tamago-ya started with a forecast....about 85 percent of its point estimate... to order ingredients from its suppliers on the previous evening. After it started receiving orders, Tamago-ya updated its database every 15 minutes and shared it with all parties including its five key suppliers. These key suppliers, strategically located near Tamago-ya, were involved in the last-hour demand fulfillment process. They brought ingredients to Tamago-ya every 15 minutes in response to the updated orders”*

*“We want to keep inventory of perishable ingredients as small as possible. Although wholesalers need a 2-3 percent markup, they manage inventories. The markup is smaller than the inventory cost we would incur, and good relationships with wholesalers make it possible for us to place occasional urgent orders.”*

*“Tamago-ya had its production facilities close to its suppliers... not to its customers, so that it had more flexibility in procurement in the case of unexpected demand. It also maintained relatively small warehouses, since it believed larger warehouses tended to lead to larger inventories. Tamago-ya only kept condiments (e.g., soy sauce) in stock for one week. All other fresh ingredients were delivered on demand, and were discarded if left unused for the day.”*

*“In addition to other lunch box manufacturers, convenience store chains such as Seven Eleven Japan were major competitors to Tamago-ya. Convenience stores had larger economies of scale, which enabled them to sell a variety of lunch box menus at a low price (less than US\$5).*

*However, convenience stores could not change menus frequently due to the inertia of its large scale. Also, people rushed to convenience stores for lunch boxes during lunch time, which resulted in long waiting lines and frequent stockouts.”*

### 9.2.2 Tamago-Ya 2007's: Supply Chain Roadmap™

Based on case information, Figure 23 shows Supply Chain Roadmap for Tamago-Ya, in which are defined several aspects about the situation at the case's time.

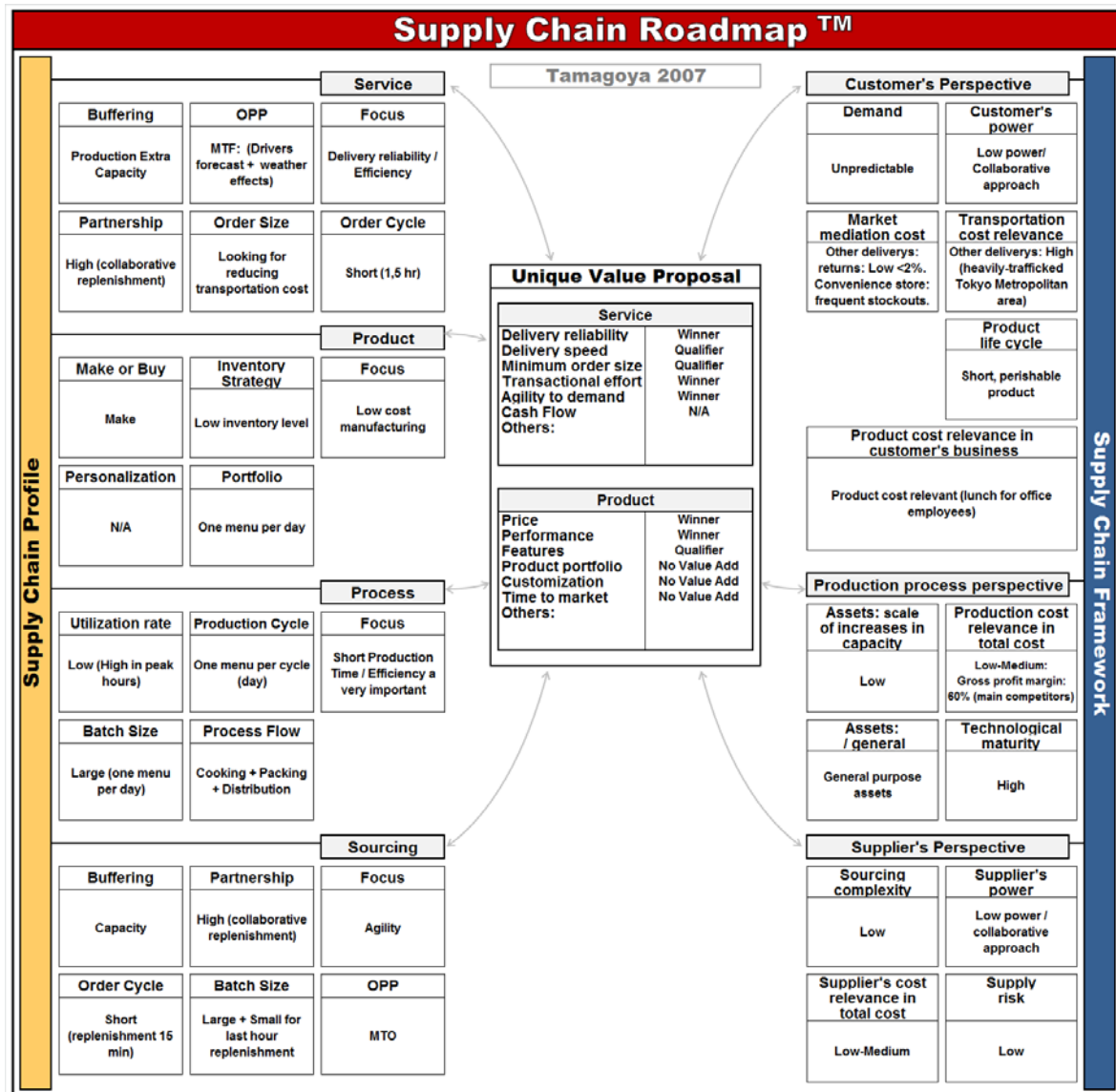


Figure 23, Tamago-ya 2007: Supply Chain Roadmap  
 Source: Own elaboration

Tamago-ya create a “efficient” supply chain, where the main competitive advantage was to eliminate “the market mediation cost”, transforming the most difficult condition of the business framework for the industry in his core competence. “Market mediation cost” was eliminated by the implementation of a unique menu per day and collaborative demand planning, the first one, reducing customers choices to two options: request or no request a delivery, and the uncertainty associate to customers choice is solved by the collaborative planning performed by the trucks drivers. All the other supply chain processes are oriented to reinforce these two competences, as example of that: reusable boxes and a minimum order size per office, for to allow driver-customer

face to face contact and based on that a collaborative forecast, which is adjusted at the last moment in order to assure a minimum market mediation cost. Tamago-ya achieve a high efficiency supply chain, which allow to use high quality ingredients in order to offer a superior value to their customers.

9.2.3 Tamago-ya 2007's: gap analysis based on "Reference SCGM"

Table 29, Tamago-ya 2007: gap analysis based on "Reference SCGM"

Source: Own elaboration.

Unique Value proposal	Service Winners	Information sharing for cost improvement	Collaborative relationships	Agility to unpredictable demand	Order accuracy (for customization)	Solutions proposal	
	Service Qualifiers	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
	Product Winners	Lowest cost	Product Features (innovation)			Solutions proposal	
	Product Qualifiers	Product Performance					
Supply Chain Framework	Market Mediation Cost	Low		middle		High	
	Demand Uncertainty	Low		middle		High	
	Customers power	High		middle		Low	
	Cycle life	Long		middle		Short	
	Cost sensitivity	High		middle		Low	
	Assets	Mainly dedicated		middle		Mainly General Purpose	
	Supply risk	Low		middle		High	
	Supply Chain Profile	Focus	Supply Chain	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponment
Service			Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information
Product			Lowest cost at standard performance		Quick manufacturability	Postponment	Customization
Production			High utilization rate		Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
Sourcing			Low total cost supplier	Collaborative relationships	Agile response		Agile response / Risk management
Service		OPP	MTF	MTS	MTO	ATO	Configurable
		Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production bath	Customer's needs	Customer's needs
		Order cycle...	Fixed	Regular delivery	Shortest	Variable	Flexible
		Partnership	Possible	Required	Not necessary	Not necessary	Improbable
Product		Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory / Capacity pooling
		Inventory Strategy	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness
		Personalization	Improbable	Improbable	Not necessary, but possible	Not necessary, but possible	Not necessary, but highly possible
		Product Segments	Low	Low - Medium	Low-Medium	High	Undetermined
		Process Flow	Tippically Continuous line	Indifferent	No a continuous line	Assembly after divergence point	Indifferent
Production		Batch Size	Largest possible in order to increase efficiency		smallest possible looking for lowest obsolescence	smallest possible in order to increase delivery speed	
		Production Cycle	Longest possible	Shortest possible	Shortest possible	Probably, Long lead time	Shortest possible
		Utilization rate	Probably Very High		Probably Medium-High		Probably Low
		OPP	Desirable MTS	Desirable MTS	Desirable MTO for exclusive components/		
Sourcing		Order size,	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk		
		Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed		
		Partnership	It's important		It's possible	Highly possible	Non usual
		Buffering	Inventory and multiple sources of supply	Primary source of supply	Multiple sources of supply		
			Efficient	Continuous replenishment	Agile	LeAgile	Flexible

Table 29 presents gap analysis compared to reference SCGM, where is shown a predominant "efficient" supply chain, which complies with all the main requirements of these type of strategy: Low cost, low market mediation cost, predictable demand (supported by a simple but effective

demand planning process), large production batches, strong partnership with suppliers, among others.

#### 9.2.4 Tamago-ya 2007's: Conclusions

As was explained previously, Tamago-ya complies with the main requirements of an efficient supply chain, but, is so important to highlight the change of industry's condition, because in a framework dominated by high market mediation cost (for both, loss sales or expired product), they created a new value proposal, which is located among the most predominant market proposals (fast food/home cooking restaurants or packaged food), giving the most valuable features of both: fresh food in the case of fast food/home cooking restaurants and fast service, without waiting lines, in the case of packaged foods.

Tamago-ya's case is an example about the importance of the alignment between business framework and supply chain strategy, a very pioneering supply chain strategy succeeded based on a coherent strategy, where the sources of misalignment are eliminated (demand uncertainty and high market mediation cost) by an innovative approach.



### 9.3 Toyota: Demand Chain Management, Scion experience<sup>§</sup>

#### 9.3.1 Excerpts from the case

Some excerpts from the case developed by Stanford University (Lee 2005):

*“In the late 1950s Toyota’s production systems were improved, culminating in the establishment of the ‘Toyota Production System’ (TPS) by Taichi Ohno, a system that has become the basis for highly efficient “lean” manufacturing in industries worldwide.”*

*“The ordering process operates in three planning cycles: monthly, weekly and daily.*

*(a) The monthly planning starts one month in advance of production, when they conducts market analysis and order/sales planning to determine total production volume for the next month. Based on this information, they produce a preliminary production plan for the next three months by series, engine, body type, and major functions.”*

*(b) Weekly Cycle: Every Tuesday, dealers place their weekly orders with Toyota in full car specs, with the order for the first week of the month being placed seven working days before the beginning of the month. Once orders are received, the Sales division makes adjustments between the monthly plan and actual weekly orders.*

*(c) Daily Cycle: Up to three days prior to actual production, dealers can change the order spec as part of the online system. No changes can be made in the number of cars ordered for each engine type, but within engine type, colors and options can be changed for up to 20 percent. However, Toyota does not guarantee that all changes will be met.”*

*“Toyota uses various means to temporarily adjust its production capacity; e.g., more shifts, holiday work, changing the number of job processes for each worker, increasing the number of workers, and higher line speed. Toyota also recognizes that frequent production capacity changes can have an adverse effect on product quality.”*

*“In addition, dealers can swap or trade their stocks using a secondary market running on Dealer Daily. A dealer in search of a specific car to sell has several options:*

- 1. Check the pipeline in the coming month for allocated inventory via Dealer Daily.*
- 2. If none, check the pipeline in the coming month for other dealers via Dealer Daily.*
- 3. If none, the dealer can “preference” it in upcoming dealer allocation, which would increase the probability of getting the product from the region’s next dealer allocation.*
- 4. If there is none in the region’s order, the dealer can wait and submit a request in PPR2, which takes 60 to 90 days. Such cases are very rare, constituting less than 1 percent of all orders.”*

*“Toyota’s first attempt to target younger consumers was through the creation of the Genesis group in 1999, which was largely a marketing function to launch the 2000 Celica, Echo, and MR2 Spyder, three new car models that were believed to have a good chance of attracting younger customers.... The lesson was that just marketing was not sufficient, and that an end to end initiative, including product differentiation and different dealership experience, would be required to attract the younger consumer group.”*

*“The Scion business would have some key distinctive elements:*

*Product: A customized product that stands out, with European feel and unique features that also provide luxury. The goal is to build a premium small car that offers a lot of value for its relatively low price.*

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<sup>§</sup> Based in: Toyota: Demand Chain Management. Stanford graduate school of business. Case GD-42. 2005.

*Marketing: Customers are not influenced by mass marketing, but rather want to experience the product personally and learn about it from their friends and family. Toyota has to allow consumers to discover the product on their own terms, and spread the message through word-of-mouth and authentic interactions.*

*Dealership experience: .... They want the buying experience at the dealership to be much simpler and shorter than the typical 4 to 5 hours buying process.”*

*“In June 2003, Toyota launched the Scion brand, with two models: xA and xB, in California.*

*Each model has about 40 different types of accessories that customers can choose from, versus about 15 offered for a typical Toyota sedan. Customers can use the detailed information available online or at the dealership to configure the car (color, transmission, exterior, interior, wheels, and sound). Once they place an order with the dealer -the car built exactly to their specifications- will be ready for pickup within 5 to 7 business days. Those who want the car faster and are willing to compromise can choose a car from the dealer’s local inventory and have it ready overnight.”*

*“Other car manufacturers offer a high level of customization only for luxury cars, and then the delivery time is usually much longer, especially when the cars are made overseas. For example, it takes three months to get a custom-made BMW from Germany.”*

*“Production takes place in Japan. All features at the factory level, except for color and transmission (automatic/manual), are standardized (except for side airbags for the xA). That way, even though each car has an extensive spec, the assembly process remains simple.”*

*“From the factory the cars are delivered to a port pool in Japan, and then shipped to a U.S. port... total lead-time from the factory to the port in US is about three weeks.”*

*“Customization of the cars takes place either at the US port or at the dealership, based on actual customer orders.... When an order is placed, the dealer will first check if he has in stock a car with the right color and transmission. If the car is available in his local inventory, he will install the ordered accessories and have it ready for the customer. If the car is available in the dealer’s stock at the port, the Customization Center at the port will install the ordered accessories .... If the dealer doesn’t have the desired car in stock, he can exchange inventory electronically with other dealers .... In that case, again, installation of the accessories will take place at the port. No matter from which inventory the car is taken, it will be accessorized and available to the customer within 5 to 7 business days..... Most of the accessories are designed and manufactured in the U.S. To ensure lean delivery, Toyota modified its business processes for Scion cars, including cutting down the delivery time of parts to the Customization Center from two to one day, and priority-processing Scion vehicles at the port.”*

*“In undersupply situations, as was the case with the xB, then cars are moved through the system as fast as possible, with priority shipping and processing at the ports. In addition, the xB cars were allocated to dealers in the port on the dock in Japan, to provide dealers with as much visibility to “their” available stock by product. On the other hand, early demand for xA was overestimated by 50 percent. Consequently, production was shut down for four months. Excess inventory was stored in Long Beach, with only limited quantity allocated to dealers to retain the 20 to 30 days of supply.”*

*“The distribution system resembles a multi-echelon inventory network to address demand uncertainties: a very flexible plant; a port pool in Japan; a port pool in Long Beach; and 10 percent discretionary pool that can be shifted between regions based on demand.”*

“To improve local customization, Toyota may design future Scion cars to be prewired and have snap-on and -off accessories. This will simplify the installation of such accessories as DVDs and will make local customization even more efficient, with higher quality and lower cost to customers.”

### 9.3.2 Toyota’s Scion: Supply Chain Roadmap™

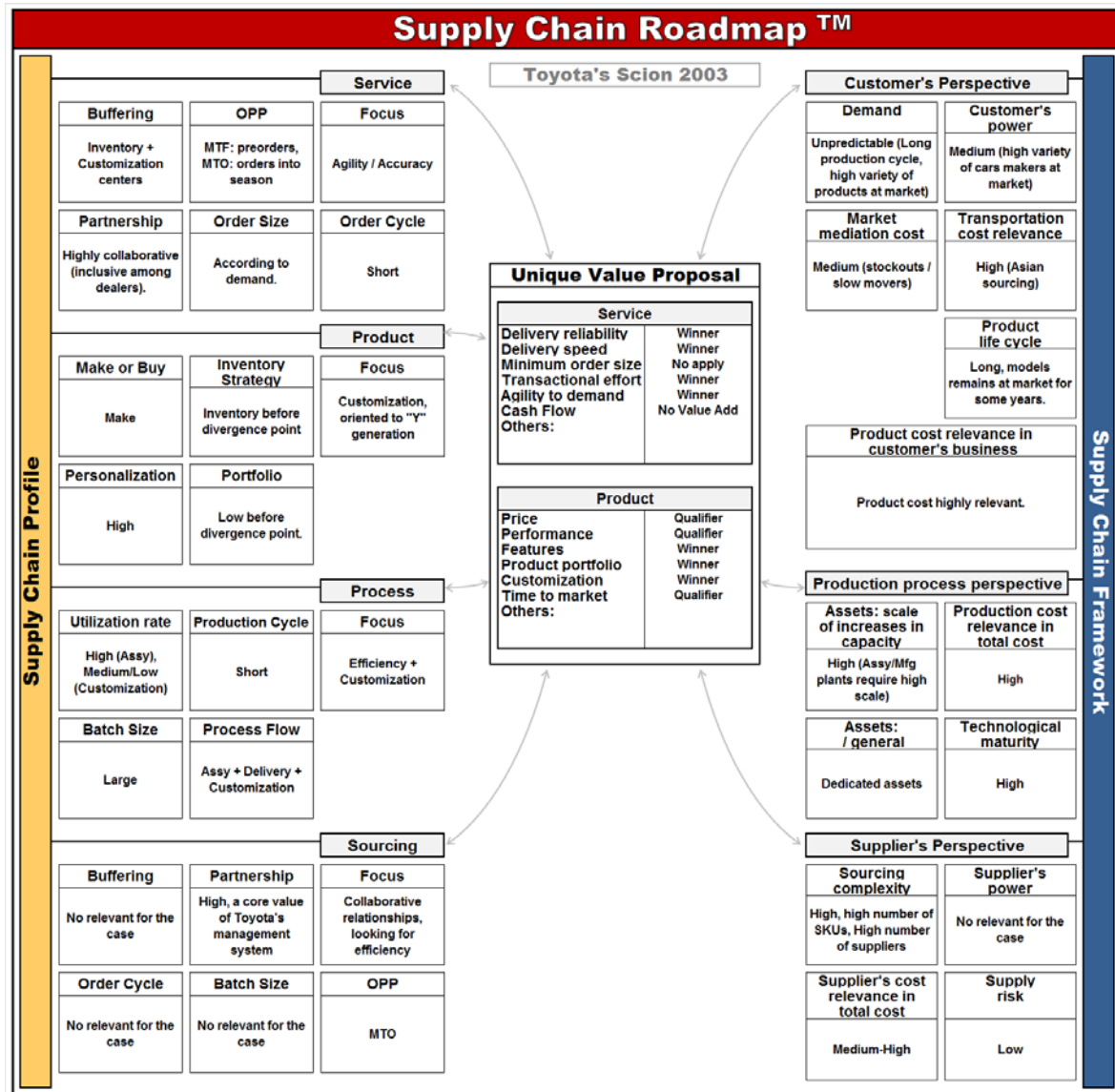


Figure 24, Toyota Scion: Supply Chain Roadmap  
 Source: Own elaboration

Based on case information, Figure 24 shows Supply Chain Roadmap for Toyota’s Scion, in which are defined several aspects about the situation at the case’s time.

Toyota Scion’s Supply Chain framework is characterized by a highly competitive industry, where customers have a large number of options, which results into a highly unpredictable market. Toyota developed a value proposal based on an innovative, fashion and unique product, with an affordable cost for “Y” generation people. In order to support this value proposal, Toyota created an

efficient supply chain before divergence point, based on a MTF order penetration point, and they developed a customization process, which must be done near to the market –at the distributor site or in the customization center, nearest to the market-. This is a “Leagile” supply chain, where an efficient process is done before OPP and an agile process is performed after OPP.

9.3.3 Toyota Scion: gap analysis based on “Reference SCGM”

Table 30, Toyota Scion: gap analysis based on “Reference SCGM”

Source: Own elaboration.

Unique Value proposal	Service Winners	Information sharing for cost improvement	Collaborative relationships	Agility to unpredictable demand	Order accuracy (for customization)	Solutions proposal	
	Service Qualifiers	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
	Product Winners	Lowest cost	Product Features (innovation)			Solutions proposal	
	Product Qualifiers	Product Performance					
Supply Chain Framework	Market Mediation Cost	Low		middle		High	
	Demand Uncertainty	Low		middle		High	
	Customers power	High		middle		Low	
	Cycle life	Long		middle		Short	
	Cost sensitivity	High		middle		Low	
	Assets	Mainly dedicated		middle		Mainly General Purpose	
	Supply risk	Low		middle		High	
Supply Chain Profile	Focus	Supply Chain	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events
		Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information
		Product	Lowest cost at standard performance		Quick manufacturability	Postponment	Customization
		Production	High utilization rate		Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
		Sourcing	Low total cost supplier	Collaborative relationships	Agile response		Agile response / Risk management
	Service	OPP	MTF	MTS	MTO	ATO	Configurable
		Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production bath	Customer's needs	Customer's needs
		Order cycle...	Fixed	Regular delivery	Shortest	Variable	Flexible
		Partnership	Possible	Required	Not necessary	Not necessary	Improbable
	Product	Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory / Capacity pooling
		Inventory Strategy	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness
		Personalization	Improbable	Improbable	Not necessary, but possible	Not necessary, but possible	Not necessary, but highly possible
		Product Segments	Low	Low - Medium	Low-Medium	High	Undetermined
	Production	Process Flow	Tippically Continuous line	Indifferent	No a continuous line	Assembly after divergence point	Indifferent
		Batch Size	Largest possible in order to increase efficiency		smallest possible looking for lowest obsolescence	smallest possible in order to increase delivery speed	
		Production Cycle	Longest possible	Shortest possible	Shortest possible	Probably, Long lead time	Shortest possible
		Utilization rate	Probably Very High		Probably Medium-High		Probably Low
	Sourcing	OPP	Desirable MTS	Desirable MTS	Desirable MTO for exclusive components/		
		Order size,	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk		
		Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed		
Partnership		It's important		It's possible	Highly possible	Non usual	
Buffering	Inventory and multiple sources of supply	Primary source of supply	Multiple sources of supply				
		Efficient	Continuous replenishment	Agile	LeAgile	Flexible	

Table 30 presents gap analysis compared to reference SCGM, where is shown a pure “Leagile” supply chain, which complies with all the main requirements of these type of strategy: efficiency at

upstream processes, agility after OPP, highly customizable products, inventories concentrated before OPP, among others.

#### 9.3.4 Toyota Scion: Conclusions

As was explained previously, Toyota Scion's Supply Chain complies with the main requirements of a Leagile supply chain, where the OPP is managed in a perfect way: low product variety before OPP, products designed to customization, an efficient supply chain upstream of OPP, customization processes performed as nearest as possible to customers location (dealers site or customization center) and inventory pooling among dealers.

Scion case is an example about the importance of the alignment between business framework and supply chain strategy, where an agile supply chain at downstream processes, oriented to product customization, is supported by a very efficient upstream supply chain.

## 9.4 Wills Lifestyle in India\*\*

### 9.4.1 Excerpts from the case

Some excerpts from the case developed by the Kellogg School of Management (Chopra 2007):

*“...despite the company’s efforts to increase flexibility, including a 2003 initiative that brought manufacturing in-house, production costs remained about US\$1.1 per unit higher than those of third-party manufacturers”*

*“ITC launched the Wills Lifestyle brand in an effort to capture this market in India in 2000. By 2003, however, the business faced multiple challenges. The buildup of unsold inventory equaled about 60 percent of the annual sales turnover of that period, and a lack of popular stock keeping units (SKUs) increased the frequency of lost sales. On-time in-full delivery (OTIF), an unimpressive 40 percent, often delayed the season’s launch..... In addition, low sales volumes meant the Wills Lifestyle management team was finding it difficult to retain garment vendors, forcing it to seek new ones each season.”*

*“....the retail team constructed the product portfolio based on the number of options and projected sales volume at each price point, also known as range architecture (RA)..... Once the range was approved, sales quantities were forecast for each product by consensus of the management team and the sales head..... Garment quantities were constrained by the requirement to order fabrics in minimum lot sizes—numbers determined by fabric mills—though customers could pay a surcharge for lower quantities.....manufacturing vendors (manufacturers) were identified and charged with production for each product..... The chief criterion for vendor selection was experience with international brands of high quality. Because the full range was to come to market simultaneously, the entire volume had to be manufactured together in a small time window. This requirement further increased the number of vendors, despite a low overall production volume..... All finished goods were delivered to an ITC warehouse, from which they were shipped to retail stores. The lead time for delivery of garments to the warehouse was about eight months after the finalization of the style and quantity. The main constituents of the lead time were:*

- Fabric finalization and placement of the fabric order: 30 days*
- Delivery lead time for fabric: 60 to 90 days*
- Prototyping and manufacturing lead times: 60 to 90 days*
- Delivery lead time: 15 to 25 days (from vendors to stores via the warehouse)”*

*“Because of the two- to three-month lead time for fabric and the three- to four-month lead time for manufacturing and delivery, a single manufacturing order was placed for the whole season’s requirement. Most vendors produced large volumes at low cost, with minimum batch sizes ranging from 2,000 to 3,000 pieces per style. The large minimum batch sizes of most garment vendors, in contrast to the lower volume required by Wills, resulted in the entire season’s requirement being produced at the season’s start, as vendors were reluctant to split already small volumes further.”*

*“ITC had a single warehouse in Delhi that received all garments and replenished all stores. The national sales head.... determined allocation of stock to stores. The allocation took into account the sales turnover target of each store and region and balanced available stock.... found that the rapid expansion of stores during 2001 and 2002 created significant problems with its supply chain performance. Large amounts of inventory became obsolete at the end of a season, and sales were lost because popular products and sizes were out of stock.”*

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\*\* Based in: Wills Lifestyle in India. Kellog School of management. Case Kel362. 2009

*“They uncovered several issues. The first was the difficulty of making accurate forecasts; given the inherent unpredictability of demand for specific styles, forecast errors averaged 50 percent.... production volumes far lower than industry standards for garment manufacturing..... different Wills function was responsible for each stage of the planning and forecasting process, and between-function handoffs did not occur until all decisions within a given function had been made.”*

*“They conceived the idea of implementing just-in-time (JIT) manufacturing with the goal of shifting the risk from finished goods inventory to fabric inventory and manufacturing capacity.”*

*“The project team studied the weaknesses in existing processes and concluded that a responsive and flexible supply chain should be designed to enable several specific outcomes:*

*Rapid response to winning styles, reduction of financial risk associated with “losers” and development and production of new styles using fabric left over from early losers”*

*“The team set a... goal of increasing sales seasons from two (with five deliveries to stores) to six (with more frequent deliveries to stores). This increase required the restructuring of manufacturing and a reorganization of the entire supply chain for greater flexibility and responsiveness. While these changes meant increased unit production costs, they were expected to reduce obsolescence and lost sales significantly.”*

*“The team recommended the following major change.....to improve flexibility and responsiveness: Creation of concept-to-product cells, SKU reduction and the use of design platforms, creation of manufacturing cells and demand-driven replenishment”*

*“The sourcing cycle was fundamentally changed from primarily forecast-driven to demand-driven. Given a specific demand forecast, sales decided on the base lot order for each store to be delivered at the beginning of the season. Then a pool stock quantity was added to the base stock order for the initial production quantity. The pool stock consisted of seven days’ estimated sales to buffer the production queuing, manufacturing, and delivery lead times. After the launch of the product to market, new orders, which were based on actual sales figures from store managers, drove the replenishment production plan for the week. The goal of production was to enable replenishment on a weekly basis by generating replenishment orders for each store based on its actual sales once the enterprise resource planning implementation was complete.”*

*“Chairman Y.C. Deveshwar’s vision was to create “a world-class supply chain from fiber to fashion” and to make the division India’s leading fashion brand for ready-to-wear Western clothing. To this end, a master facility in Gurgaon (near Delhi) was established to provide a platform for research and development activities related to fabrics and washes and to facilitate the prototyping of designs. Necessary product-focused capabilities included design, garment construction, specifications, sourcing/manufacturing, and testing of all inputs.”*

*“In 2003 the team reconstructed the supply chain to be more responsive to customer demand and reduce obsolete inventory and lost sales. While the effort succeeded in matching supply and demand, internal costs of production continued to be higher than those of third parties, giving management much to debate at the retreat and upon their return.”*

*“...an initial opening of the retail sector in India to foreign direct investment.... The new rule allowed retailers such as The Gap, Zara....to enters the Indian market with majority ownership. Another major issue for LRBD was an analysis of its cost structure and decisions regarding how best to use internal manufacturing capacity. While it was much more flexible and responsive than third-party manufacturing, internal capacity was more expensive than third parties.”*

9.4.2 Wills: Supply Chain Roadmap™

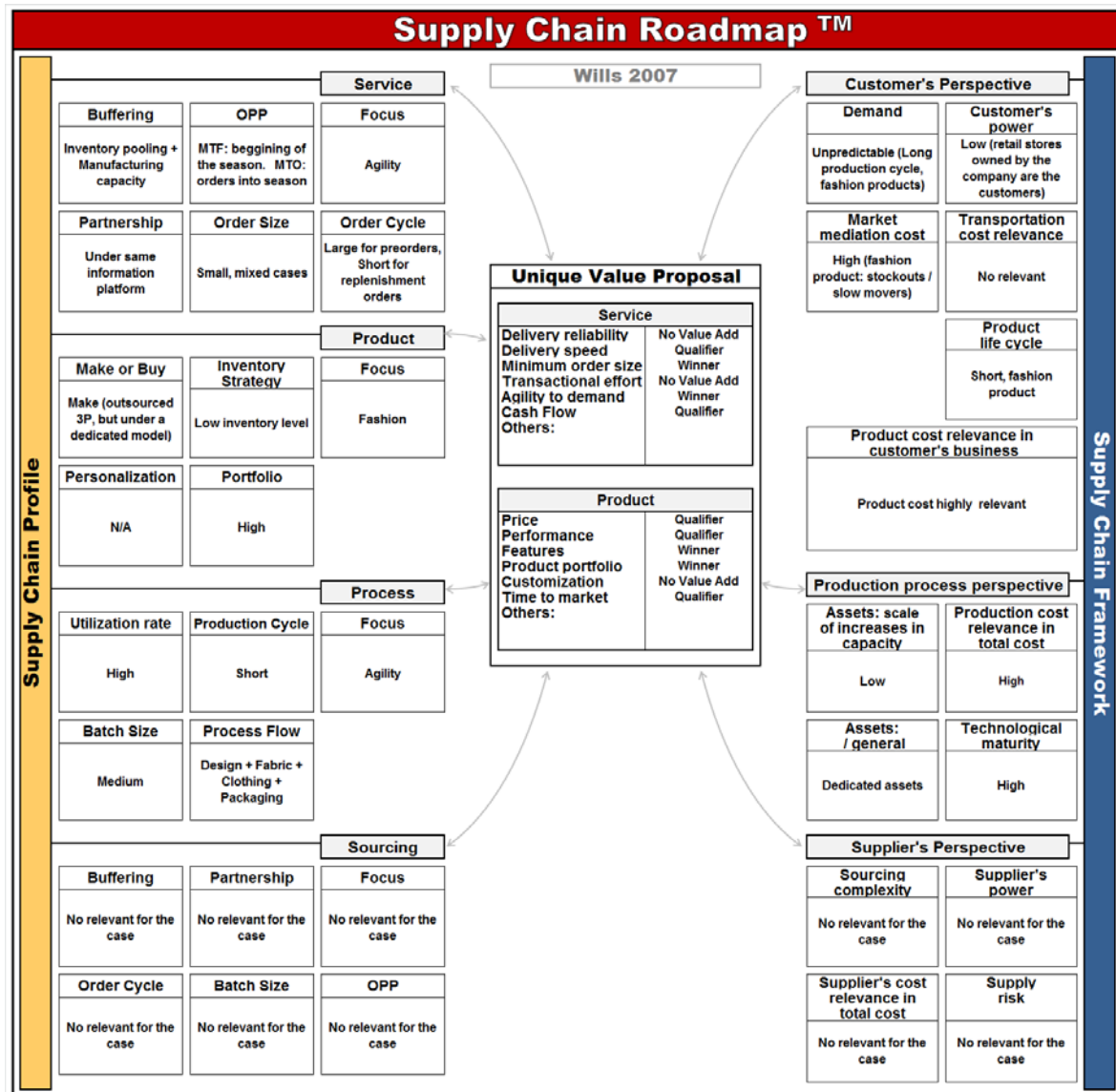


Figure 25, Wills: Supply Chain Roadmap  
Source: Own elaboration

Based on case information, Figure 25 shows Supply Chain Roadmap for Wills, in which are defined several aspects about the situation at the case's time. Supply Chain Roadmap characterization is based on some assumptions:

- Retail stores (owned by Wills) are the customers.
- Suppliers perspective, understood as fabrics and raw materials sourcing is not include in the analysis, due case doesn't include information about this portion of the supply chain.

Wills's Supply Chain framework is characterized by typical features of fashion industry: High market mediation cost, transformation processes outsourced and products with short life cycle.



Wills defined a new approach to the business, moving from outsourced operations to owned operations, in order to increase responsiveness and to reduce market mediation cost. Aiming for that, they defined a “Just in Time” -Agile- approach as the core of the supply chain strategy

9.4.3 Wills: gap analysis based on “Reference SCGM”

Table 31, Wills: gap analysis based on “Reference SCGM”

Source: Own elaboration.

Unique Value proposal	Service Winners	Information sharing for cost improvement	Collaborative relationships	Agility to unpredictable demand	Order accuracy (for customization)	Solutions proposal	
	Service Qualifiers	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
	Product Winners	Lowest cost	Product Features (innovation)			Solutions proposal	
	Product Qualifiers	Product Performance					
Supply Chain Framework	Market Mediation Cost	Low		middle		High	
	Demand Uncertainty	Low		middle		High	
	Customers power	High		middle		Low	
	Cycle life	Long		middle		Short	
	Cost sensitivity	High		middle		Low	
	Assets	Mainly dedicated		middle		Mainly General Purpose	
	Supply risk	Low		middle		High	
	Supply Chain Profile	Focus	Supply Chain	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponment
Service			Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information
Product			Lowest cost at standard performance		Quick manufacturability	Postponment	Customization
Production			High utilization rate		Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
Sourcing			Low total cost supplier	Collaborative relationships	Agile response		Agile response / Risk management
Service		OPP	MTF	MTS	MTO	ATO	Configurable
		Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production bath	Customer's needs	Customer's needs
		Order cycle...	Fixed	Regular delivery	Shortest	Variable	Flexible
		Partnership	Possible	Required	Not necessary	Not necessary	Improbable
		Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory / Capacity pooling
Product		Inventory Strategy	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness
		Personalization	Improbable	Improbable	Not necessary, but possible	Not necessary, but possible	Not necessary, but highly possible
		Product Segments	Low	Low - Medium	Low-Medium	High	Undetermined
Production		Process Flow	Tippically Continuous line	Indifferent	No a continuous line	Assembly after divergence point	Indifferent
		Batch Size	Largest possible in order to increase efficiency		smallest possible looking for lowest obsolescence	smallest possible in order to increase delivery speed	
		Production Cycle	Longest possible	Shortest possible	Shortest possible	Probably, Long lead time	Shortest possible
		Utilization rate	Probably Very High		Probably Medium-High		Probably Low
Sourcing		OPP	Desirable MTS	Desirable MTS	Desirable MTO for exclusive components/		
		Order size,	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk		
		Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed		
		Partnership	It's important		It's possible	Highly possible	Non usual
Buffering		Inventory and multiple sources of supply	Primary source of supply	Multiple sources of supply			
			Efficient	Continuous replenishment	Agile	LeAgile	Flexible

Table 31 presents gap analysis compared to reference SCGM, where is shown an “Agile” supply chain with a service perspective oriented to “Continuous replenishment”, which was defined by Wills when they said “The goal of production was to enable replenishment on a weekly basis by generating replenishment orders for each store based on its actual sales”.

#### 9.4.4 Wills: Conclusions

The mixture of an agile supply chain with a service perspective oriented to “continuous replenishment” creates a dichotomy, because a “continuous replenishment” requires “stable demand behavior” in order to assure service without increasing costs associated to transformation processes. In a highly unpredictable demand behavior, agility is a good choice, but it implies higher product cost because assets utilization rate is lower in order to allow responsiveness, and it resulted in higher cost than industry for Wills, which was one of the main complaint of Wills’s management.

The gap analysis of this case shows two main inconsistencies:

- Wills expected in an agile supply chain, both objectives: reduce market mediation cost and product cost similar to outsourced operations (to efficient supply chains).
- Wills designed a continuous replenishment process in a supply chain with high uncertainty in demand behavior.

Both inconsistencies are the root cause of the poor behavior of Wills at the early stages of the introduction of his “Agile” Supply chain, and as a consequence of that, they expressed difficulties in obtaining high levels of efficiency, as is explained in his annual reports in 2004 “ *Effective operating strategies enabled the business to shrink market response time resulting in a decrease in the obsolescence levels of finished goods ..... the business is engaged in addressing the challenge of gearing up the supply chain to significantly higher scale of operations...*”, later, in order to fill the efficiency gap, they increased assets utilization rate based on higher volumes for exports market, as is explained in his annual reports in 2005 “*In the area of apparel exports, your company made a healthy beginning during the year, establishing relationships with key customers. The business is in the process of enhancing its manufacturing capacities to take full advantage of the emerging growth opportunities.*”

In addition to that, this case is a good opportunity to highlight the misunderstanding that remains in several practitioners about “Toyota Production System –TPS-” (Also miscalled “Just in Time”), because TPS is oriented to “Leagility” as was shown in previous case (See Scion case) more than “Agility”, as was understood by Wills. Confusion lies in some tools (“Kanban”, “one piece flow”, “manufacturing cells”, etc.) that were developed by TPS, which could be used in several supply chain strategies, as Agile or Leagile.

## 10. Own Case Analysis

### 10.1 Applying “Supply Chain Roadmap™” in your own case

In order to apply “Supply Chain Roadmap™” to real cases is necessary to develop the three steps defined in the left side of the Figure 26, right side indicates the tools used in each step.

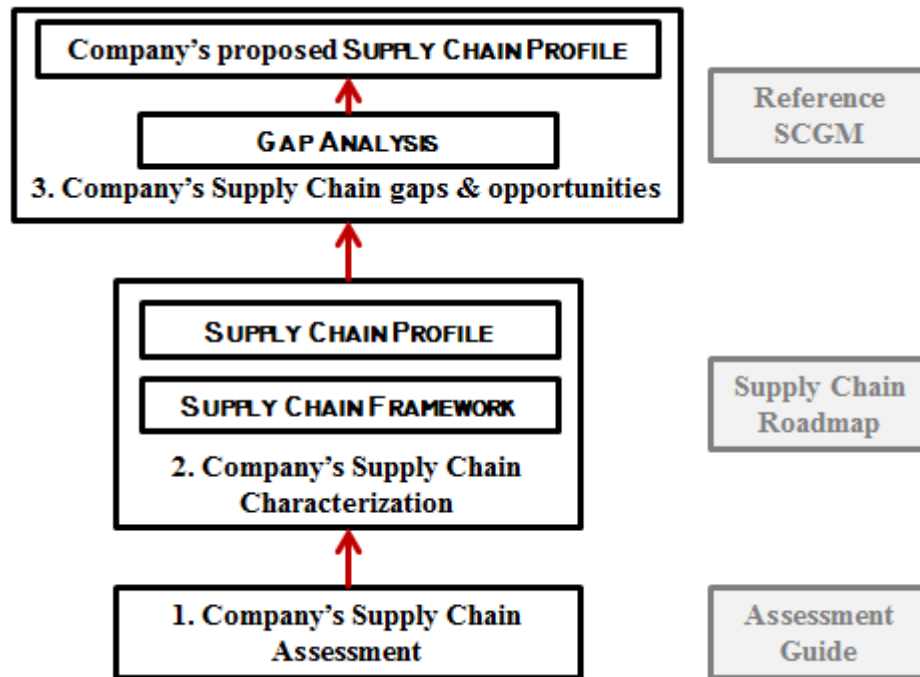


Figure 26, Steps to apply “Supply Chain Roadmap™” method in a real case  
Source: Own elaboration

Assessment guide is composed of three tools: (1) Framework Assessment, which is oriented to evaluate business environment, (2) Profile Assessment, which is oriented to evaluate current supply chain profile, and, (3) Focus Assessment, which is used to define the current focus of each supply chain process, understanding focus as the driver of the management decisions at strategic, tactical and operative levels.

Assessment could be done in two different approaches:

For large size companies, in a two stages approach, first stage at individual level, and later, should be done a consensus assessment based on team discussion and agreement.

For small/medium size companies, in a single stage approach, where assessment is developed in conjunction by a small group of people (1 to 3 people).

After that, supply chain roadmap is filled based on “consensus assessment”, and again, the result is reviewed, evaluated and adjusted by the team.

Finally, “Supply Chain Roadmap” is compared against “Reference SCGM”, and a group discussion should be done in order to find the most relevant gaps, and how they should be solved.

“Supply Chain Roadmap™” method, is a guide about how to challenge discussions about supply chain strategy based on a friendly method, but, quality of the results depends of the representativeness of the team and the depth of the discussions done.

Tools are presented in: Table 32 presents “Framework assessment”, Table 33 presents “Profile assessment”, Table 34 presents “Focus assessment”, Figure 27 presents “Supply Chain Roadmap” and Table 35 presents “Reference SCGM”.

Table 32, Framework assessment tool  
 Source: Own elaboration.

Please, answer the questions, under "market perspective", in other words, Which is the "general condition/behavior" of the industry on the market?					
		Factors/ Elements	Criteria	Qualification	Comments
Supply Chain Framework	Customers (Market)	Market mediation cost	Market mediation cost relevance in total cost (Obsolescence, Working Capital, Lost sales.) -Low, Medium, High-		
		Transportation cost	Transportation/Logistics cost relevance in total cost. -Low, Medium, High-		
		Demand uncertainty	Is demand <i>predictable, unpredictable or unexpected</i> ?		
		Customer's power	Customer's power based on alternatives (channels, suppliers, substitutive products) and demand/offer ratio. -Low, Medium, High-		
		Product cycle life	Length of product life cycle ( <i>Short, Medium, Long</i> )		
		Cost sensitivity	Product/Service cost relevance in Customer's business. (Low, Medium, High)		
	Process	Fixed Assets: Increase in capacity	Magnitude of the increases in capacity of new assets ( <i>Small, Medium, High</i> )		
		Fixed Assets: General purpose/dedicated	<i>General purpose or dedicated assets?</i>		
		Process technological maturity.	Process technological maturity. ( <i>New product, Maturing, Mature</i> )		
		Cost	Manufacturing cost - <i>transformation cost</i> - relevance in total cost. (Low, Medium, High)		
	Suppliers	Supply risk	Are there risks associateds to supply disruptions? ( <i>Yes, no relevant</i> )		
		Supplier's power	Supplier's power based on alternatives (distribution channels, suppliers, substitutive products) and demand/offer ratio. -Low, Medium, High-		
Sourcing complexity		Mix of: (1) Global sourcing/ Local sourcing / Strategic partnership? (2) High number SKUs/Suppliers? (3) Markets Volatility? -Low, Medium, High-			
Cost		Product/Service - <i>raw materials</i> - cost relevance in manufacturer's business. -Low, Medium, High-			

Table 33, Profile assessment tool  
 Source: Own elaboration.

Please, answer the questions, under **your company's perspective**, in other words, Which is the "general condition/behavior" of your company on the market?

		Factors/ Elements	Criteria	Qualification	Comments	
Unique Value Proposal	Service	Delivery reliability -Perfect Orders-				
		Delivery speed -Short Lead time-	<b>Winner:</b> What are the differentiated services features in order to create an unique value proposal in the market?			
		Minimum order size	<b>Qualifier:</b> What are the minimum required services features in order to compete in the market?			
		Transactional effort -EDI, others-	<b>Non Value Add:</b> What are the services features no required?			
		Agility to demand changes				
	Product	Cash Flow (High Inventories turns)				
		Other:				
		Price				
		Performance	<b>Winner:</b> What are the differentiated product features in order to create an unique value proposal in the market?			
		Features (Differentiated features)	<b>Qualifier:</b> What are the minimum required product features in order to compete in the market?			
Supply Chain Profile	Service	Product portfolio (Wide portfolio..)	<b>Non Value Add:</b> What are the product features no required?			
		Customized Products				
		Time to market (innovation)				
		Other:				
		OPP	Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.			
Supply Chain Profile	Service	Order Size	In units ( <i>FTL, LTL, packages</i> ) and relevance compared against customers requirements ( <i>Large, normal, Small</i> )			
		Order Cycle	Fixed (cycle) or variable (lead time)? <i>How many days?</i> Relevance ( <i>Long, Medium, Short</i> )? <i>-from order to dispatching-</i>			
		Partnership	Are Collaborative relationships used in a strategic/systematic way? <i>Yes, no relevant</i>			
		Buffering	How/Where is demand buffered? ( <i>Inventory, Capacity, Pooling, other?</i> )			
		Product	Inventory Strategy	What is the inventories strategy? (1) High inventory level for optimizing production batches, (2) High rotation to reduce working capital, (3) Common components/ materials (pooling), (4) Inventory before divergence point, (5) Pooling for increasing responsiveness		
	Personalization		Are products personalized according to customer's specific needs? ( <i>Yes or Not</i> )			
	Make or buy?		Are Transformation processes <i>made or buyed</i> (outsourced)?			
	Product Segments		How many product segments are? ( <i>High, Medium, Low</i> ) - compared against market/industry-			
	Process		Process Flow	What is the dominant process flow type? ( <i>Batch, Job Shop, Assembly line, continuous line</i> )		
		Batch Size	Relevance compared against inventories policy ( <i>Large, normal, Small</i> )			
Production Cycle		Fixed or variable? <i>How many days?</i> Relevance ( <i>Long, Medium, Short</i> ) ? <i>-time to produce all portfolio SKUs-</i>				
Utilization rate		What is the asset's utilization rate? %				
Buffering		How/Where is process buffered? ( <i>Inventory, Capacity, Pooling, other?</i> )				
Sourcing	OPP	Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.				
	Order Size	In units ( <i>FTL, LTL, packages</i> ) and relevance compared against inventory policy requirements ( <i>Large, normal, Small</i> )				
	Order Cycle	Fixed or variable? <i>How many days?</i> Relevance ( <i>Long, Medium, Short</i> )? <i>-from order to receiving-</i>				
	Partnership	Are Collaborative relationships used in a strategic/systematic way? <i>Yes, no relevant</i>				
	Buffering	How/Where is supply buffered? ( <i>Inventory, Capacity, Pooling, other?</i> )				

Table 34, Focus assessment tool  
Source: Own elaboration.

Please, answer the questions, under <b>your company's perspective</b> , in other words, Which is the most important focus of your company on the market? Rank top 3 focus in each area (Highest 3 - Medium 2 - Lowest 1 - Others 0)		
Area	Focus	Individual Assessment 1
<b>Supply Chain</b>	Efficiency	
	Collaborative relationships	
	Agile to unpredictable demand	
	Postponment	
	Flexible to unpredictable events	
	Other:	
<b>Service</b>	Transactional oriented	
	Information sharing for improvement	
	Information sharing for fulfill demand	
	Order accuracy (for customization)	
	No sharing information	
	Other:	
<b>Product</b>	Lowest cost at standard performance	
	Quick manufacturability	
	Postponment	
	Customization	
	Other:	
<b>Production</b>	High utilization rate	
	Short set-up times and extra-capacity	
	Extra capacity after divergence point	
	Assets flexibility / Pooling	
	Other:	
<b>Sourcing</b>	Low total cost supplier	
	Collaborative relationships	
	Agile response	
	Agile response / Risk management	
	Other:	

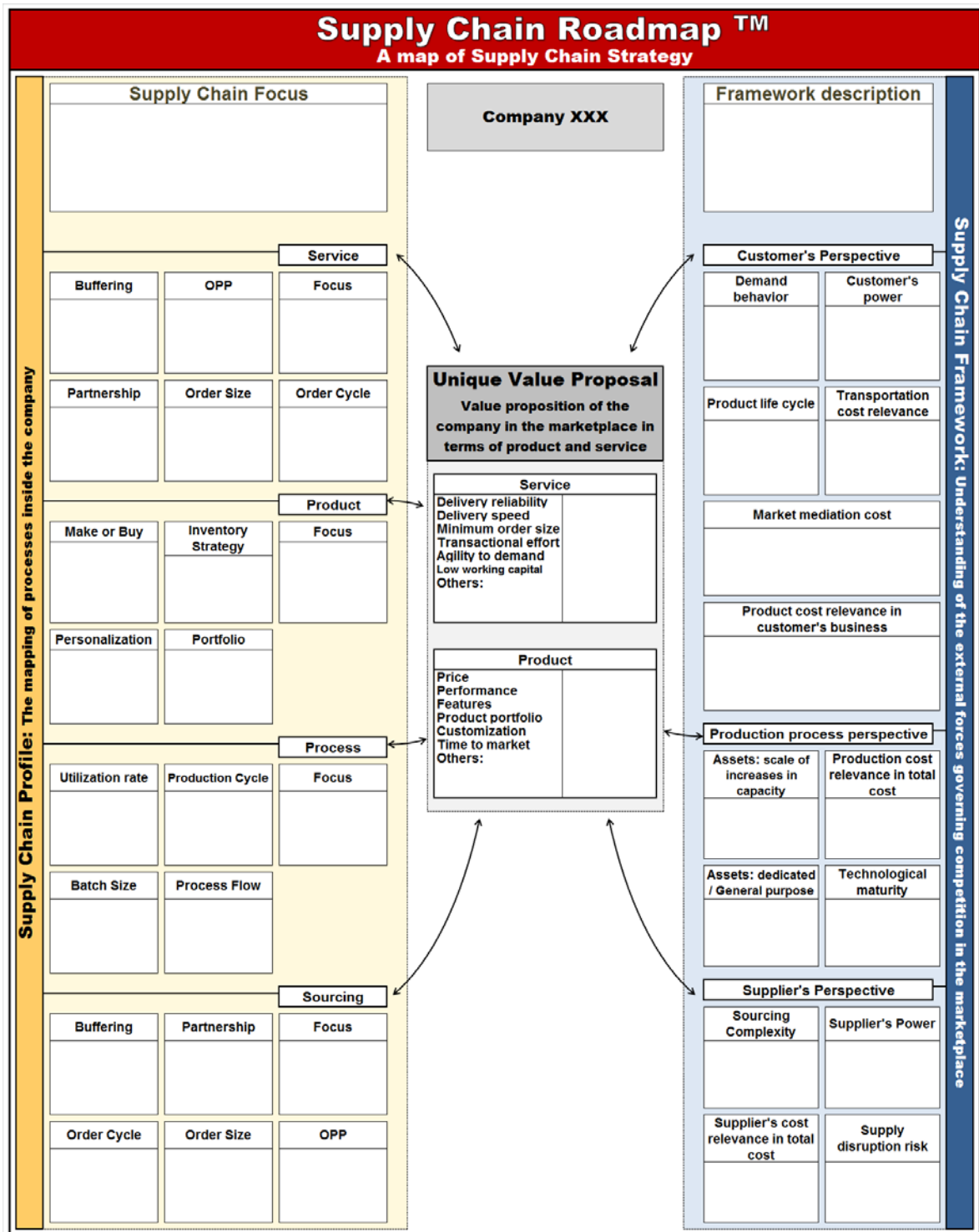


Figure 27, "Supply Chain Roadmap™" tool  
 Source: Own elaboration

Table 35, Reference SCGM tool (Gap Analysis)  
 Source: Own elaboration.

Gap analysis vs "Supply Chain Generic Model"								
		Efficient	Continuous Replenishment	Agile	LeAgile	Flexible		
Value Proposal	Service	Main winner	Perfect orders	Low working capital	Fast response to unpredictable demand	Customized products	Solutions proposal	
		Min. order size	Full Truck Load	Customer needs / Full Truck Load	Production batch	For customized products	For production / transportation	
		Delivery	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
	Product	Main winner	Lowest cost	Performance/cost	Product Features (innovation)		Solutions proposal	
		Portfolio	Small	Medium	Large	Large	Whatever	
		Price	Lowest		Competitive		No matter	
Supply Chain Framework	Market Mediation	Low		middle	High			
	Demand Uncertainty	Low		middle	High			
	Customers power	High		middle	Low			
	Cycle life	Long		middle	Short			
	Cost sensitivity	High		middle	Low			
	Assets	Mainly dedicated		middle	Mainly General Purpose			
	Supply risk	Low		middle	High			
	Supply Chain Profile	Management (Focus)	Supply Chain	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events
Service			Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information	
Product			Lowest cost at standard performance			Quick manufacturability	Postponment	Customization
Production			High utilization rate			Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
Sourcing			Low total cost supplier	Collaborative relationships	Agile response		Agile response / Risk management	
Service		OPP	MTF	MTS (MTO in some industries)	MTO	ATO	Configurable	
		Buffering	Inventory, smallest as possible			Inventory before divergence point / Extra capacity	Inventory / Capacity pooling	
		Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs	
		Order cycle...	Fixed	Regular delivery	Shortest	Variable	Flexible	
		Partnership	Possible	Required	Not necessary	Not necessary	Improbable	
Product		Inventory Strategy	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness	
		Personalization	Improbable			Not necessary, but possible	Not necessary, but possible	Not necessary, but highly possible
		Product Segments	Low	Low - Medium		High	Undetermined	
Production		Workload leverage	Smoothed		Medium size Peaks / Valleys	Smoothed before divergence point	Large size Peaks / Valleys	
		Utilization rate	Probably Very High		Probably Medium-High		Probably Low	
		Process Flow	Typically Continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	Indifferent	
		Batch Size	Largest possible in order to increase efficiency		smallest possible looking for lowest obsolescence	smallest possible in order to increase delivery speed		
		Production Cycle	Longest possible	Shortest possible		Probably, Long lead time	Shortest possible	
		Sourcing	OPP	Desirable MTS			Desirable MTO for exclusive components/	
Order size,			According to lowest transportation cost			Smallest possible in order to reduce obsolescence risk		
Order Cycle			Fixed, looking for lowest transaction cost			Shortest possible in order to increase delivery speed		
Partnership			It's important			It's possible	Highly possible	Non usual
Buffering			Inventory / multiple sources of supply	Primary source of supply		Multiple sources of supply		
Predominant features of the supply chain under analysis			Gaps of the supply chain under analysis					
Secondary features of the supply chain under analysis								



## 10.2 First case: FMCG Company

Company Omega (for confidentiality reasons its name has been changed) is a multinational company with operations in several countries around the world, they compete in several categories of fast moving consumer goods. Analysis is restricted to one of these categories (category B) in a Latin American country.

### 10.2.1 Application of the method

Assessment was developed by a consensus among medium and top managers of several functions as operations planning, distribution, sales, marketing and supply chain, tables 36 to 38 present results of the assessments.

Table 36, Supply Chain Profile Assessment, Omega Company, Category B

Source: Omega Company

Please, answer the questions, under **your company's perspective**, in other words, Which is the "general condition/behavior" of your company on the market?

		Factors/ Elements	Criteria	Consensus	Comments
Unique Value Proposal	Service	Delivery reliability -Perfect Orders-	<b>Winner:</b> What are the differentiated services features in order to create an unique value proposal in the market? <b>Qualifier:</b> What are the minimum required services features in order to compete in the market? <b>Non Value Add:</b> What are the services features no required?	Qualifier	Forecast accuracy is low-medium level, which generates adjustments to production plan at the end of month
		Delivery speed -Short Lead time-		Qualifier	
		Minimum order size		Qualifier	
		Transactional effort -EDI, others-		Qualifier	
		Agility to demand changes		Qualifier	
	Product	Cash Flow (High Inventories turns)	Non value add		
		Other:			
		Price	Qualifier		
		Performance	Qualifier		
		Features (Differentiated features)	<b>Winner:</b> What are the differentiated product features in order to create an unique value proposal in the market? <b>Qualifier:</b> What are the minimum required product features in order to compete in the market? <b>Non Value Add:</b> What are the product features no required?	Qualifier	Oriented to differentiated features, but not enough relevant for customers.
Product portfolio (Wide portfolio.)	Qualifier				
Customized Products	Non value add				
Time to market (innovation)	Qualifier				
Other: <b>Brand awareness</b>	Qualifier	Is one of the top brands in its category.			
Supply Chain Profile	Service	OPP	Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.	Make to forecast	At the end of month, apply a "Make to order" (for processes after divergence point, for production adjustments -due to medium forecast accuracy-)
		Order Size	In units (FTL, LTL, packages) and relevance compared against customers requirements (Large, normal, Small)	LTL, normal	Don't apply minimum order size policy
		Order Cycle	Fixed (cycle) or variable (lead time)? How many days? Relevance (Long, Medium, Short)? -from order to dispatching-	Fixed, aprox 2 days, Short	
		Partnership	Are Collaborative relationships used in a strategic/systematic way? Yes, no relevant	No relevant	
		Buffering	How/Where is demand buffered? (Inventory, Capacity, Pooling, other?)	Mainly Inventory / Small quantity of extra Capacity after divergence point	After divergence point there is extra capacity, which allows to modify production plan at the end of month according to demand changes
	Product	Inventory Strategy	What is the inventories strategy? (1) High inventory level for optimizing production batches, (2) High rotation to reduce working capital, (3) Common components/ materials (pooling), (4) Inventory before divergence point, (5) Pooling for increasing responsiveness	1	Cost driven by assets efficiency/utilization rate
		Personalization	Are products personalized according to customer's specific needs? (Yes or No)	Not	
		Make or buy?	Are Transformation processes made or bought (outsourced)?	Made	
		Product Segments	How many product segments are? (High, Medium, Low) - compared against market/industry-	Medium	
	Process	Process Flow	What is the dominant process flow type? (Batch, Job Shop, Assembly line, continuous line)	Batch	Batch + Continuous line (separated by divergence point)
		Batch Size	Relevance compared against inventories policy (Large, normal, Small)	Normal	
		Production Cycle	Fixed or variable? How many days? Relevance (Long, Medium, Short)? -time to produce all portfolio SKUs-	2 by month	
		Utilization rate	What is the assets utilization rate? %	>90%	
	Sourcing	OPP	Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.	Make to forecast	Overdemanded local sourcing
		Order Size	In units (FTL, LTL, packages) and relevance compared against inventory policy requirements (Large, normal, Small)	FTL	
Order Cycle		Fixed or variable? How many days? Relevance (Long, Medium, Short)? -from order to receiving-	Short (local), Long (Imported)		
Partnership		Are Collaborative relationships used in a strategic/systematic way? Yes, no relevant	Yes		
Buffering		How/Where is supply buffered? (Inventory, Capacity, Pooling, other?)	Pooling	Multiple suppliers	

Table 37, Framework Assessment, Omega Company, Category B

Source: Omega Company

Please, answer the questions, under "market perspective", in other words, Which is the "general condition/behavior" of the industry on the market?

		Factors/ Elements	Criteria	Consensus	Comments
Supply Chain Framework	Customers (Market)	Market mediation cost	Market mediation cost relevance in total cost (Obsolescence, Working Capital, Lost sales.) -Low, Medium, High-	Medium	Two times by year product renovation
		Transportation cost	Transportation/Logistics cost relevance in total cost. -Low, Medium, High-	High	>10%
		Demand uncertainty	Is demand <i>predictable, unpredictable or unexpected</i> ?	Unpredictable	End of month syndrome
		Customer's power	Customer's power based on alternatives (channels, suppliers, substitutive products) and demand/offer ratio. -Low, Medium, High-	High	Driven by Private labels
		Product cycle life	Length of product life cycle ( <i>Short, Medium, Long</i> )	Medium	Product renovation changes packaging and minor features, but affects sales of previous products
		Cost sensitivity	Product/Service cost relevance in Customer's business. (Low, Medium, High)	Medium	Medium, is a traffic generator for customers
	Process	Fixed Assets: Increase in capacity	Magnitude of the increases in capacity of new assets ( <i>Small, Medium, High</i> )	High	Capacity increases could be near to 10% country demand
		Fixed Assets: General purpose/dedicated	General purpose or dedicated assets?	Dedicated	
		Process technological maturity.	Process technological maturity. ( <i>New product, Maturing, Mature</i> )	Mature	Technological changes are oriented to efficiency
		Cost	Manufacturing cost - <i>transformation cost</i> - relevance in total cost. (Low, Medium, High)	High	Aprox 20%
	Suppliers	Supply risk	Are there risks associateds to supply disruptions? ( <i>Yes, no relevant</i> )	Yes	No
		Supplier's power	Supplier's power based on alternatives (distribution channels, suppliers, substitutive products) and demand/offer ratio. -Low, Medium, High-	High	Local sourcing is not enough, imports are required a 10-15% more expensive than local cost
		Sourcing complexity	Mix of: (1) Global sourcing/ Local sourcing / Strategic partnership? (2) High number SKUs/Suppliers? (3) Markets Volatility? -Low, Medium, High-	High	Low
		Cost	Product/Service - <i>raw materials</i> - cost relevance in manufacturer's business. -Low, Medium, High-	High	Aprox 50%

Table 38, Framework Assessment, Omega Company, Category B

Source: Omega Company

Area	Focus	Consensus
Supply Chain	Efficiency	3
	Collaborative relationships	
	Agile to unpredictable demand	2
	Postponment	
	Flexible to unpredictable events	
Service	Other:	
	Transactional oriented	3
	Information sharing for improvement	
	Information sharing for fulfill demand	
	Order accuracy (for customization)	
Product	No sharing information	
	Other:	
	Lowest cost at standard performance	3
	Quick manufacturability	
	Postponment	
Production	Customization	
	Other:	
	High utilization rate	3
	Short set-up times and extra-capacity	2
	Extra capacity after divergence point	
Sourcing	Assets flexibility / Pooling	
	Other:	
	Low total cost supplier	3
	Collaborative relationships	
	Agile response	
Sourcing	Agile response / Risk management	
	Other:	

Based on assessment was developed Supply Chain Roadmap and gap analysis, which are presented in Figure 28 and Table 39.

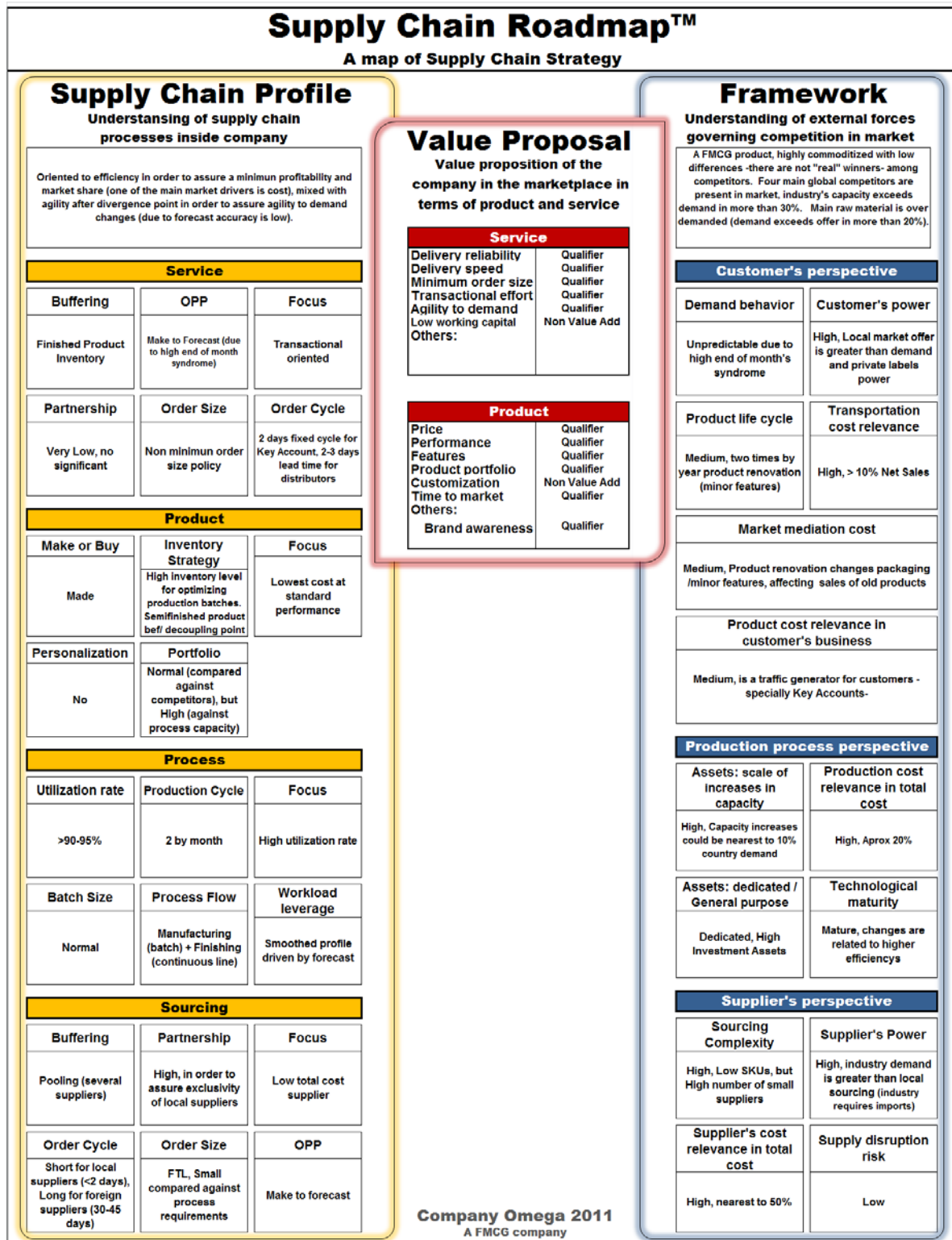


Figure 28, Category B, Omega Company under "Supply Chain Roadmap™".  
Source: Own elaboration

Table 39, Category B, Omega Company gap analysis under “reference SCGM”.  
 Source: Own elaboration

		<b>Gap Analysis</b>					
		<b>Efficient</b>	<b>Continuous Replenishment</b>	<b>Agile</b>	<b>LeAgile</b>	<b>Flexible</b>	
<b>Supply Chain Framework</b>	Market Mediation Cost	Low		middle		High	
	Demand Uncertainty	Low		middle		High	
	Customers power	High		middle		Low	
	Cycle life	Long		middle		Short	
	Cost sensitivity	High		middle		Low	
	Assets	Mainly dedicated		middle		Mainly General Purpose	
	Supply risk	Low		middle		High	
	<b>Value Proposal</b>	* Main winner	Perfect orders	Low working capital	Fast response to unpredictable demand	Customized products	Solutions proposal
Min. order size		Full Truck Load	Customer needs / Full truck load	Production batch	Production batch Post OPP	For production / transportation	
Delivery		Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
* Main winner		Lowest cost	Performance/cost	Product Features (innovation)		Solutions proposal	
Portfolio		Small	Medium	Large	Large	Whatever	
Price		Lowest	Competitive			No matter	
<b>Supply Chain Profile</b>		* Supply Chain	Efficiency	Collaborative Relationships	Agile to unpredictable demand	Postponement	Flexible to unpredictable events
	Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy for customization	No sharing information	
	Product	Lowest cost at standard performance		Quick Manufacturability	Postponement	Customization	
	Production	High utilization rate		Short set-up times / extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling	
	Sourcing	Low total cost supplier	Collaborative Relationships	Agile response		Agile response / Risk management	
	* OPP	MTF	MTS MTO in some industries	MTO	ATO	Configurable	
	* Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory pooling/ Capacity pooling	
	Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs	
	Order cycle...	Fixed lead time	Regular delivery	Shortest according to queue	Shortest, according to post OPP queue	Flexible	
	Partnership	Possible	Required	Not necessary	Not necessary	Improbable	
	* Inventory Strategy	High inventory for efficient production	High rotation for low working capital	Internal Pooling	Inventory before divergence point	Internal / External Pooling	
	* Personalization	Improbable		Not necessary, but possible		Not necessary, but highly possible	
	Product Segments against peers	Low	Low - Medium		High	Undetermined	
	* Workload leverage	Smoothed		Medium size Peaks / Valleys	Smoothed before divergente point	Large size Peaks / Valleys	
	* Utilization rate	Very High		Medium-High		Low	
	Process Flow	Typically continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	Indifferent	
	Batch Size	Largest possible in order to increase production efficiency		small possible for lowest	smallest possible in order to increase delivery speed		
	Production Cycle	Longest possible	Medium - Short possible for increasing responsiveness		Long before OPP Short before OPP	Shortest possible	
	* OPP	Desirable MTS		Desirable MTO for exclusive components / materials			
	Order size	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk			
	Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed			
	Partnership	It's important		It's possible	Highly possible	Non usual	
	Buffering	Inventory / multiple sources of supply	Primary source of supply	Multiple sources of supply			
	Predominant features of the supply chain under analysis Secondary features of the supply chain under analysis * Dominant factors: factors that dominate the definition of prevailing supply chain						
			Gaps		Predominant supply chain model		

Company Omega 2011  
 A FMCG company

### 10.2.2 Gap analysis

Gap analysis shows:

- Omega supply chain is a predominant efficient supply chain, with some Leagile features, especially at the end of month, where production plan after divergence point is adjusted according to forecast inaccuracies.
- Main market driver is “low cost”, due to two main conditions: high customer’s power (industry’s capacity exceeds demand) and similar product features under consumer eyes.
- Brand awareness is an important qualifier in order to assure customer preference under similar “Qualifiers”.
- While “unique value proposal” does not have a real “Winner”, market should be oriented to low cost condition.
- Freights are an important cost driver, and they are affected by current service policies (no minimum order size, no fixed order cycle).
- There are four conditions generating lower efficiencies: High number of SKUs, forecast inaccuracy, variable order cycle, and no minimum order size policy. All of them are factors affecting in a negative way the main driver of the market: Low cost. Probably others companies are affected by the same conditions, but if some of the competitors is able to adjust these conditions (assuming low cost as main market driver), could affect current market status.
- Main recommendations are:
  - o Maintain “efficiency oriented” supply chain, in order to assure lowest cost.
  - o Adjust “Unique value proposal” in order to find a real “Winner” that could move market in a different condition than “Lowest cost”.
  - o While there is not a real change in market driver (Lowest cost), it’s important to adjust factors affecting efficiency:
    - Number of SKUs, in order to increase efficiency and to reduce forecast inaccuracy.
    - Service policy, in order to assure better efficiency dispatches (FTL policy, supported by fixed order cycle).

### 10.2.3 Manager’s Feedback

Method results were shared and discussed with Omega’s Supply Chain Manager:

**Q:** What is your opinion about the method?

**A:** It is easy and fast. With the aim of assure method quality is so important to support assessment stage with a previous training in order to unify concepts and definitions among participants.

*Note: Assessment stage for Omega required adjustment in the consensus stage because some participants misinterpreted some concepts. As result of this, assessment for Alpha was supported with a one hour introduction session, in order to assure understanding of questions and technical concepts.*

**Q:** What is your opinion about the “Supply Chain Roadmap” graphic?

**A:** It is an understandable summary on one page of the factors of a supply chain.

I like it because it is a clear vision of the interaction between company’s processes and market. Initial explanation about roadmap components is required to understand it. It is important to place a brief explanation that is each of the elements (profile, framework, unique value proposal).

*Note: First version of Omega’s Supply Chain Roadmap, hadn’t explanations about the meaning of each element, they were added in a second version (Fig 28), as a result of this comments.*

**Q:** What is your opinion about the “gap analysis” stage and its recommendations?

**A:** Spectacular, is very simple and allows us to understand where we are and where we should run the business. The results are clear, precise and confirm our perceptions about the adjustments required by the business.

**Q:** How do you qualify “easy to use” of the method?

**A:** Assessment stage requires a leverage of participants, in order to assure similar understanding of the question among all, but, method is easy and fast to use in its different stages.

**Q:** How do you qualify relevance of recommendations generated by the method?

**A:** As I explained before, results are clear and relevant for our business, and it is a confirmation about our perceptions, which, obliges us to speed up the changes.

**Q:** Have you met any similar tool or method?

**A:** No, I think this is a unique method. I like to apply this method to the other company’s categories.

*Note: Tables and figures of Omega case were updated in order to include the modifications suggested by the case analysis and feedback.*

### 10.3 Second case: Manufacturer of raw materials for textile industry

Company Alpha (for confidentiality reasons its name has been changed) is a multinational company headquartered in USA, with operations in some countries around the world, they are focused in the manufacture of a very important raw material for textile industry. Analysis is restricted to one of his factories located in a Latin American country.

Assessment was developed by General Manager, tables 40 to 42 present results of the assessments.

Table 40, Supply Chain Profile Assessment, Alpha Company  
Source: Alpha Company

Please, answer the questions, under **your company's perspective**, in other words, Which is the "general condition/behavior" of your company on the market?

Factors/ Elements		Criteria	Consensus	Comments	
Unique Value Proposal	Service	Delivery reliability -Perfect Orders-	Qualifier		
		Delivery speed -Short Lead time-	Qualifier		
		Minimum order size	Winner		
		Transactional effort -EDI, others-	Non Value Add		
		Agility to demand changes	Qualifier		
		Cash Flow (High Inventories turns)	Winner		
	Product	Other:	Non Value Add		
		Price	Winner		
		Performance	Winner		
		Features (Differentiated features)	Qualifier		
		Product portfolio (Wide portfolio.)	Qualifier		
		Customized Products	Qualifier		
		Time to market (innovation)	Qualifier		
		Other: <b>Brand awareness</b>	Non Value Add		
Supply Chain Profile	Service	OPP	Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.	Make to order	
		Order Size	In units (FTL, LTL, packages) and relevance compared against customers requirements (Large, normal, Small)	Normal, LTL (80% of orders are greater than FTL)	1 to 2 weeks of consumption order size
		Order Cycle	Fixed (cycle) or variable (lead time)? <i>How many days?</i> Relevance (Long, Medium, Short)? -from order to dispatching-	It depends of queuing, normally orders are received two months in advance	
		Partnership	Are Collaborative relationships used in a strategic/systematic way? <i>Yes, no relevant</i>	No	Mainly technical support
		Buffering	How/Where is demand buffered? (Inventory, Capacity, Pooling, other?)	Inventory	
	Product	Inventory Strategy	What is the inventories strategy? (1) High inventory level for optimizing production batches, (2) High rotation to reduce working capital, (3) Common components/ materials (pooling), (4) Inventory before divergence point, (5) Pooling for increasing responsiveness	High rotation to reduce WC	
		Personalization	Are products personalized according to customer's specific needs? (Yes or Not)	Not	
		Make or buy?	Are Transformation processes <i>made or bought</i> (outsourced)?	Made	
		Product Segments	How many product segments are? (High, Medium, Low) -compared against market/industry-	Medium	
	Process	Process Flow	What is the dominant process flow type? (Batch, Job Shop, Assembly line, continuous line)	Two Job shop (each of them a continuous line)	
		Batch Size	Relevance compared against inventories policy (Large, normal, Small)	Normal	
		Production Cycle	Fixed or variable? <i>How many days?</i> Relevance (Long, Medium, Short)? -time to produce all portfolio SKUs-	Short (15 days)	short
		Utilization rate	What is the asset's utilization rate? %	100%	Just shutdown 4 days a year
	Sourcing	OPP	Make to Forecast, Make to Stock, Assembly to stock, Make to order, Design to order, etc.	Make to forecast	Colton crops are being produce once a year
		Order Size	In units (FTL, LTL, packages) and relevance compared against inventory policy requirements (Large, normal, Small)	Small	
		Order Cycle	Fixed or variable? <i>How many days?</i> Relevance (Long, Medium, Short)? -from order to receiving-	Medium	1 month
		Partnership	Are Collaborative relationships used in a strategic/systematic way? <i>Yes, no relevant</i>	No relevant	
		Buffering	How/Where is supply buffered? (Inventory, Capacity, Pooling, other?)	Inventory	

Table 41, Supply Chain Framework Assessment, Alpha Company

Source: Alpha Company

Please, answer the questions, under "market perspective", in other words, Which is the "general condition/behavior" of the industry on the market?

		Factors/ Elements	Criteria	Consensus	Comments
Supply Chain Framework	Customers (Market)	Market mediation cost	Market mediation cost relevance in total cost (Obsolescence, Working Capital, Lost sales.) -Low, Medium, High-	Low	
		Transportation cost	Transportation/Logistics cost relevance in total cost. -Low, Medium, High-	Medium	Inland freight is too high
		Demand uncertainty	Is demand <i>predictable, unpredictable or unexpected</i> ?	Predictable in short term	External players and price volatility create unpredictability in medium term
		Customer's power	Customer's power based on alternatives (channels, suppliers, substitutive products) and demand/offer ratio. -Low, Medium, High-	High	International Suppliers
		Product cycle life	Length of product life cycle ( <i>Short, Medium, Long</i> )	Long	
		Cost sensitivity	Product/Service cost relevance in Customer's business. (Low, Medium, High)	High	
	Process	Fixed Assets: Increase in capacity	Magnitude of the increases in capacity of new assets ( <i>Small, Medium, High</i> )	High	Investment equivalent to 15% of market size
		Fixed Assets: General purpose/dedicated	General purpose or dedicated assets?	Dedicated asstes	
		Process technological maturity.	Process technological maturity. ( <i>New product, Maturing, Mature</i> )	Mature	
		Cost	Manufacturing cost - <i>transformation cost</i> - relevance in total cost. (Low, Medium, High)	Medium	35% of total cost
	Suppliers	Supply risk	Are there risks associateds to supply disruptions? ( <i>Yes, no relevant</i> )	No relevant	
		Supplier's power	Supplier's power based on alternatives (distribution channels, suppliers, substitutive products) and demand/offer ratio. -Low, Medium, High-	High	
Sourcing complexity		Mix of: (1) Global sourcing/ Local sourcing / Strategic partnership? (2) High number SKUs/Suppliers? (3) Markets Volatility? -Low, Medium, High-	Medium	Global sourcing, low SKU	
Cost		Product/Service - <i>raw materials</i> - cost relevance in manufacturer's business. -Low, Medium, High-	High		

Table 42, Supply Chain Focus Assessment, Alpha Company

Source: Alpha Company

Please, answer the questions, under *your company's perspective*, in other words, Which is the most important focus of your company on Rank top 3 focus in each area (Highest 3 - Medium 2 - Lowest 1 - Others 0)

Area	Focus	Consensus
Supply Chain	Efficiency	3
	Collaborative relationships	1
	Agile to unpredictable demand	2
	Postponment	
	Flexible to unpredictable events	
Service	Other:	
	Transactional oriented	3
	Information sharing for improvement	
	Information sharing for fulfill demand	2
	Order accuracy (for customization)	1
Product	No sharing information	
	Other:	
	Lowest cost at standard performance	3
	Quick manufacturability	2
	Postponment	1
Production	Customization	
	Other:	
	High utilization rate	3
	Short set-up times and extra-capacity	2
	Extra capacity after divergence point	
Sourcing	Assets flexibility / Pooling	1
	Other:	
	Low total cost supplier	3
	Collaborative relationships	1
	Agile response	
	Agile response / Risk management	2
	Other:	



Based on assessment was developed Supply Chain Roadmap and gap analysis, which are presented in Figure 29 and Table 43.

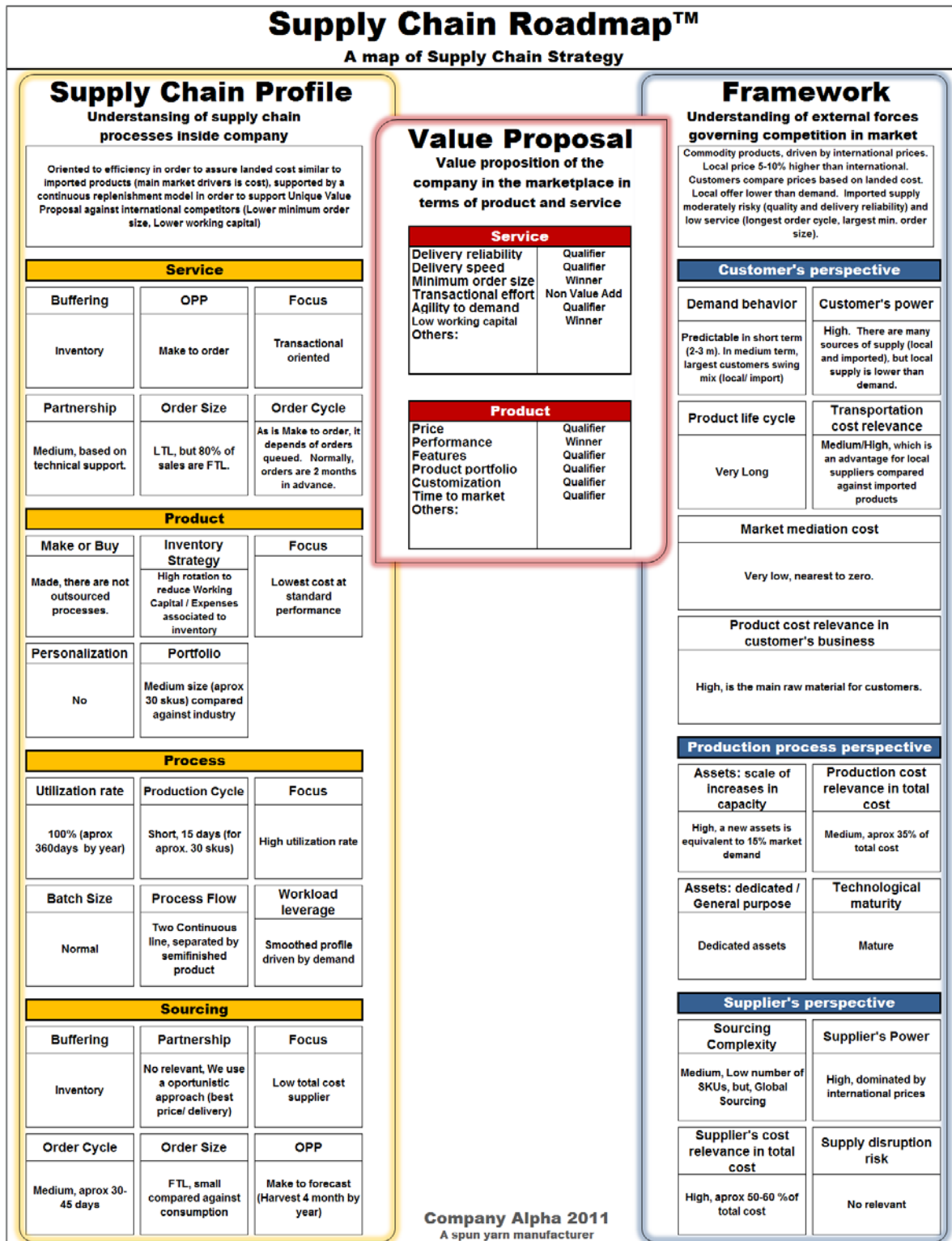


Figure 29, Alpha Company under "Supply Chain Roadmap™".

Source: Own elaboration

Table 43, Alpha Company, gap analysis under “reference SCGM”.  
 Source: Own elaboration

		Efficient	Continuous Replenishment	Agile	LeAgile	Flexible	
<b>Supply Chain Framework</b>	Market Mediation Cost	Low		middle	High		
	Demand Uncertainty	Low		middle	High		
	Customers power	High		middle	Low		
	Cycle life	Long		middle	Short		
	Cost sensitivity	High		middle	Low		
	Assets	Mainly dedicated		middle	Mainly General Purpose		
	Supply risk	Low		middle	High		
	<b>Value Proposal</b>	Service	Perfect orders	Low working capital	Fast response to unpredictable demand	Customized products	Solutions proposal
Min. order size		Full Truck Load	Customer needs / Full truck load	Production batch	Production batch Post OPP	For production / transportation	
Delivery		Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
Product		Lowest cost	Performance/cost	Product Features (innovation)		Solutions proposal	
Portfolio		Small	Medium	Large	Large	Whatever	
Price		Lowest	Competitive			No matter	
<b>Supply Chain Profile</b>		Management (Focus)	Efficiency	Collaborative Relationships	Agile to unpredictable demand	Postponement	Flexible to unpredictable events
	Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy for customization	No sharing information	
	Product	Lowest cost at standard performance		Quick Manufacturability	Postponement	Customization	
	Production	High utilization rate		Short set-up times / extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling	
	Sourcing	Low total cost supplier	Collaborative Relationships	Agile response		Agile response / Risk management	
	Service	MTF	MTS MTO in some industries	MTO	ATO	Configurable	
	Order size, according to...	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory pooling/ Capacity pooling	
	Order cycle...	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs	
	Partnership	Fixed lead time	Regular delivery	Shortest according to queue	Shortest, according to post OPP queue	Flexible	
	Product	Possible	Required	Not necessary	Not necessary	Improbable	
	Inventory Strategy	High inventory for efficient production	High rotation for low working capital	Internal Pooling	Inventory before divergence point	Internal / External Pooling	
	Personalization	Improbable		Not necessary, but possible		Not necessary, but highly possible	
	Product Segments against peers	Low	Low - Medium		High	Undetermined	
	Production	Workload leverage	Smoothed		Medium size Peaks / Valleys	Smoothed before divergent point	Large size Peaks / Valleys
	Utilization rate	Very High		Medium-High		Low	
	Process Flow	Tippically continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	Indifferent	
	Batch Size	Largest possible in order to increase production efficiency		small possible for lowest	smallest possible in order to increase delivery speed		
	Production Cycle	Longest possible	Medium - Short possible for increasing responsiveness		Long before OPP Short before OPP	Shortest possible	
	Sourcing	Order size	Desirable MTS		Desirable MTO for exclusive components / materials		
	Order Cycle	Fixed, looking for lowest transaction cost	Smallest possible in order to reduce obsolesce risk				
	Partnership	It's important	It's possible		Highly possible	Non usual	
	Buffering	Inventory / multiple sources of supply	Primary source of supply		Multiple sources of supply		
	Predominant features of the supply chain under analysis						
	Secondary features of the supply chain under analysis						
	* Dominant factors: factors that dominate the definition of prevailing supply chain						
	<div style="display: flex; justify-content: space-between;"> <span style="border: 1px solid black; padding: 2px;">Gaps</span> <span style="border: 1px solid black; padding: 2px;">Predominant supply chain model</span> </div>						

Company Alpha 2011  
 A spun yarn manufacturer

Gap analysis shows:

- Alpha supply chain is an upstream efficient supply chain, at the downstream, both product and service, are oriented to a continuous replenishment supply chain.
- Management is focused in an efficient supply chain.
- Unique value proposal is oriented to a continuous replenishment supply chain, but, they are not focused in the two main drivers for customers: low working capital and no minimum order size.
- Efficiency is required in order to assure competitive price, compared against international suppliers (who are oriented to low cost).
- Customers are oriented to compare offers based on landed cost.
- Regular delivery and LTL order size are the most important features of the alpha's supply chain, due to support two of his winners: Low working capital and no minimum order size (lower than FTL).
- Market is driven primarily by "low cost" and in a second importance level by "low working capital", due to the impact of both in the final cost of the products.
- Product quality (backed in technical support in site), supply stability (low risk) and low working capital are important winners in order to assure customer preference against imported products.
- Alpha's supply chain is a continuous replenishment supply chain, but they are not using collaborative relationships in a strategic way.
  
- Main recommendations are:
  - o Maintain "efficiency oriented" upstream supply chain, in order to assure a minimum price gap against international competitors.
  - o Maintain "Unique value proposal" oriented to "Product Quality" and "Low working capital", which are real winners for customers.
  - o Increase tactical actions in order to deep collaborative relationships with customers seeking to enhance "low working capital" and "low risk supplier" features.
  - o Tactical actions should be oriented to enhance "Low working capital" by two actions:
    - Reduce working capital
      - Increase delivery frequency and collaborative planning in order to reduce customer's inventory, inclusive, offering VMI (vendor management inventory) programs to customers.
    - Increase working capital value perception
      - Estimate product total cost (landed cost + inventory handling + inventory holding cost + financial cost), looking to make relevant these costs to customers.

### **10.3.3 Manager's Feedback**

Previous to Alpha's evaluation "Supply Chain Roadmap" was improved and adjusted based on Omega's feedback.

Method results were shared and discussed with Alpha's General Manager:

**Q:** What is your opinion about the method?

**A:** This method helps to see the entire business picture and also helps to understand the impact of internal processes, external forces in the market place and measure if the unique value proposal is properly working the best way to accomplish goals. In summary, it creates a link with the business strategy.

**Q:** What is your opinion about the "Supply Chain Roadmap" graphic?

**A:** It's a one snap shot picture that allows seeing all the forces together, very similar to what you can get from a balanced scorecard tool, but focused in supply chain strategy. It also helps to question how clear do we know, what we are, and what market are we competing in creating connections "Cause and effect". This graphic helps to detect where resources are not been used worthy.

**Q:** What is your opinion about the "gap analysis" stage and its recommendations?

**A:** Gap analysis reflects what supply chain we are in, and helps to find opportunities, producing recommendations and action plans that need to be addressed. Also, it brings new elements to cover.

In our case, we have used "Gap analysis" output in our annual strategic planning meeting adding new action plans and recommendations in order to reformulate our supply chain strategy.

**Q:** How do you qualify "easy to use" of the method?

**A:** Method is very easy to apply (assessment) and very easy to understand (Roadmap and gap analysis).

**Q:** How do you qualify relevance of recommendations generated by the method?

**A:** As we explained before, conclusions are very important and very relevant for us, and, based on them we redefine our supply chain strategy in our annual strategic meeting.

**Q:** Have you met any similar tool or method?

**A:** We have not; this is the very first time.

### **10.4 Adjusting "Supply Chain Roadmap<sup>TM</sup>" method**

After application of "Supply Chain Roadmap" in previous cases, and based on my own perceptions and feedback from managers, is necessary to do some minor adjustments in method described previously in numeral 10.1, which are shown in table 44.

Table 44, Adjustments of the model.  
 Source: Own elaboration

Feature		Omega Feedback	Adjustments made between both cases	Alpha Feedback
Easy to understand	Assessment	Previous training in order to unify terms and concepts	Short training (< 1 hour) in order to unify concepts and terms	Very clear and easy to apply. Previous explanation was simple.
	Supply Chain Roadmap	Requires explanation of the figure, after explanation, is easy to understand	Short description into the figure of the three sides (framework, profile and process)	Very clear and simple drawing.
	Gap Analysis	Color code of the map is not clear	Code color for primary features, secondary features and adjustments. Change of graphic model.	Very clear and simple drawing.
Fast to apply		Less than 4 hours	None	Less than 3 hours
Relevance of results		Very relevant, confirms our previous perceptions	None	Relevant, results were used for annual strategic plan

Figure 30 shows “Three-step method” updated to adjustments made after cases feedback.

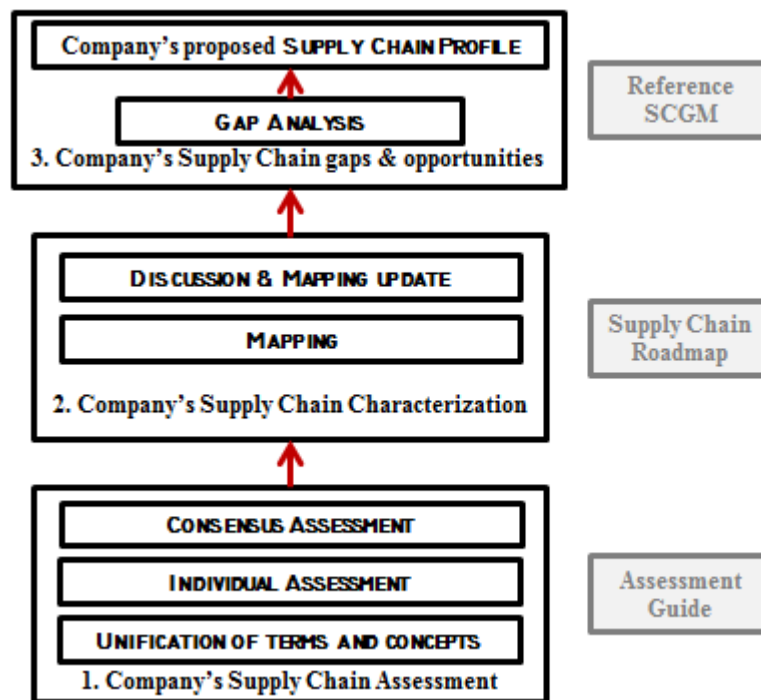


Figure 30, “Three-step method” for applying “Supply Chain Roadmap™”.  
 Source: Own elaboration

As a result of my own feedback of the results of both cases and in order to facilitate gap analysis was introduced a new factor into the supply chain profile, which is “Workload leverage”, this helps to explain in an easy way differences of “process cadence / timing” among different kind of supply chains and means “the adaptation of the supply chain profile to the demand”. Process cadence is called by Germans as “takt” and by Japanese is known as “Cycle time”, and in its means the time required for producing a single item, supposing a smoothed workload on the assets during a fixed planning horizon.

## **Section 5: Model validation**

*This section pretends to show “Supply Chain Roadmap <sup>TM</sup>” method evolution, where are explained the validity test used for assuring method quality and relevance. In addition to that, are presented the project’s conclusions.*

## 11. Model validation

### 11.1 Quality of research design

As was explained previously in section 4.4, Yin mentions four tests that are necessary for determining the quality of a case research design:

- Validity of the Construction: Questions if there is a relationship and/or subjective effect between the manner in which the researcher has gathered the data sources and has constructed the concepts s/he is trying to study. (Adams 2007).
- Internal validity: Define causality relationships, where certain conditions are taken into consideration, other conditions rule.
- External validity: Define the domain in which the study's findings can be generalized.
- Reliability: Demonstrate that the operations of a study can be repeated with the same results.

Table 45 shows where are applied the recommend practices throughout the method development in order to assure its quality.

Table 45, Method Validity and Reliability  
Source: Own elaboration

Section	Figures (F) / Tables (T)	Topic	Validity							Reliability	
			Construction			Internal			External	Case study protocol	Case study database
			Multiple Sources of evidence	Establish chain of evidence	Key informants review the draft case	Pattern Matching	Explanation Building	Use logic models	Replication logic in Multiple case studies		
5.		Supply Chain Strategy definition	○								
6.1 to 6.4	F5-9	Supply Chain Framework / Profile	○				○	○	○		
6.5	T7, F10	Supply Chain framework factors	○	○			○	○	○		
6.6	T9, F11-13	Supply Chain profile elements	○	○			○	○	○		
6.7-6.8	F14-16, T10	Unique value proposal	○	○			○	○	○		
6.9-6.11	T11-T14	Supply Chain profile Quadrants						○			
6.12	F17-18, T15	Supply Chain Roadmap						○	○		
7.	T16-25, F19-20	Supply Chain Generic Models (SCGM)	○	○				○			
8.	T26-T32	Reference Supply Chain Generic Models (SCGM)	○	○			○	○			
9.	F22-25, T33-37	Case applications							○		
10.		Own case			○					○	○

The main elements that assure research quality are:

- In several sections of the research were used multiple sources of evidence, which were analyzed in a parallel view in order to find the most relevant factors (pattern matching).
  - Definition of framework factors and supply chain profile.
  - Definition of Supply Chain Generic Models.
- As consequence of the previous analysis, were defined the reasons why some definitions were made. (Chain of evidence combined with explanation building).
- “Logic models” are used in the definition of the Supply Chain Roadmap model and reference SCGM.





		Supply Chain Profile																	
		Customers interfase					Internal processes					Supplier processes							
		Order cycle	OPP	Inventory placement	Relationship focus	Buffering	Product divergence point	Inventory focus	Process focus	Process configuration	Process cycle	Buffering	Order cycle	OPP	Inventory placement	Relationship focus	Buffering		
Supply Chain Framework	Customer perspective	Customer power																	
		Cost impact																	
		Price																	
		Quality																	
	Economic aspects	Performance																	
		Innovation																	
		Portfolio																	
		Customization (Product)																	
		Minimum order size																	
		Accuracy																	
		Speed																	
		Flexibility																	
		Customization (Service)																	
		Forecast accuracy																	
Product life cycle																			
Technological aspects	Scale economies																		
	Reach economies																		
	Profitability																		
	Fixed cost / Product cost																		
	Manufacturing cost / Product cost																		
Supplier perspective	Transport cost / Product cost																		
	Transaction cost																		
	Fixed assets investment																		
	Technology maturity																		
	Process flow																		

Figure 33, Supply Chain Roadmap, prototype 3 –Matrix-.  
 Source: Own elaboration

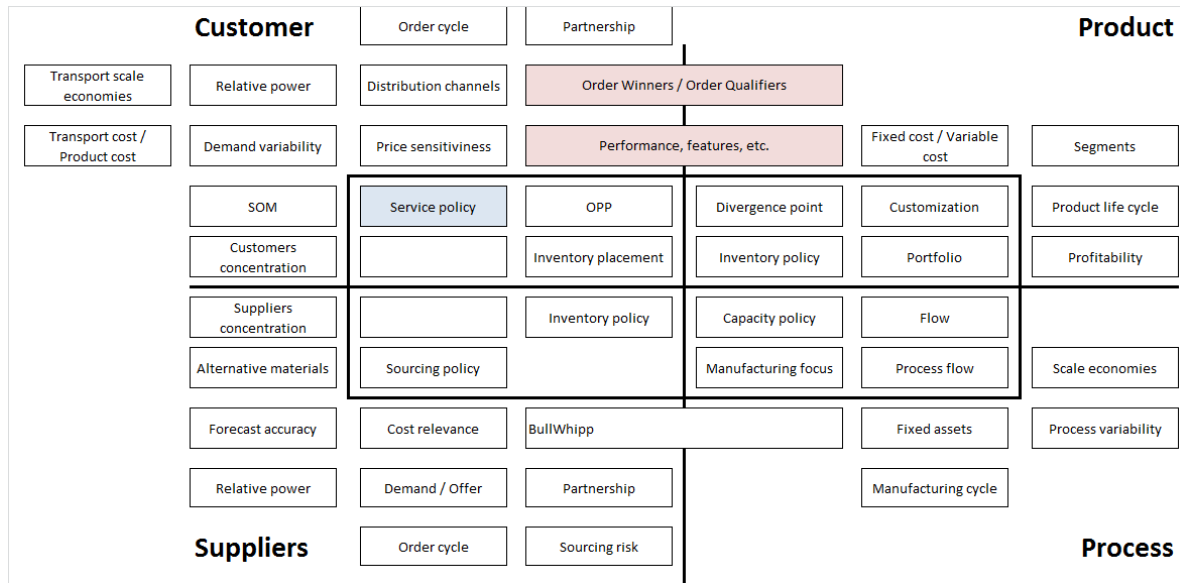


Figure 34, Supply Chain Roadmap, prototype 4 – Cross-.  
 Source: Own elaboration

### 11.2.2 Framework factors and Profile elements

“Supply Chain Roadmap™” Cross graphic model was adjusted after several versions, where the main changes were related to the framework factors and profile elements that must be included into the model. Previous versions are shown in Figures 35 to 38.

Figure 35 shows “Supply Chain Roadmap” under its first version, called at this moment 2S2P, and where is visible a lower factors/elements quantity than in the final model.

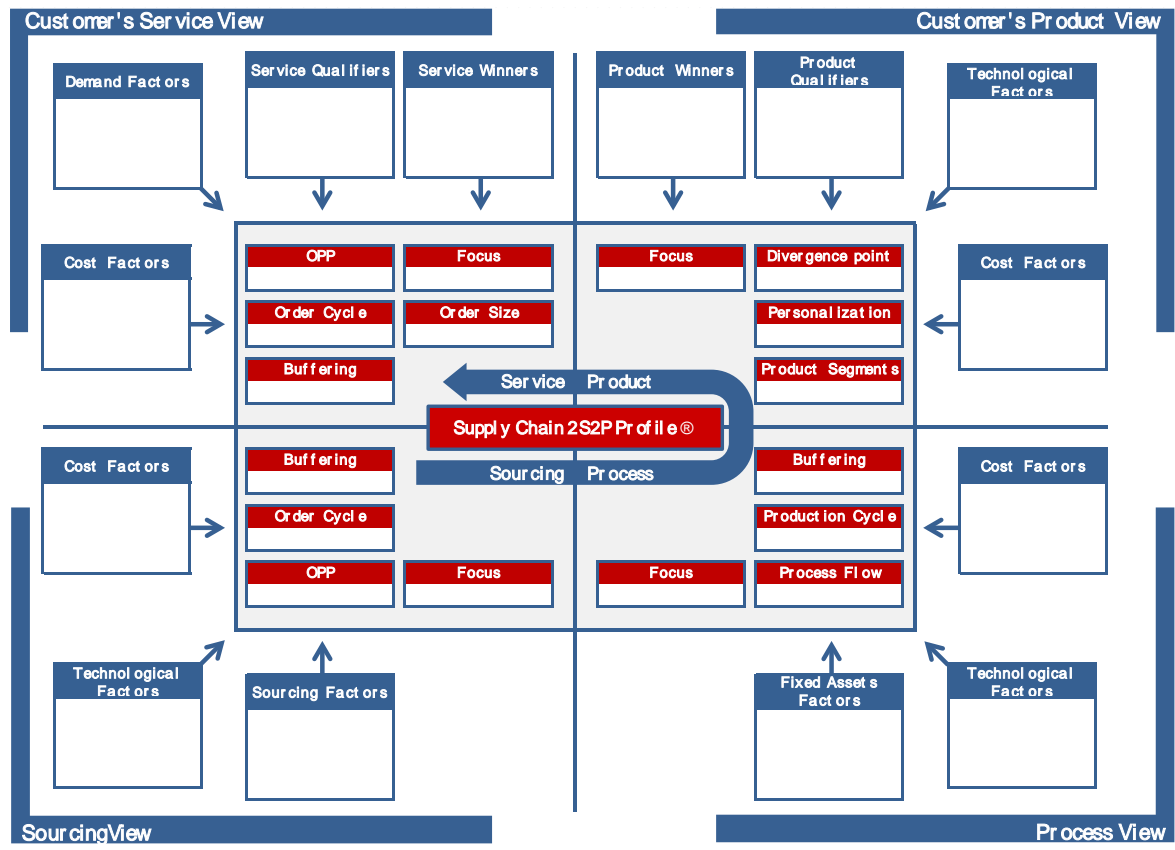


Figure 35, Supply Chain Roadmap, first version  
 Source: Own elaboration

Figure 36 shows “Supply Chain Roadmap” under its second version, where is introduced for first time the name “Supply Chain Roadmap”. The main changes versus previous version were: introduction of “unique value proposal” concept, “customer’s power” effect in business framework, removal of “divergence point” due to its redundancy with other elements as OPP and introduction of inventory strategy as key element of supply chain strategy.

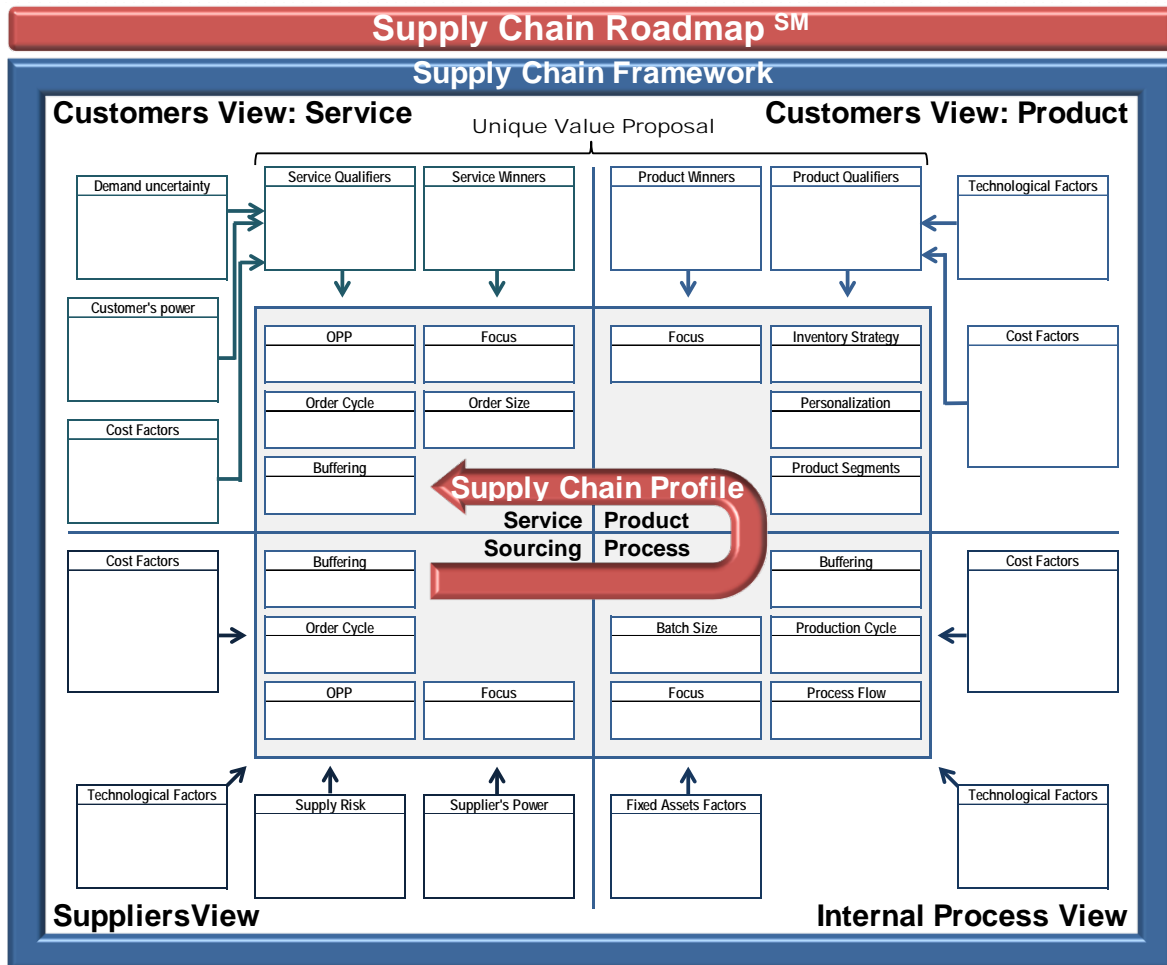


Figure 36, Supply Chain Roadmap, second version  
 Source: Own elaboration

Figure 37 shows “Supply Chain Roadmap” under its third version, where is introduced a more detailed view of the unique value proposal, in order to do a more friendly definition of this. In addition to that, Cost factors related to service are divided in its two main components: Transport and market mediation cost, and, Assets factors are divided in its two main components: utilization rate and dedicated/general. All of these changes aiming for a easier understanding of the supply chain strategy in a single view.

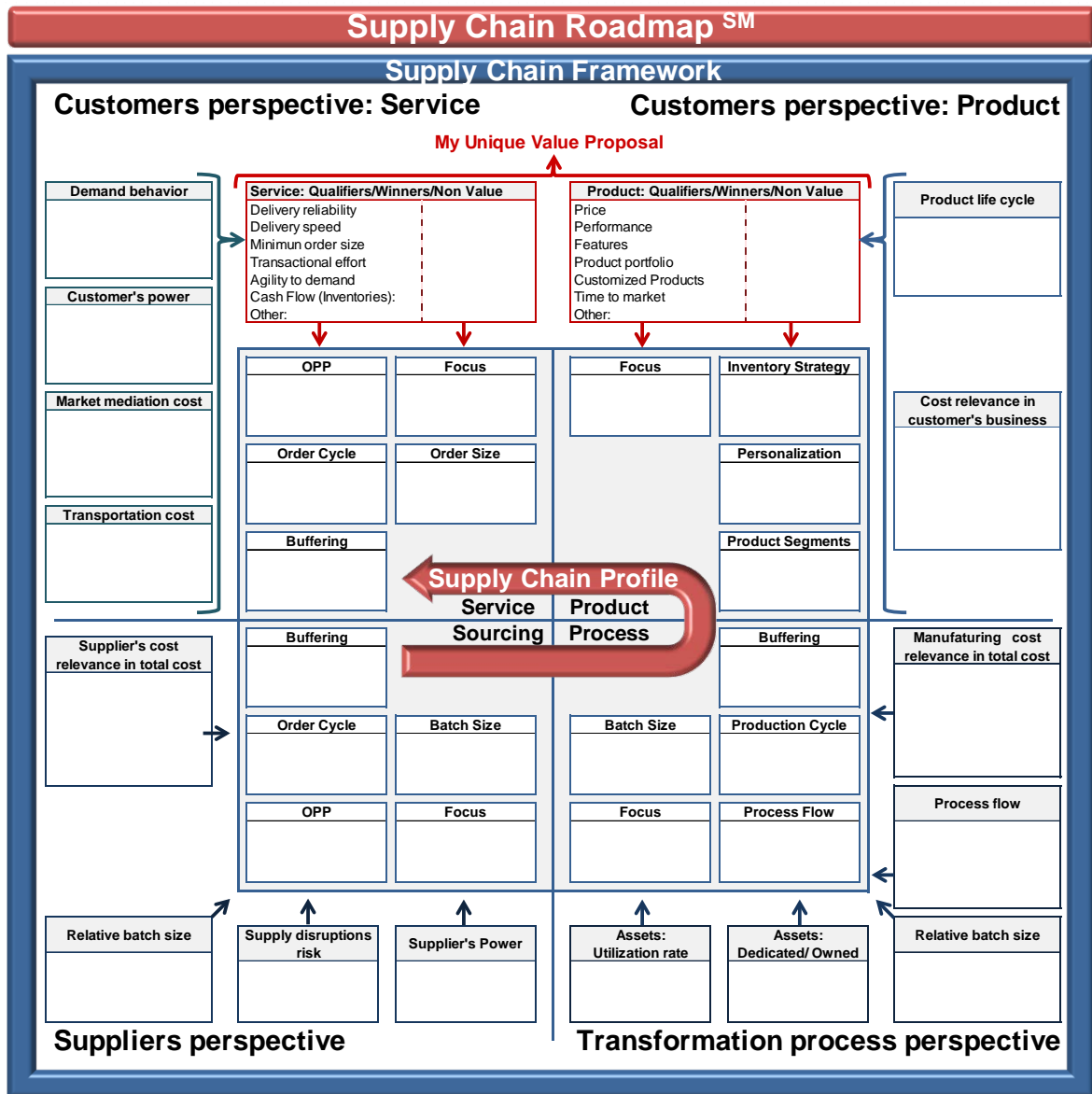


Figure 37, Supply Chain Roadmap, third version  
 Source: Own elaboration

Figure 38 shows “Supply Chain Roadmap” under its intermediate version, where are introduced forms changes, moving name of the four elements of supply chain profile to the corners of the central box.

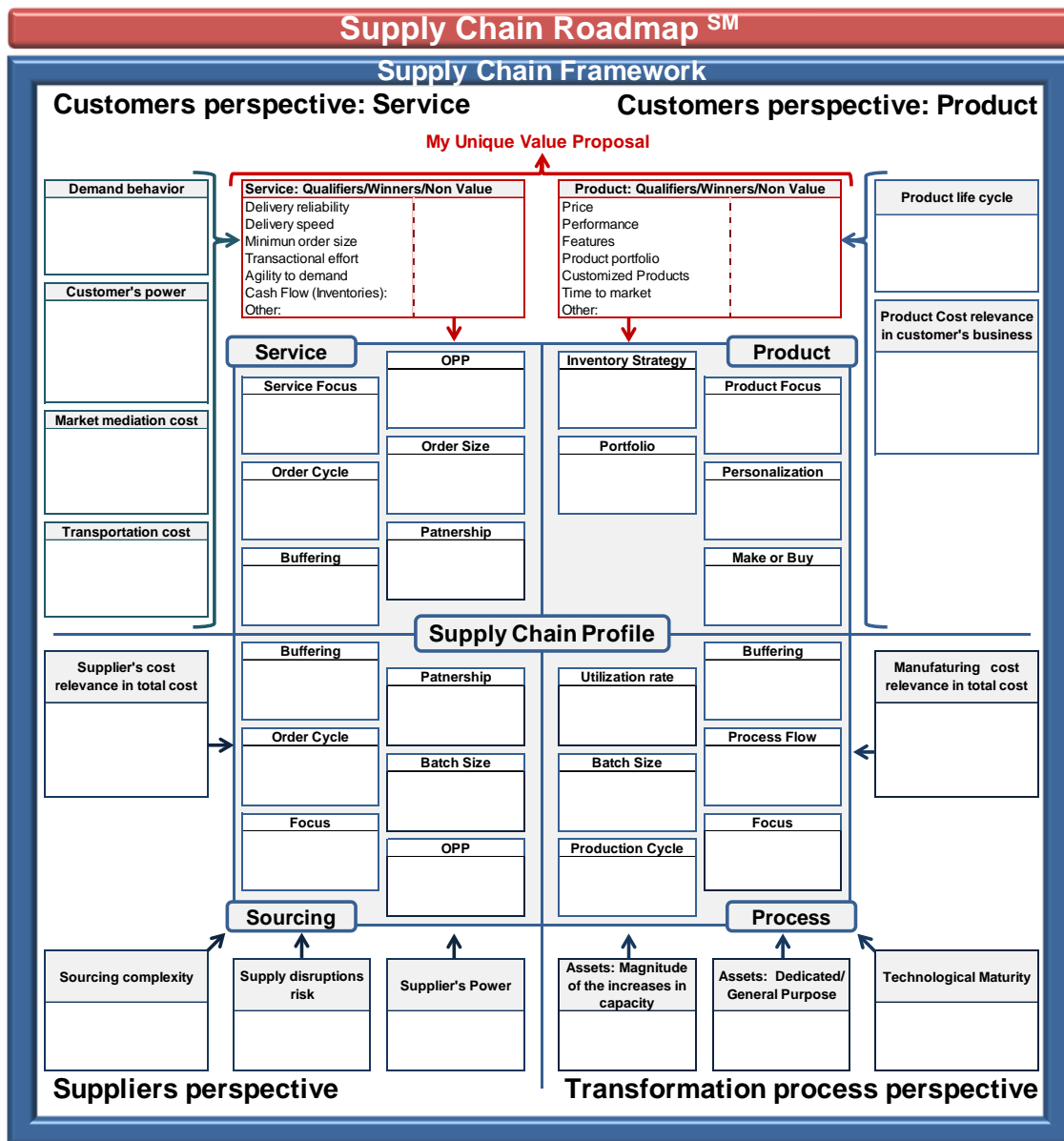


Figure 38, Supply Chain Roadmap, intermediate version  
 Source: Own elaboration

In addition to that, are introduced substance changes, as:

- “Make or Buy”, definition of sourcing strategy as part of the supply chain strategy, which was evidenced when method was applied to Crocs case, were sourcing strategy was key factor of the company results.
- “Utilization rate” is an internal factor more than external factor, and it was causing misunderstanding when the model was applied to “Tamago-ya”, because utilization rate was critical for “Tamago-ya” strategy, but it was a non-critical factor for the market.
- “Relative batch size” was removed, due to it could be very changing from one industry player to another one.

- “Suppliers / Customers partnership” was introduced as key element on the supply chain strategy, which was evidenced in “Tamago-ya” case, where partnership in both sides was key success factor.
- “Sourcing complexity”, understood as SKU numbers/ Suppliers number is inserted as a factor that shows industry complexity in sourcing side. It was relevant, because from one industry to another one, it changes supply chain focus and it could be source of innovative strategies, as was seen in Crocs case, where Crocs changed industry rules, moving from a complex sourcing industry to a supply chain strategy with lower complexity.

All of these changes affected equally “Supply Chain Generic Model” Matrix, where the same elements are presented but in a tabular view.

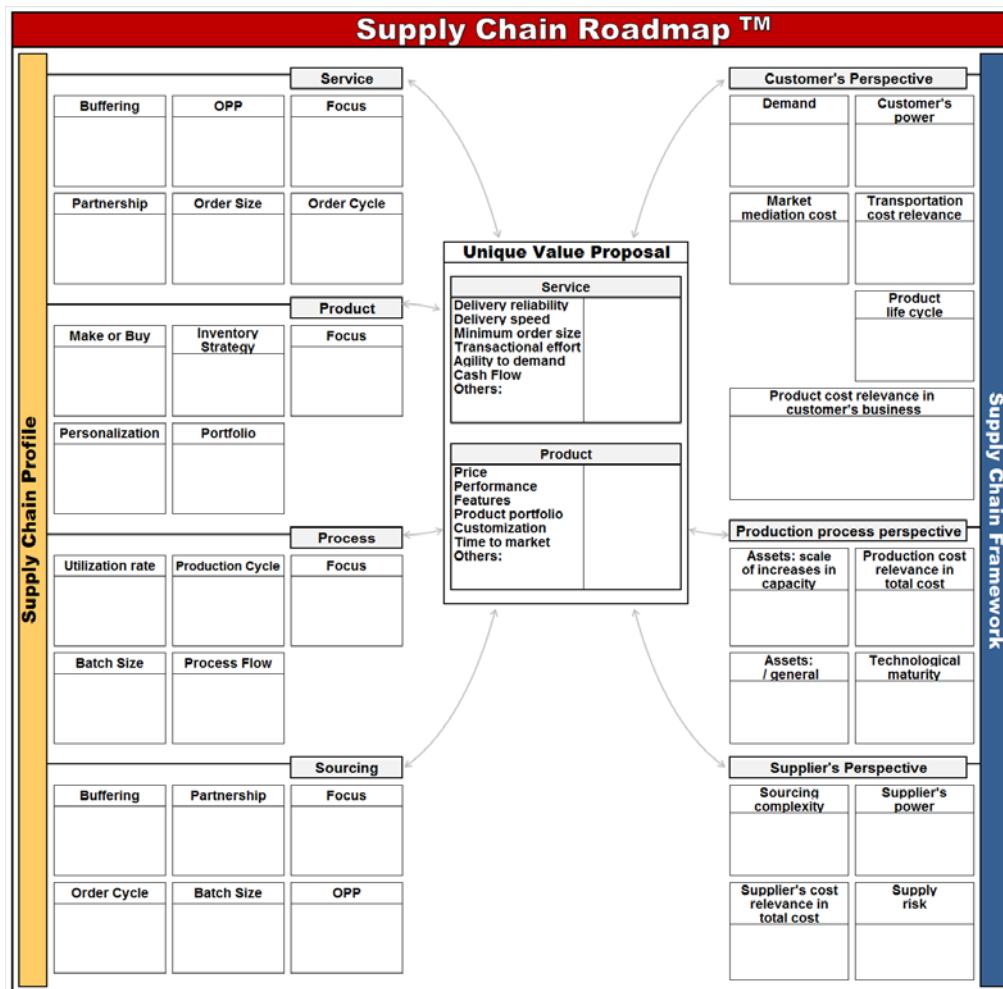


Figure 39, Supply Chain Roadmap, final version before Omega’s case  
 Source: Own elaboration

Figure 39 shows “Supply Chain Roadmap” under its definitive version previous to Omega’s evaluation. Changes are related to visualization aspects, which were defined after the development of the real own case, where was found understanding difficulties due its complexity. This version was simplest, clearest and friendliest for understanding. However, after Omega’s feedback, version

was updated in three main aspects: a brief description of each component (Profile, Framework and unique value proposal) was included, design was improved in order to do clearest the three components (Profile, Framework and unique value proposal).

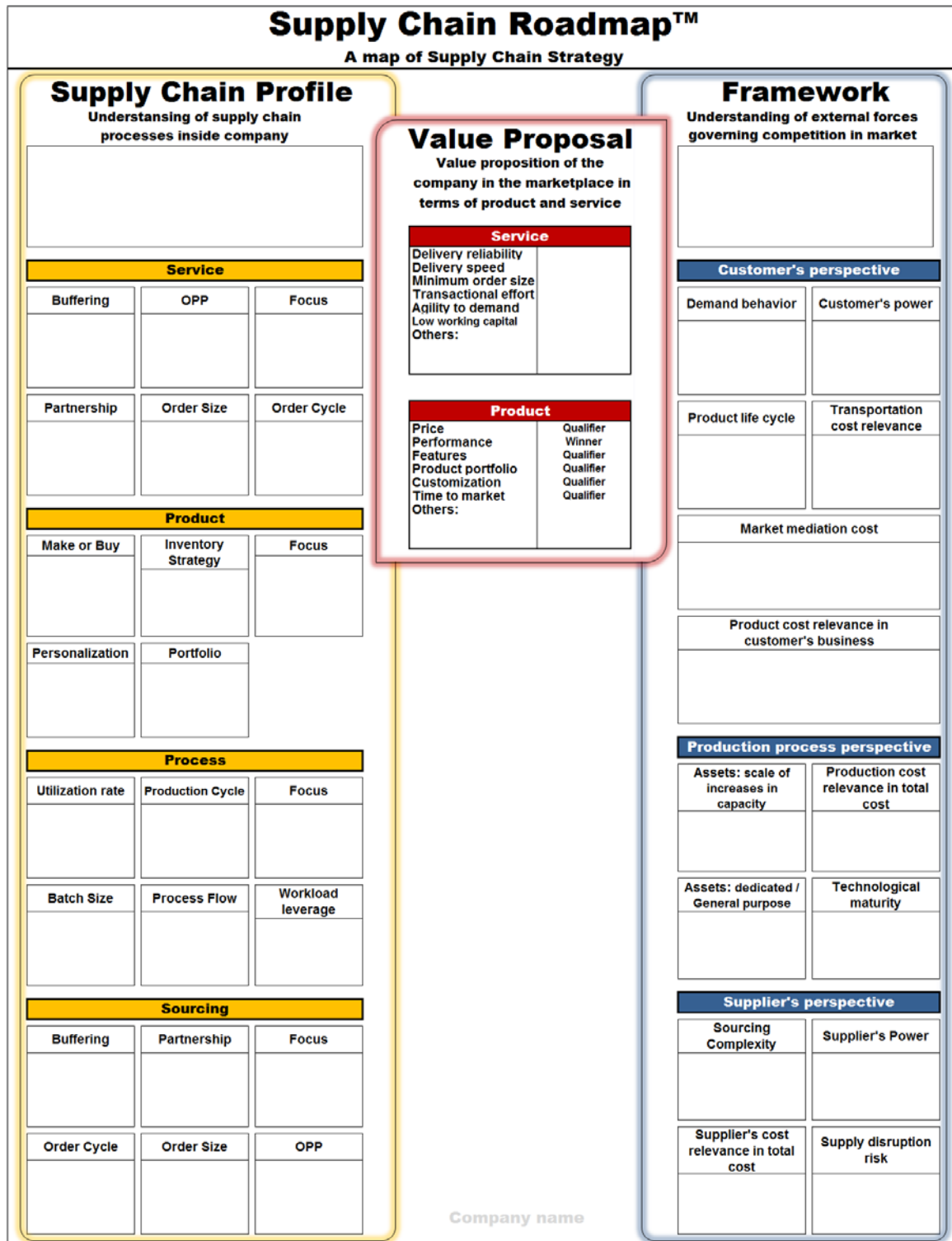


Figure 40, Supply Chain Roadmap, final version after cases feedback  
 Source: Own elaboration

### 11.2.3 Gap analysis

Gap analysis is based on reference of “Supply Chain Generic Models”, which was updated simultaneously with the changes of the “Supply Chain Roadmap”, as was explained previously, but, in addition to that, in the development of the cases were found several difficulties to understand the gap analysis, due to, the view of the reference SCGM was modified in several versions.

Table 46, Reference SCGM, first version  
Source: Own elaboration

		Factors/ Elements	Efficient	Continuous replenishment	Agile	Le Agile	Flexible
Service Product	Demand uncertainty		Predictable	Predictable and stable demand	Unpredictable	Unpredictable w/ long supply time	Very unpredictable demand
	Customer's power		Normally High	Oriented to collaboration	Low-Medium	Low	Very Low
	Unique Value Proposal	Winners	Information sharing for cost improvement	Collaborative relationships efficiency oriented, automated transactions	Agility to unpredictable demand	Order management for customized products	Solutions proposal
		Winners	Lowest cost	Product Features	Product Features	Customization	Solutions proposal
	Technological	Long life cycle	Mainly long life cycle	Short life cycle	Mainly short life cycle		
	Cost	Very price sensitive	Price not an issue	Price aware, but not highly sensible	Very price sensitive	No price sensitivity	
	Process	Fixed Assets	Dedicated Assets	Dedicated Assets	General purpose assets	Dedicated Assets	General purpose assets
	Suppliers	Supply risk	Low risk of disruptions	Low risk of disruptions	Prepared for high risk of supply disruption	Prepared for high risk of supply disruption	High risk of supply disruption
	Supply Chain Focus		Efficiency	Collaborative relationships	Quick response	Postponment	Flexible to unpredictable crisis / requirements
	Service	OPP	MTF	MTS	MTO	ATO	Configured for each case
Product	Focus	Minimize cost	Minimize cost	Quick manufacturability	Postponment	Customization	
	Inventory Strategy	Driven for production batches	High rotation	Pooling	Inventory before divergence point	Pooling	
Process	Focus	High utilization rate	High utilization rate	Assets flexibility, short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility, short set-up times	
	Production Cycle	Longest possible	Shortest possible	Shortest possible	Probably, Long lead time	Shortest possible	
	Buffering	Inventory	Inventory	Inventory before divergence point / Extra capacity / Capacity pooling	Inventory before divergence point / Extra capacity	Inventory / Capacity pooling	
Sourcing	Focus	Low total cost supplier	Collaborative relationships	Agile response	Agile response	Agile response / Risk management	
	Buffering	Multiple sources of supply	Primary source of supply	Multiple sources of supply	Multiple sources of supply	Multiple sources of supply	



Next version introduced signs in order to understand where or not apply the element/ factor in the supply chain under analysis, as is shown in Table 47.

Table 47, Reference SCGM, second version  
Source: Own elaboration

		Factors/ Elements	Efficient	Continuous replenishment	Agile	Le Agile	Flexible
Supply Chain Framework	Product Service	Cost	Market mediation cost: Lowest possible	Transportation cost could be high	Market mediation cost: High	Transportation cost could be high	High
		Demand uncertainty	Predictable	Predictable and stable demand	Unpredictable	Unpredictable w/ long supply time	Very unpredictable demand
		Customer's power	Normally High	Customer is oriented to collaborative relationship whereby customer's power loses relevance	Low-Medium	Low	Very Low
	Unique Value Proposal	Winners	Information sharing for cost improvement	Collaborative relationships efficiency oriented, automated transactions	Agility to unpredictable demand	Order management for customized products	Solutions proposal
		Qualifiers	Order fulfillment (Perfect orders) / Lowest transactional cost	Order fulfillment (Perfect orders)	Delivery speed, Order accuracy	Agility to unpredictable requirements	Implementation time
		Winners	Lowest cost	Product Features (innovation)	Product Features (innovation)	Product Features (innovation)	Solutions proposal
		Qualifiers	Product Performance	Product Performance	Product Performance	Product Performance	Product Performance
	Process	Technological	Long life cycle	Mainly long life cycle	Short life cycle	Mainly short life cycle	According to specific industry's characteristics
		Cost	Very price sensitive	Price not an issue	Price aware, but not highly sensible	Very price sensitive	No price sensitivity
		Fixed Assets	Mainly dedicated Assets	Mainly dedicated Assets	Mainly General purpose assets	Mainly dedicated Assets	Mainly General purpose assets
	Suppliers	Technological	Mature	Mature	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
		Cost	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
		Supplier's power	Low risk of disruptions	Low risk of disruptions	Low or high risk of supply disruption	Low or high risk of supply disruption	High risk of supply disruption
		Sourcing complexity Cost	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
	Supply Chain Profile	Supply Chain Focus		Efficiency and lowest service cost based on planning	Collaborative relationships for continuous improvement	Quick response to unpredictable supply / demand conditions	Postponement
Service		Focus	Little sharing of information / Transactional oriented	Information sharing	Information sharing for fulfill demand, order accuracy (for customization)	Agility, Order accuracy (for customization)	No sharing information
		OPP	Typically MTF (make to forecast)	Typically MTS (make to stock)	Make to order (order after postponement point)	Typically ATO/BTO (assembly / build to order)	Typically configured according to each case
		Order Size	According to lowest transportation cost	According to replenishment needs	Smallest possible in order to reduce obsolete	According to customer's needs	According to customer's needs
		Order Cycle	Fixed, looking for lowest transaction cost	Regular delivery	Shortest possible in order to avoid stockouts	Variable order cycle	Flexible delivery response
		Partnership	Possible	Highly possible	No	Not necessary, but possible	Non usual
Product		Buffering	Finished product looking for scale economies / Distribution capacity	Inventory	Inventory before divergence point / Inventory pooling / Capacity	Inventory before divergence point	Capacity pooling
		Focus	Minimize cost at standard performance	Minimize cost at standard performance	Quick manufacturability, Postponement design (mass customization) when it could be possible	Postponement	Customization
		Inventory Strategy	Required for optimizing production batches, reduce working capital w/o affect product cost	High rotation to reduce working capital	Common components/materials (pooling). Inventory reconfiguration (postponement)	Generic inventory (Assy/configure/distribute)	Pooling for increasing responsiveness
		Personalization	Improbable	Improbable	Not necessary, but in some cases could be possible	Not necessary, but possible	Not necessary, but highly possible
		Make or buy	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics
Process		Product Segments	Low	Low - Medium	Low-Medium	High	Undetermined
		Focus	High utilization rate	High utilization rate	Assets flexibility, short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility, short set-up times
		Process Flow	Typically Continuous line	Indifferent	No a continuous line	Assembly after divergence point	Indifferent
		Batch Size	One/few in production cycle to increase efficiency w/o affect working capital	Smallest in trade off with low production cost	Smallest possible in order to reduce obsolete risk	Smallest possible in order to increase delivery speed	Smallest possible in order to increase delivery speed
	Production Cycle	Longest possible, in balance with low inventory	Shortest in trade off with low production cost	Shortest possible in order to increase delivery speed	Probably, Long lead time	Shortest possible in order to increase delivery speed	
Sourcing	Utilization rate	Probably High	Probably High	According to specific industry's characteristics	According to specific industry's characteristics	According to specific industry's characteristics	
	Buffering	Inventory, smallest as possible	Inventory, smallest as possible	Inventory before divergence point / Extra capacity / Capacity pooling	Inventory before divergence point / Extra capacity	Inventory / Capacity pooling	
	Focus	Low total cost supplier: Cost & Quality	Collaborative relationships / Information sharing	Agile response, Suppliers near to assy facility, Information sharing	Agile response / Information sharing	Agile response / Risk management	
	OPP	Desirable MTS	Desirable MTS	Desirable MTO for exclusive components/materials	Desirable MTO for exclusive components/materials	Desirable MTS for generic items	
	Order Size	According to lowest transportation cost	Oriented to reduce transportation cost	Smallest possible in order to reduce obsolete risk	Smallest possible in order to reduce obsolete risk	Smallest possible in order to reduce obsolete risk	
Partnership	Order Cycle	Fixed, looking for lowest transaction cost	Oriented to reduce manufacturing cost	Shortest possible in order to increase delivery speed	Long lead time	Shortest possible in order to increase delivery speed	
	Buffering	Inventory, smallest as possible and multiple sources of supply	Primary source of supply	Multiple sources of supply	Multiple sources of supply	Multiple sources of supply	

Second version improved too little versus previous version, due to that, it was made a full change of the view of Reference SCGM, in a cleanest and most friendly view as is shown in Table 48.

Table 48, Reference SCGM, version before own cases application  
Source: Own elaboration

Supply Chain Framework							
<b>Market Mediation Cost</b>	Low	middle			High		
<b>Demand Uncertainty</b>	Low	middle			High		
<b>Customers power</b>	High	middle			Low		
<b>Cycle life</b>	Long	middle			Short		
<b>Cost sensitivity</b>	High	middle			Low		
<b>Assets</b>	Mainly dedicated	middle			Mainly General Purpose		
<b>Supply risk</b>	Low	middle			High		
Value	<b>Service Winners</b>	Information sharing for cost improvement	Collaborative relationships	Agility to unpredictable demand	Order accuracy (for customization)	Solutions proposal	
	<b>Service Qualifiers</b>	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
	<b>Product Winners</b>	Lowest cost		Product Features (innovation)		Solutions proposal	
	<b>Product Qualifiers</b>	Product Performance					
Supply Chain Profile	Focus	<b>Supply Chain</b>	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponement	Flexible to unpredictable events
		<b>Service</b>	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information
		<b>Product</b>	Lowest cost at standard performance		Quick manufacturability	Postponement	Customization
		<b>Production</b>	High utilization rate		Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
		<b>Sourcing</b>	Low total cost supplier	Collaborative relationships	Agile response		Agile response / Risk management
	Service	<b>OPP</b>	MTF	MTS	MTO	ATO	Configurable
		<b>Order size, according to...</b>	Lowest transportation cost	Replenishment needs	Lowest production bath	Customer's needs	Customer's needs
		<b>Order cycle...</b>	Fixed	Regular delivery	Shortest	Variable	Flexible
		<b>Partnership</b>	Possible	Required	Not necessary	Not necessary	Improbable
		<b>Buffering</b>	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory / Capacity pooling
	Product	<b>Inventory Strategy</b>	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness
		<b>Personalization</b>	Improbable	Improbable	Not necessary, but possible	Not necessary, but possible	Not necessary, but highly possible
		<b>Product Segments</b>	Low	Low - Medium	Low-Medium	High	Undetermined
		<b>Process Flow</b>	Tippically Continuous line	Indifferent	No a continuous line	Assembly after divergence point	Indifferent
	Production	<b>Batch Size</b>	Largest possible in order to increase efficiency		smallest possible looking for lowest obsolescence	smallest possible in order to increase delivery speed	
		<b>Production Cycle</b>	Longest possible	Shortest possible	Shortest possible	Probably, Long lead time	Shortest possible
		<b>Utilization rate</b>	Probably Very High		Probably Medium-High		Probably Low
		<b>OPP</b>	Desirable MTS	Desirable MTS	Desirable MTO for exclusive components/		
	Sourcing	<b>Order size,</b>	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk		
		<b>Order Cycle</b>	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed		
		<b>Partnership</b>	It's important		It's possible	Highly possible	Non usual
		<b>Buffering</b>	Inventory and multiple sources of supply	Primary source of supply	Multiple sources of supply		
			Efficient	Continuous replenishment	Agile	LeAgile	Flexible

Final version (previous to cases application) introduced a distinction between “Unique value proposal” and “Supply Chain Framework” in order to present a simplest and clearest distinction among Framework, Profile and Value proposal, as is shown in Table 49.

Table 49, Reference SCGM, version before omega case application  
Source: Own elaboration

Unique Value Proposal	<b>Service Winners</b>	Information sharing for cost improvement	Collaborative relationships	Agility to unpredictable demand	Order accuracy (for customization)	Solutions proposal	
	<b>Service Qualifiers</b>	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time	
	<b>Product Winners</b>	Lowest cost	Product Features (innovation)			Solutions proposal	
	<b>Product Qualifiers</b>	Product Performance					
Supply Chain Framework	<b>Market Mediation Cost</b>	Low		middle		High	
	<b>Demand Uncertainty</b>	Low		middle		High	
	<b>Customers power</b>	High		middle		Low	
	<b>Cycle life</b>	Long		middle		Short	
	<b>Cost sensitivity</b>	High		middle		Low	
	<b>Assets</b>	Mainly dedicated		middle		Mainly General Purpose	
	<b>Supply risk</b>	Low		middle		High	
Supply Chain Profile	Focus	<b>Supply Chain</b>	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events
		<b>Service</b>	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information
		<b>Product</b>	Lowest cost at standard performance		Quick manufacturability	Postponment	Customization
		<b>Production</b>	High utilization rate		Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
		<b>Sourcing</b>	Low total cost supplier	Collaborative relationships	Agile response		Agile response / Risk management
	Service	<b>OPP</b>	MTF	MTS	MTO	ATO	Configurable
		<b>Order size, according to...</b>	Lowest transportation cost	Replenishment needs	Lowest production bath	Customer's needs	Customer's needs
		<b>Order cycle...</b>	Fixed	Regular delivery	Shortest	Variable	Flexible
		<b>Partnership</b>	Possible	Required	Not necessary	Not necessary	Improbable
		<b>Buffering</b>	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory / Capacity pooling
	Product	<b>Inventory Strategy</b>	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness
		<b>Personalization</b>	Improbable	Improbable	Not necessary, but possible	Not necessary, but possible	Not necessary, but highly possible
		<b>Product Segments</b>	Low	Low - Medium	Low-Medium	High	Undetermined
	Production	<b>Process Flow</b>	Tippically Continuous line	Indifferent	No a continuous line	Assembly after divergence point	Indifferent
		<b>Batch Size</b>	Largest possible in order to increase efficiency		smallest possible looking for lowest obsolescence	smallest possible in order to increase delivery speed	
		<b>Production Cycle</b>	Longest possible	Shortest possible	Shortest possible	Probably, Long lead time	Shortest possible
		<b>Utilization rate</b>	Probably Very High		Probably Medium-High		Probably Low
	Sourcing	<b>OPP</b>	Desirable MTS	Desirable MTS	Desirable MTO for exclusive components/		
		<b>Order size,</b>	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk		
		<b>Order Cycle</b>	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed		
		<b>Partnership</b>	It's important		It's possible	Highly possible	Non usual
		<b>Buffering</b>	Inventory and multiple sources of supply	Primary source of supply	Multiple sources of supply		
			Efficient	Continuous Replenishment	Agile	LeAgile	Flexible

After Omega’s feedback, version was updated in its graphic interface in order to do clearest the information and distinction among the generic models, as is presented in Figure 41.

## Gap Analysis

		Efficient	Continuous Replenishment	Agile	LeAgile	Flexible		
<b>Supply Chain Framework</b>	Market Mediation Cost	Low		middle		High		
	Demand Uncertainty	Low		middle		High		
	Customers power	High		middle		Low		
	Cycle life	Long		middle		Short		
	Cost sensitivity	High		middle		Low		
	Assets	Mainly dedicated		middle	Mainly General Purpose			
	Supply risk	Low		middle		High		
<b>Value Proposal</b>	* Main winner	Perfect orders	Low working capital	Fast response to unpredictable demand	Customized products	Solutions proposal		
	Min. order size	Full Truck Load	Customer needs / Full truck load	Production batch	Production batch Post OPP	For production / transportation		
	Delivery	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time		
	* Main winner	Lowest cost	Performance/cost	Product Features (innovation)		Solutions proposal		
	Portfolio	Small	Medium	Large	Large	Whatever		
	Price	Lowest	Competitive			No matter		
<b>Supply Chain Profile</b>	* Supply Chain	Efficiency	Collaborative Relationships	Agile to unpredictable demand	Postponement	Flexible to unpredictable events		
	Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy for customization	No sharing information		
	Product	Lowest cost at standard performance		Quick Manufacturability	Postponement	Customization		
	Production	High utilization rate			Short set-up times / extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling	
	Sourcing	Low total cost supplier	Collaborative Relationships	Agile response		Agile response / Risk management		
	* OPP	MTF	MTS MTO in some	MTO	ATO	Configurable		
	* Buffering	Inventory, smallest as possible			Inventory before divergence point / Extra capacity	Inventory pooling / Capacity pooling		
	Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs		
	Order cycle...	Fixed lead time	Regular delivery	Shortest according to queue	Shortest, according to post OPP queue	Flexible		
	Partnership	Possible	Required	Not necessary	Not necessary	Improbable		
	* Inventory Strategy	High inventory for efficient production	High rotation for low working capital	Internal Pooling	Inventory before divergence point	Internal / External Pooling		
	* Personalization	Improbable			Not necessary, but possible	Not necessary, but highly possible		
	Product Segments against peers	Low	Low - Medium		High	Undetermined		
	* Workload leverage	Smoothed		Medium size Peaks / Valleys	Smoothed before divergente point	Large size Peaks / Valleys		
	* Utilization rate	Very High			Medium-High	Low		
	Process Flow	Tippically continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	Indifferent		
	Batch Size	Largest possible in order to increase production efficiency		small possible for lowest	smallest possible in order to increase delivery speed			
	Production Cycle	Longest possible	Medium - Short possible for increasing responsiveness		Long before OPP Short before OPP	Shortest possible		
	* OPP	Desirable MTS		Desirable MTO for exclusive components / materials				
	Order size	According to lowest transportation cost			Smallest possible in order to reduce obsolesce risk			
	Order Cycle	Fixed, looking for lowest transaction cost			Shortest possible in order to increase delivery speed			
	Partnership	It's important		It's possible	Highly possible	Non usual		
	Buffering	Inventory / multiple sources of supply	Primary source of supply	Multiple sources of supply				
	Predominant features of the supply chain under analysis Secondary features of the supply chain under analysis * Dominant factors: factors that dominate the definition of prevailing supply chain							
			Gaps		Predominant supply chain model			
							Company Name	

Figure 41, Supply Chain Roadmap, final version after cases feedback  
 Source: Own elaboration

### **11.3 Own Case results**

Own cases allowed us to find some conclusions about “Supply Chain Roadmap” method:

- Previous to the assessment is required to leverage people in some basic supply chain concepts.
- Assessment stage required less than 1 hour for processing.
- Assessment consensus requires less than 1 1/2 -3 hours for discussion.
- Mapping /Gap analysis stages are no longer than 1 1/2 -3 hours.
- Gap analysis results are very focused and practical.

According to feedback received from managers of the companies where the model was applied, “Supply Chain Roadmap” model meets its value promises:

- Short time for processing.
- Easy way for understanding supply chain strategies.
- Easy understanding of map, which is useful for training/deployment objectives.
- Gap analysis recommendations are relevant to business strategy.

### **11.4 Brand and Patent Pending**

Actually “Supply Chain Roadmap” method has a “Provisional Patent” under the number 61530997 in the US patent and trademark office and is under “Patent Pending” status.

“Supply Chain Roadmap” brand is under registration number 85414829 in the US patent and trademark office.

### **11.5 Future work**

Although “Supply Chain Roadmap” was applied in six cases (four existing cases and two own cases), future work should be oriented to apply method to several cases in order to evaluate its performance in several business.

## **12. Conclusions**

Supported in cases analysis, feedback of managers of companies analyzed under model and visitors in “Poster session” in MIT, main conclusions about “Supply Chain Roadmap<sup>TM</sup>” are:

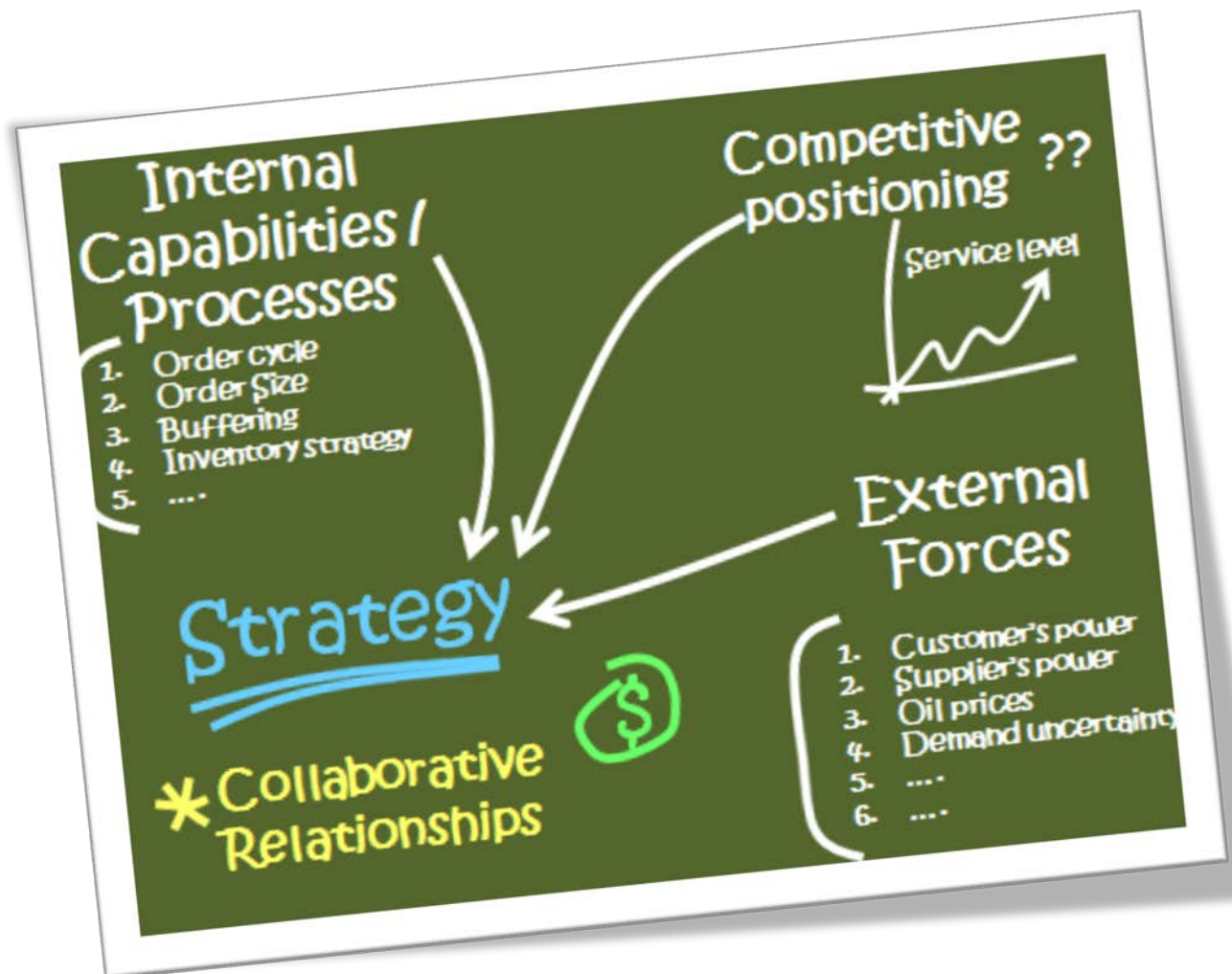
- Method is easy and fast to apply, supported in the “three-step” methodology.
- Gap analysis recommendations are relevant for the business.
- “Supply Chain Roadmap” tool is friendly and easy of understanding, for both, analysis and deployment within the organization.
- “Gap analysis” tool, provides an accurate understanding of the gaps when the supply chain under analysis is compared against “reference supply chain generic models”.
- Assessment step requires a previous leverage of participants, about supply chain concepts and terms.
- “Gap analysis” stage and conclusions elaboration requires a facilitator, trained in supply chain models.
- “Reference supply chain generic models” and mixes among them, covered all the six cases analyzed (two own developed and four from other authors).
- “Supply Chain Roadmap<sup>TM</sup>” fulfills the promise of to be *“a method for validating the supply chain functional strategy, in which the needs of the productive sector are satisfied in regards to aligning the theoretical concepts to business realities, concepts that are understandable by people in different levels and with different training, and ensuring ease in implementation and deployment”*.

## Section 6: Model & Tools

Probably in your career, you have been challenged by a big question ... What is the best supply chain strategy for my business?

And maybe, you also have bumped into the same difficulties faced by many companies ... It is very difficult to define the right criteria to select and deploy the most appropriate supply chain strategy for your company.

This is precisely the value proposition of "Supply Chain Roadmap", a three-step method for understanding, mapping and redesign of your supply chain strategy, assuring linkage with business strategy by understanding market forces and company's competitive positioning.



## 13. Introduction to “Supply Chain Roadmap” guide

### 13.1 Several approaches to business strategy

There are different approaches about the strategy, some of them focused on the competitive positioning based on the understanding of power of external forces governing competition in an industry, as Porter’s approach, which is classified in the “positioning based view” model –PBV-. Others focused on competences and capabilities of the organization, as “Resources-based view” - RBV- approach, where company capabilities are intangibles as reputation, know how, culture, innovation process, among others, are capabilities very hard to imitate for competitors, and based on them, companies could create competitive advantage.

A newest oncoming about collaborative relationships and networking as a basis for business strategy has been introduced in more recent years, where synergy among partners in the value network could create competitive advantage that is inimitable for other value networks.

### 13.2 Supply Chain Roadmap approach

Supply Chain Roadmap is positioned in the middle of “positioning-based view” and “resource-based view” approaches and defines an additional element as a result of the interaction among external forces an internal capabilities: the unique value proposal, which constitutes in the competitive positioning of the company in the marketplace, supporting strategy in the understanding of external forces and internal capabilities. In addition to that, Supply Chain Roadmap introduces “collaborative relationships” as a factor of the internal capabilities. Supply Chain Roadmap approach considers than strategy is the result of the interaction of several factors covered by the three approaches: RBV, PBV and collaborative strategy.

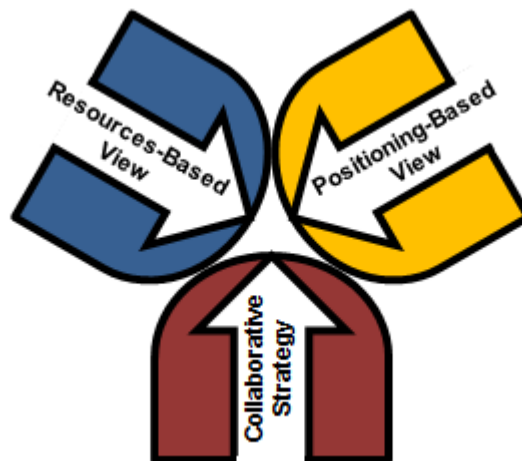


Figure 42, Several approaches about strategy  
Source: Own elaboration

#### 13.2.1 Supply Chain Framework

The environment of the business where an organization competes has multiple components, but which of them influence the design and performance of the supply chain?

Porter’s model speaks of five forces that regulate competition in any industrial sector. Two of these forces, the power of Customers and the power of supplier, are related to the natural members of the supply chain of any company, reason why they must be considered as key elements in the supply chain design, and in addition, we must go beyond what Porter proposes and introduce some



new elements inside these forces, which are the key to supply chain management, such as, product and information flows, the relation of logistics costs on total costs and the variability of demand, among others. Substitute products or services, the struggle among current competitors and the entrance of new competitors, rather than independent forces, must be considered as components of the Customers' power and of the suppliers' power, given that these are elements that modify the power relationship and the desire for collaboration among the parties. This extensive vision regarding the effect of suppliers and Customers leads us to the redefinition of the concept in a broader manner and naming them as relations with Customers and relations with suppliers. On the other hand, the other fundamental force in any supply chain are the technological and economic components related to the transformation process (understood as the production process of the good or service), since they affect structural decisions related to the production process and therefore affect the design and performance of the supply chain.

### 13.2.2 Supply Chain Profile

The structure of a supply chain is comprised of three macro processes: Supply, Transformation and Distribution. The latter process must involve a redefinition of the traditional vision, since the growing trend of introducing value-added services that accompany the product in the companies' value proposal, has forced developing an infrastructure inside the organizations for the production of products and for the delivery of value-added services, which leads us to reconsider the traditional supply chain structure, modifying the traditional concept of "order winners / qualifiers" introduced by Hill, to a concept that is more focused on the current value proposal, which we shall call "Product winners / qualifiers" and "Service winners / qualifiers". This approach intends to differentiate the competencies and infrastructure that must be developed for each one of the aspects of the value proposal and ensure that both the product and the service have the importance required by the market in the organization's supply chain strategy.

It's important to clarify that some authors describe "product" as the combination of physical goods and services accompanying and supporting commercial transaction, but, in order to differentiate competences required under a manufacturing perspective (oriented to physical goods) and competences required under a supply chain perspective, we'll be using "Product" concept as a definition for "Physical goods features" and "Service" as a definition of "Other features supporting company's value proposal".

### 13.3 Supply Chain Roadmap model

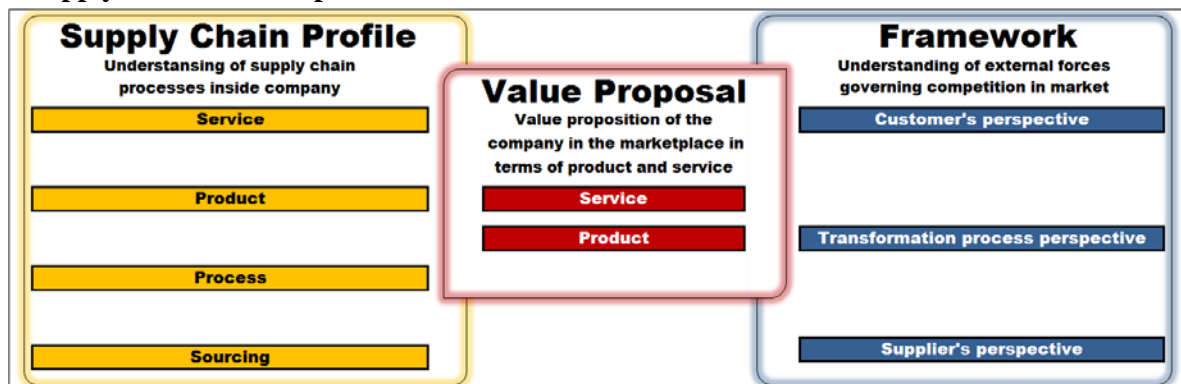


Figure 43, Supply Chain Roadmap model  
Source: own elaboration.

Figure 43 presents the *roadmap* for the design of the supply chain, where the “Activities related to the flow of products, information and financial transactions” interrelate with the “competitive environment”, which are “Supply Chain Framework” and “Supply Chain Profile” respectively. Based on the interaction between them is defined the “unique value proposal”. The complete model is designated as “Supply Chain Roadmap™”.

In few words, Supply Chain Roadmap method understands supply chain strategy as the interaction of external forces, internal processes/capabilities and company’s competitive positioning.

### 13.4 When/Where to apply Supply Chain Roadmap?

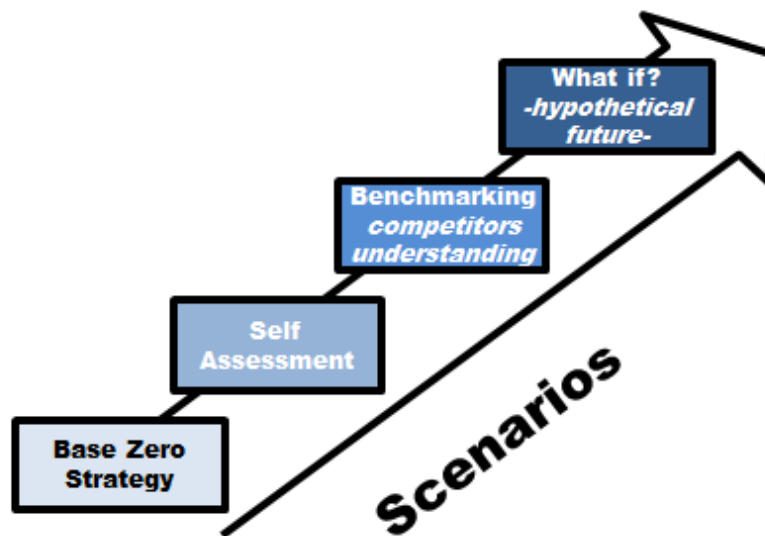


Figure 44, Scenarios where is applicable Supply Chain Roadmap  
Source: own elaboration.

In order to obtain better results, for large companies, Supply Chain Roadmap should be applied in an independent way to each business unit or product category, in order to have more accurate results, because of is very common to have several supply chains under a same company.

In addition to that, Supply Chain Roadmap should be applied in several business scenarios:

- For new business, the method supports “base zero” strategy development based on the information of business framework and parallel view of “Generic supply chain models, a detailed understanding of both could support to define factors of the strategy.
- For “Ongoing business”, Supply Chain Roadmap, supports the understanding of gaps between supply chain strategy and business strategy, supported by “Generic Supply Chain Models”. Is very important to highlight than gaps may be a competitive advantage –*companies could be running business out of the standard parameters, based on internal competences and it could be a practice very difficult to imitate for the competitors-* or gaps could be a failure than must be solved.

- In addition to previous practice, for “ongoing business”, Supply Chain Roadmap could be used for understanding of competitor’s strategy and potential failures (gaps) of their strategy than could be exploited in a favorable way.
- Supply Chain Roadmap, could be used for studying “What if?”, in order to be prepared against hypothetical business situations. For example, if oil prices are too high, transportation cost became in a relevant issue and supply chain strategy must have in consideration additional factors that could affect service policies and unique value proposal.

## 14. Three-step method

Supply Chain Roadmap is applied in a three-step method:

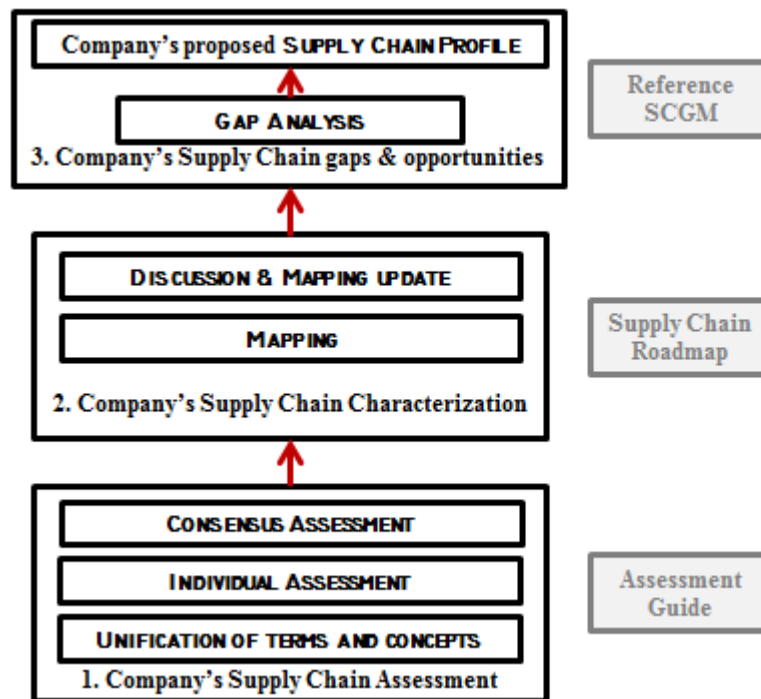


Figure 45, “Supply Chain Roadmap” three –step method.  
Source: Own elaboration

Supply Chain Roadmap method pretends to support understanding about supply chain strategy by a systematic and analytical approach, but results are highly dependent of team discussions, due that in each stage of the method are several team discussions in order to allow full understanding of scenario under review.

### 14.1 First step: Supply Chain Assessment

Before apply supply chain assessment is necessary to define assessment’s scope, in both: scenario to evaluate and business unit range (geography, product category, group of customers, etc.), as is explained in Figure 46.



Figure 46, "Supply Chain Roadmap" Assessment scope  
 Source: Own elaboration

After defining assessment scope, should be applied assessment, according to activities defined in figure 47.

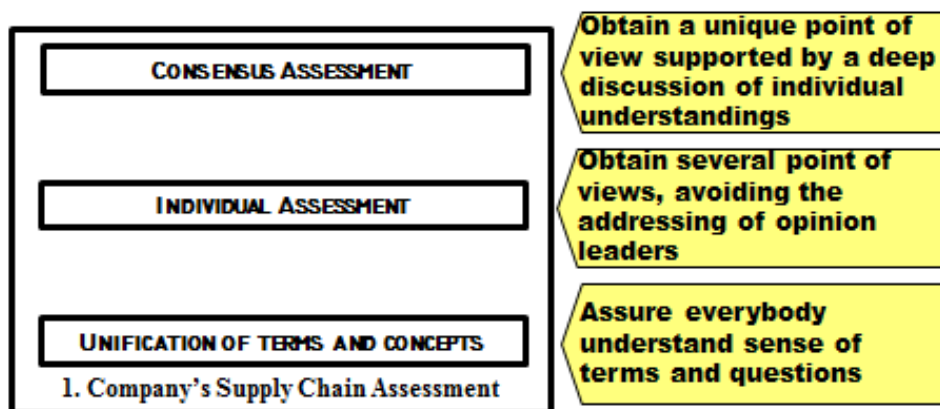


Figure 47, First step.  
 Source: Own elaboration

Assessment is applied using questionnaires detailed in figures 48 to 51.

**Assesment tool: Questionnaire 1: Supply Chain Framework**  
 Please, answer the questions, under "hypothetical market perspective" if you desires to evaluate "what if?" scenarios.  
 Please, answer the questions, under "current market perspective", if you desires to review your supply chain alignment with current business strategy.  
 Guideline: What is the dominant factor in the marketplace where your company is/will be competing?

<b>Customer's perspective</b>	<b>Market Mediation Cost</b>	Market mediation cost relevance in total cost (Obsolescence, Working Capital, Lost sales.)	Low	Medium	High	
	<b>Transportation cost</b>	Transportation/Logistics cost relevance in total cost.	Low	Medium	High	
	<b>Demand uncertainty</b>	How are demand changes in the market?	Predictable	Unpredictable	Unexpected	
	<b>Customer's power</b>	Customer's power based on alternatives (channels, suppliers, substitutive products) and demand/offer ratio	Low	Medium	High	
	<b>Product life cycle</b>	Length of product life cycle	Short	Medium	Long	
	<b>Cost sensitivity</b>	Product/Service cost relevance in Customer's business	Low	Medium	High	
<b>Process</b>	<b>Fixed Assets: Increase in capacity</b>	Magnitude of the increases in capacity of new assets	Low	Medium	High	
	<b>Fixed Assets: General purpose/</b>	Assets flexibility	General purpose	Dedicated		
	<b>Process technological maturity</b>	Maturity of technology associated to manufacturing processes	New	Maturing	Mature	
	<b>Cost</b>	Manufacturing cost -transformation cost- relevance in total cost	Low	Medium	High	
<b>Suppliers</b>	<b>Supply risk</b>	Are there risks associateds to supply disruptions?	High	Medium	No relevant	
	<b>Supplier's power</b>	Supplier's power based on alternatives (distribution channels, substitutive products) and demand/offer ratio	Low	Medium	High	
	<b>Sourcing complexity</b>	Mix of: 1- Global/Local sourcing, Strategic partnership? 2- High number SKUs/Suppliers? 3- Markets Volatility?	Low	Medium	High	
	<b>Cost</b>	Product/Service -raw materials- cost relevance in manufacturer's business	Low	Medium	High	

Figure 48, Assesment, questionnaire 1: Supply Chain Framework  
 Source: Own elaboration

**Assessment tool: Questionnaire 2: Supply Chain Profile**  
 Please, answer the questions, under "Internal processes/capabilities perspective", in other words, Which is the "general condition/behavior" of our supply chain?  
 Guideline: What is the dominant factor in your supply chain?

Service	<b>Order penetration point</b>	Where is customer's order received?	MTF Make to Forecast	MTS Make to stock	MTO Make to Order	ATO Assembly to Order	DTO Design to Order	
	<b>Order Size</b>	Relevance compared against customers requirements	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs	
	<b>Order Cycle from order to receiving-</b>	Relevance compared against customers requirements	Fixed lead time	Regular delivery	Shortest according to queue	Shortest, according to post OPP queue	Flexible	
	<b>Partnership</b>	Are collaborative relationships used?	Tactic relations with some customers	Strategic relations with key customers	No relevant		No used	
	<b>Buffering</b>	How/Where is demand buffered?	Inventory of finished product	Inventory before divergence point / Extra capacity	Extra capacity	Inventory Pooling / Capacity Pooling	Other?	
Product	<b>Inventory Strategy</b>	What is the inventory strategy?	High inventory level for optimizing production batches	High rotation to reduce working capital	Common components/ materials (pooling)	Inventory before divergence point	Pooling for increasing responsiveness	
	<b>Personalization</b>	Are products personalized according to customer's needs?	No, never	Yes, in a few special cases	Yes, relevant number of orders			
	<b>Make or buy?</b>	Are fabrication processes made or outsourced?	No	Yes, components	Yes, finished products are bought			
	<b>Product segments / SKUs</b>	Segments/ SKUs compared against industry	Low	Low- Medium	Medium	High	Infinite	
Process	<b>Process Flow</b>	What is the dominant process flow type?	Typically continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	According to customer's requirement	
	<b>Batch Size</b>	Relevance compared against inventories policy	Largest possible to increase efficiency	Smallest possible to reduce obsolescence	Smallest possible to reduce order cycle			
	<b>Production cycle time to produce all SKUs-</b>	Relevance (Long, Medium, Short), compared against industry?	Longest possible to increase efficiency	Medium-Short possible to increase responsiveness	Long before OPP Short before OPP	Shortest possible		
	<b>Utilization rate</b>	What is the Assets utilization rate?	Very High (>95%)	High (>90%)	Medium (>80%)	Low (>70%)	Very low (<70%)	
	<b>Workload leverage</b>	Workload variability	Smoothed	Medium size Peak/ Valleys	Large size Peak/Valleys	Smoothed before divergence point		
Sourcing	<b>Order penetration point</b>	Where is order received (by suppliers)?	MTF Make to Forecast	MTS Make to stock	MTO Make to Order	ATO Assembly to Order	DTO Design to Order	
	<b>Order Size</b>	Relevance compared against inventory policy requirements	According to lowest transportation cost	According to lowest production cost	According to customer needs			
	<b>Order Cycle from order to receiving-</b>	Relevance compared against inventory policy requirements	Fixed, to reduce transaction cost	Shortest possible to reduce delivery time	According to customers needs			
	<b>Partnership</b>	Are collaborative relationships used?	Strategic relations with key suppliers	Tactic relations with some suppliers	No relevant			
	<b>Buffering</b>	How/Where is demand buffered?	Inventory	Suppliers Pooling	A unique / reliable supplier	Mix?	Other?	

Figure 49, Assessment, questionnaire 2: Supply Chain Profile  
 Source: Own elaboration

**Assesment tool: Questionnaire 3: Unique Value Proposal**

Please, answer the questions, under "market perspective" if you desires to redesign your supply chain.  
 Please, answer the questions, under "your current value proposal" perspective, if you desires to review your supply chain alignment with current business strategy:

		Perfect orders	Low working capital	Agility to unpredictable demand	Customized Products	Solutions proposal
<b>Service</b>	<b>Main value add in service</b> What is the most important value added for your customers in terms of service?					
	<b>Delivery reliability</b> Perfect orders (on time, in full, documents ok) level	No relevant	Qualifier	Winner		
	<b>Delivery Speed</b> Length of your order cycle -from customer order to customer's receiving-	No relevant	Qualifier	Winner		
	<b>Minimum order size</b> Do you have a strict or flexible "minimum order size" policy?	No relevant	Qualifier	Winner		
	<b>Transactional effort</b> Do you have automated order management processes with your customers?	No relevant	Qualifier	Winner		
	<b>Agility to demand changes</b> How is your responsiveness level?	No relevant	Qualifier	Winner		
	<b>Working capital optimization</b> Are you working a continuous replenishment model in order to reduce customer's inventories?	No relevant	Qualifier	Winner		
	<b>Other</b>	No relevant	Qualifier	Winner		
<b>Product</b>	<b>Main value add in product</b> What is the most important value added for your customers in terms of product?	Lowest cost	Best ratio Performance / cost	Product Features (Innovation)	Customized Products	Solutions proposal
	<b>Low cost</b> Are your products the lowest cost at similar performance level?	No relevant	Qualifier	Winner		
	<b>High Performance</b> Are your products the best performers of the market?	No relevant	Qualifier	Winner		
	<b>Differentiated Features</b> Do you offer special/ unique features, relevant for customers?	No relevant	Qualifier	Winner		
	<b>Product portfolio</b> Do you have the widest product portfolio (SKUs)?	No relevant	Qualifier	Winner		
	<b>Customized products</b> Do you offer customized products in a regular basis?	No relevant	Qualifier	Winner		
	<b>Time to market (innovation)</b> Are you market leader in terms of innovation introduction?	No relevant	Qualifier	Winner		
	<b>Others</b>	No relevant	Qualifier	Winner		

Figure 50, Assessment, questionnaire 3: Unique Value Proposal.  
 Source: Own elaboration

**Assesment tool: Questionnaire 4: Management focus**  
 Please, select the most important focus of the company's management in each perspective:  
 Guideline: What is the dominant factor for making decisions in business execution / business planning

<b>End to End Supply Chain</b>	Efficiency	Collaborative relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events / needs	Other:	Comments:
<b>Service</b>	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy (for customization)	No sharing information	Other:	Comments:
<b>Product</b>	Lowest cost at standard performance	Quick manufacturability	Postponment	Customization		Other:	Comments:
<b>Process</b>	High utilization rate	Short set-up times and extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling		Other:	Comments:
<b>Sourcing</b>	Low total cost supplier	Collaborative relationships	Agile response	Agile response / Risk management		Other:	Comments:

Figure 51, Assessment, questionnaire 4: Management focus.  
 Source: Own elaboration

## 14.2 Second step: Mapping

Mapping stage pretends to support understanding of supply chain scenario, by giving a graphical single view of supply chain strategy, due that, there is an activity related to discuss “Supply Chain Roadmap” in order to adjust topics that weren’t found in assessment’s step.

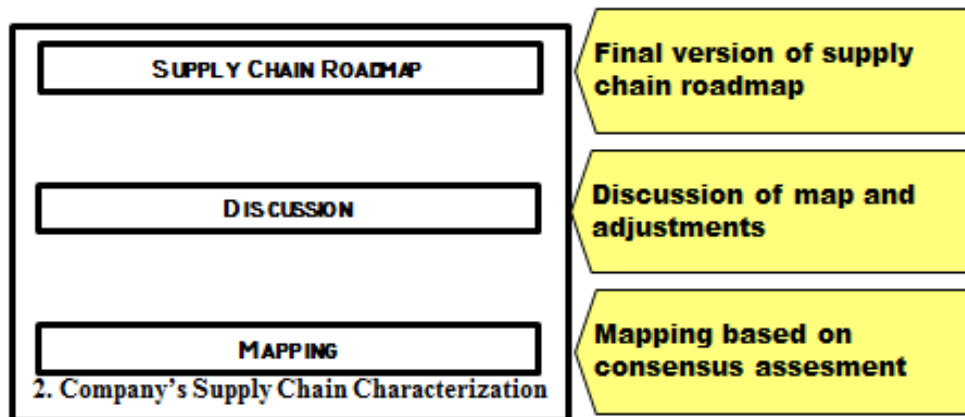


Figure 52, Second step  
 Source: Own elaboration

Mapping is applied using tool detailed in figure 53.



## Supply Chain Roadmap™

by H.D. Perez

Mapping Tool: A map of Supply Chain Strategy

<div style="border: 2px solid yellow; padding: 5px;"> <h3 style="text-align: center; margin: 0;">Supply Chain Profile</h3> <p style="text-align: center; margin: 0;">Understanding of supply chain processes inside company</p> <div style="border: 1px solid gray; height: 50px; margin-bottom: 5px;"></div> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <thead> <tr style="background-color: #FFD700;"> <th colspan="3" style="text-align: center; padding: 2px;">Service</th> </tr> </thead> <tbody> <tr> <td style="width: 33%; padding: 2px;">Buffering</td> <td style="width: 33%; padding: 2px;">OPP</td> <td style="width: 33%; padding: 2px;">Focus</td> </tr> <tr> <td style="height: 30px;"></td> <td></td> <td></td> </tr> <tr> <td style="padding: 2px;">Partnership</td> <td style="padding: 2px;">Order Size</td> <td style="padding: 2px;">Order Cycle</td> </tr> <tr> <td style="height: 30px;"></td> <td></td> <td></td> </tr> </tbody> </table> <table border="1" style="width: 100%; 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padding: 5px;"> <h3 style="text-align: center; margin: 0;">Framework</h3> <p style="text-align: center; margin: 0;">Understanding of external forces governing competition in market</p> <div style="border: 1px solid gray; height: 50px; margin-bottom: 5px;"></div> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <thead> <tr style="background-color: #1F77B4; color: white;"> <th colspan="2" style="text-align: center; padding: 2px;">Customer's perspective</th> </tr> </thead> <tbody> <tr> <td style="width: 50%; padding: 2px;">Demand behavior</td> <td style="width: 50%; padding: 2px;">Customer's power</td> </tr> <tr> <td style="height: 30px;"></td> <td></td> </tr> <tr> <td style="padding: 2px;">Product life cycle</td> <td style="padding: 2px;">Transportation cost relevance</td> </tr> <tr> <td style="height: 30px;"></td> <td></td> </tr> <tr> <td colspan="2" style="padding: 2px; text-align: center;">Market mediation cost</td> </tr> <tr> <td colspan="2" style="height: 30px;"></td> </tr> <tr> <td colspan="2" style="padding: 2px; 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Figure 53, Mapping tool.  
 Source: Own elaboration

### 14.3 Third step: Gap analysis

Gap analysis stage pretends to find dominant behavior of supply chain, factors that are out of the dominant behavior –gaps-, discussion about gaps –Are gaps a competitive advantage inimitable for competitors? Or Are gaps failures of the scenarios that must be solved?- and finally, an updated version of supply chain roadmap and action plan to fix or strengthen the gap, according if gap is a competitive advantage or a model’s failure.

This is one of the most important steps of the Supply Chain Roadmap method and should be focused in the understanding if the gaps are factors that create value and competitive advantage or if them are in the wrong direction.

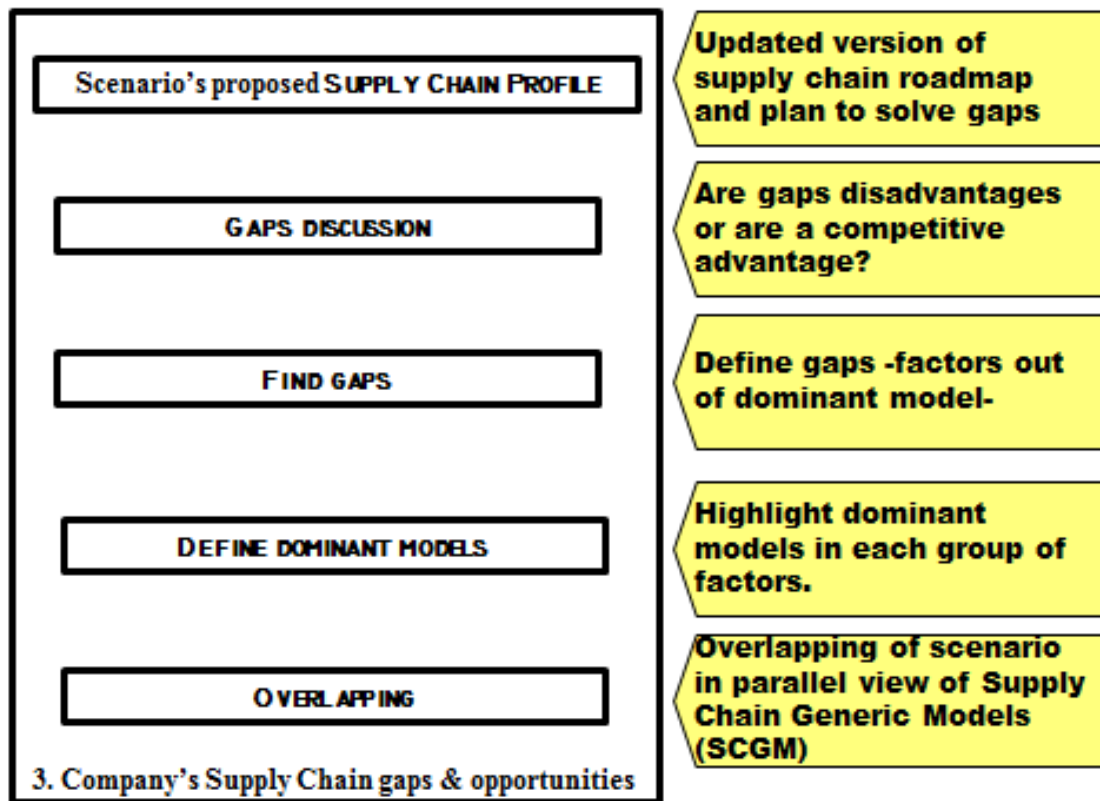


Figure 54, Third step.  
Source: Own elaboration

Based on definitions of previous step, Gap analysis is applied using model detailed in figure 55, dominant factors of each group are differentiated by an asterisk at the right side and they define what the dominant supply chain is.

First, “dominant behaviors” are highlighted in gray color at “Gap Analysis” tool, as is shown in Figure 56.

Second, dominant “Supply Chain models” are defined by the key dominant behaviors (with an asterisk) and they are highlighted in blue color, as is shown in Figure 57.

Third, “Dominant behaviors” out of the “dominant supply chain models” are defined as the gaps, as is shown in Figure 58. Gaps will be analyzed in a team discussion in order to define their relevance.

Supply Chain Roadmap™ by H.D. Perez						
Gap Analysis Tool: A comparative assesment of your supply chain strategy						
		Efficient	Continuous Replenishment	Agile	LeAgile	Flexible
<b>Supply Chain Framework</b>	Market Mediation Cost	Low		middle		High
	Demand Uncertainty	Low		middle		High
	Customers power	High		middle		Low
	Cycle life	Long		middle		Short
	Cost sensitivity	High		middle		Low
	Assets	Mainly dedicated		middle	Mainly General Purpose	
	Supply risk	Low		middle		High
<b>Value Proposal</b>	* Main winner	Perfect orders	Low working capital	Fast response to unpredictable demand	Customized products	Solutions proposal
	Min. order size	Full Truck Load	Customer needs / Full truck load	Production batch	Production batch Post OPP	For production / transportation
	Delivery	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time
	* Main winner	Lowest cost	Performance/cost	Product Features (Innovation)		Solutions proposal
	Portfolio	Small	Medium	Large	Large	Whatever
	Price	Lowest	Competitive			No matter
<b>Supply Chain Profile</b>	* Supply Chain	Efficiency	Collaborative Relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events
	Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy for customization	No sharing information
	Product	Lowest cost at standard performance		Quick Manufacturability	Postponment	Customization
	Production	High utilization rate		Short set-up times / extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
	Sourcing	Low total cost supplier	Collaborative Relationships	Agile response		Agile response / Risk management
	* OPP	MTF	MTS MTO in some	MTO	ATO	Configurable
	* Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory pooling/ Capacity pooling
	Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs
	Order cycle...	Fixed lead time	Regular delivery	Shortest according to queue	Shortest, according to post OPP queue	Flexible
	Partnership	Possible	Required	Not necessary	Not necessary	Improbable
	* Inventory Strategy	High inventory for efficient production	High rotation for low working capital	Internal Pooling	Inventory before divergence point	Internal / External Pooling
	* Personalization	Improbable		Not necessary, but possible		Not necessary, but highly possible
	Product Segments against peers	Low	Low - Medium		High	Undetermined
	* Workload leverage	Smoothed		Medium size Peaks / Valleys	Smoothed before divergente point	Large size Peaks / Valleys
	* Utilization rate	Very High		Medium-High		Low
	Process Flow	Typically continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	Indifferent
	Batch Size	Largest possible in order to increase production efficiency		small possible for lowest	smallest possible in order to increase delivery speed	
	Production Cycle	Longest possible	Medium - Short possible for increasing responsiveness		Long before OPP Short before OPP	Shortest possible
	* OPP	Desirable MTS		Desirable MTO for exclusive components / materials		
	Order size	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk		
	Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed		
	Partnership	It's important		It's possible	Highly possible	Non usual
	Buffering	Inventory / multiple sources of supply	Primary source of supply	Multiple sources of supply		
	Predominant features of the supply chain under analysis					
Secondary features of the supply chain under analysis						
* Dominant factors: factors that dominate the definition of prevailing supply chain						
Gaps		Predominant supply chain model				
Company Name						

Figure 55, Gap analysis tool or SCGM parallel view.

Source: Own elaboration

Supply Chain Roadmap™ by H.D. Perez								
Gap Analysis Tool: A comparative assesment of your supply chain strategy								
		Efficient	Continuous Replenishment	Agile	LeAgile	Flexible		
<b>Supply Chain Framework</b>	Market Mediation Cost	Low		middle		High		
	Demand Uncertainty	Low		middle		High		
	Customers power	High		middle		Low		
	Cycle life	Long		middle		Short		
	Cost sensitivity	High		middle		Low		
	Assets	Mainly dedicated		middle		Mainly General Purpose		
	Supply risk	Low		middle		High		
	<b>Value Proposal</b>							
<b>Service</b>	* Main winner	Perfect orders	Low working capital	Fast response to unpredictable demand	Customized products	Solutions proposal		
	Min. order size	Full Truck Load	Customer needs / Full truck load	Production batch	Production batch Post OPP	For production / transportation		
	Delivery	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time		
	* Main winner	Lowest cost	Performance/cost	Product Features (Innovation)		Solutions proposal		
	Portfolio	Small	Medium	Large	Large	Whatever		
	Price	Lowest	Competitive			No matter		
<b>Supply Chain Profile</b>	<b>Management (Focus)</b>	* Supply Chain	Efficiency	Collaborative Relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events	
		Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy for customization	No sharing information	
		Product	Lowest cost at standard performance		Quick Manufacturability	Postponment	Customization	
		Production	High utilization rate		Short set-up times / extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling	
		Sourcing	Low total cost supplier	Collaborative Relationships	Agile response		Agile response / Risk management	
	<b>Service</b>	* OPP	MTF	MTS MTO in some industries	MTO	ATO	Configurable	
		* Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory pooling/ Capacity pooling	
		Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs	
		Order cycle...	Fixed lead time	Regular delivery	Shortest according to queue	Shortest, according to post OPP queue	Flexible	
		Partnership	Possible	Required	Not necessary	Not necessary	Improbable	
	<b>Product</b>	* Inventory Strategy	High inventory for efficient production	High rotation for low working capital	Internal Pooling	Inventory before divergence point	Internal / External Pooling	
		* Personalization	Improbable		Not necessary, but possible		Not necessary, but highly possible	
		Product Segments against peers	Low	Low - Medium		High	Undetermined	
		* Workload leverage	Smoothed		Medium size Peaks / Valleys	Smoothed before divergente point	Large size Peaks / Valleys	
		* Utilization rate	Very High		Medium-High		Low	
	<b>Production</b>	Process Flow	Typically continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	Indifferent	
		Batch Size	Largest possible in order to increase production efficiency		small possible for lowest	smallest possible in order to increase delivery speed		
		Production Cycle	Longest possible	Medium - Short possible for increasing responsiveness		Long before OPP Short before OPP	Shortest possible	
		* OPP	Desirable MTS		Desirable MTO for exclusive components / materials			
		Order size	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk			
	<b>Sourcing</b>	Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed			
		Partnership	It's important		It's possible	Highly possible	Non usual	
		Buffering	Inventory / multiple sources of supply	Primary source of supply	Multiple sources of supply			
		Predominant features of the supply chain under analysis						
		Secondary features of the supply chain under analysis						
	* Dominant factors: factors that dominate the definition of prevailing supply chain							
			Gaps		Predominant supply chain model			
							Company Name	

Figure 56, Gap analysis tool, Dominant Behaviors.

Source: Own elaboration

Supply Chain Roadmap™ by H.D. Perez						
Gap Analysis Tool: A comparative assesment of your supply chain strategy						
		Efficient	Continuous Replenishment	Agile	LeAgile	Flexible
<b>Supply Chain Framework</b>	Market Mediation Cost	Low		middle		High
	Demand Uncertainty	Low		middle		High
	Customers power	High		middle		Low
	Cycle life	Long		middle		Short
	Cost sensitivity	High		middle		Low
	Assets	Mainly dedicated		middle		Mainly General Purpose
	Supply risk	Low		middle		High
	<b>Value Proposal</b>	* Main winner	Perfect orders	Low working capital	Fast response to unpredictable demand	Customized products
Min. order size		Full Truck Load	Customer needs / Full truck load	Production batch	Production batch Post OPP	For production / transportation
Delivery		Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time
* Main winner		Lowest cost	Performance/cost	Product Features (Innovation)		Solutions proposal
Portfolio		Small	Medium	Large	Large	Whatever
Price		Lowest	Competitive			No matter
<b>Supply Chain Profile</b>	* Supply Chain	Efficiency	Collaborative Relationships	Agile to unpredictable demand	Postponment	Flexible to unpredictable events
	Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy for customization	No sharing information
	Product	Lowest cost at standard performance		Quick Manufacturability	Postponment	Customization
	Production	High utilization rate		Short set-up times / extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
	Sourcing	Low total cost supplier	Collaborative Relationships	Agile response		Agile response / Risk management
	* OPP	MTF	MTS MTO in some industries	MTO	ATO	Configurable
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	Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs
	Order cycle...	Fixed lead time	Regular delivery	Shortest according to queue	Shortest, according to post OPP queue	Flexible
	Partnership	Possible	Required	Not necessary	Not necessary	Improbable
	* Inventory Strategy	High inventory for efficient production	High rotation for low working capital	Internal Pooling	Inventory before divergence point	Internal / External Pooling
	* Personalization	Improbable		Not necessary, but possible		Not necessary, but highly possible
	Product Segments against peers	Low	Low - Medium		High	Undetermined
	* Workload leverage	Smoothed		Medium size Peaks / Valleys	Smoothed before divergente point	Large size Peaks / Valleys
	* Utilization rate	Very High		Medium-High		Low
	Process Flow	Tippically continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	Indifferent
	Batch Size	Largest possible in order to increase production efficiency		small possible for lowest	smallest possible in order to increase delivery speed	
	Production Cycle	Longest possible	Medium - Short possible for increasing responsiveness		Long before OPP Short before OPP	Shortest possible
	* OPP	Desirable MTS	Desirable MTO for exclusive components / materials			
	Order size	According to lowest transportation cost	Smallest possible in order to reduce obsolesce risk			
	Order Cycle	Fixed, looking for lowest transaction cost	Shortest possible in order to increase delivery speed			
	Partnership	It's important	It's possible	Highly possible	Non usual	
	Buffering	Inventory / multiple sources of supply	Primary source of supply	Multiple sources of supply		
	Predominant features of the supply chain under analysis					
Secondary features of the supply chain under analysis						
* Dominant factors: factors that dominate the definition of prevailing supply chain						
		Gaps		Predominant supply chain model		
						Company Name

Figure 57, Gap analysis tool, Dominant Supply Chain models.

Source: Own elaboration

Supply Chain Roadmap™ by H.D. Perez						
Gap Analysis Tool: A comparative assesment of your supply chain strategy						
		Efficient	Continuous Replenishment	Agile	LeAgile	Flexible
<b>Supply Chain Framework</b>	Market Mediation Cost	Low		middle		High
	Demand Uncertainty	Low		middle		High
	Customers power	High		middle		Low
	Cycle life	Long		middle		Short
	Cost sensitivity	High		middle		Low
	Assets	Mainly dedicated		middle		Mainly General Purpose
	Supply risk	Low		middle		High
	<b>Value Proposal</b>					
<b>Service</b>	* Main winner	Perfect orders	Low working capital	Fast response to unpredictable demand	Customized products	Solutions proposal
	Min. order size	Full Truck Load	Customer needs / Full truck load	Production batch	Production batch Post OPP	For production / transportation
	Delivery	Perfect orders / Lowest transactional cost		Delivery speed, Order accuracy		Implementation time
	* Main winner	Lowest cost	Performance/cost	Product Features (Innovation)		Solutions proposal
	Portfolio	Small	Medium	Large	Large	Whatever
	Price	Lowest	Competitive			No matter
<b>Supply Chain Profile</b>	* Supply Chain	Efficiency	Collaborative Relationships	Agile to unpredictable demand	Postponement	Flexible to unpredictable events
	Service	Transactional oriented	Information sharing for improvement	Information sharing for fulfill demand	Order accuracy for customization	No sharing information
	Product	Lowest cost at standard performance		Quick Manufacturability	Postponement	Customization
	Production	High utilization rate		Short set-up times / extra-capacity	Extra capacity after divergence point	Assets flexibility / Pooling
	Sourcing	Low total cost supplier	Collaborative Relationships	Agile response		Agile response / Risk management
	* OPP	MTF	MTS MTO in some industries	MTO	ATO	Configurable
	* Buffering	Inventory, smallest as possible		Inventory before divergence point / Extra capacity		Inventory pooling / Capacity pooling
	Order size, according to...	Lowest transportation cost	Replenishment needs	Lowest production batch	Customer's needs	Customer's needs
	Order cycle...	Fixed lead time	Regular delivery	Shortest according to queue	Shortest, according to post OPP queue	Flexible
	Partnership	Possible	Required	Not necessary	Not necessary	Improbable
	* Inventory Strategy	High inventory for efficient production	High rotation for low working capital	Internal Pooling	Inventory before divergence point	Internal / External Pooling
	* Personalization	Improbable		Not necessary, but possible		Not necessary, but highly possible
	Product Segments against peers	Low	Low - Medium		High	Undetermined
	* Workload leverage	Smoothed		Medium size Peaks / Valleys	Smoothed before divergente point	Large size Peaks / Valleys
	* Utilization rate	Very High		Medium-High		Low
	Process Flow	Tipically continuous line	Indifferent	No a continuous line	"Assembly" after divergence point	Indifferent
	Batch Size	Largest possible in order to increase production efficiency		small possible for lowest	smallest possible in order to increase delivery speed	
	Production Cycle	Longest possible	Medium - Short possible for increasing responsiveness		Long before OPP Short before OPP	Shortest possible
	* OPP	Desirable MTS		Desirable MTO for exclusive components / materials		
	Order size	According to lowest transportation cost		Smallest possible in order to reduce obsolesce risk		
	Order Cycle	Fixed, looking for lowest transaction cost		Shortest possible in order to increase delivery speed		
	Partnership	It's important		It's possible	Highly possible	Non usual
	Buffering	Inventory / multiple sources of supply	Primary source of supply	Multiple sources of supply		
	Predominant features of the supply chain under analysis					
	Secondary features of the supply chain under analysis					
	* Dominant factors: factors that dominate the definition of prevailing supply chain					
	Gaps		Predominant supply chain model			
	Company Name					

Figure 58, Gap analysis tool, Gaps definition.  
 Source: Own elaboration

#### **14.4 Key question for the Gap Analysis**

Gap analysis is supported by the “reference supply chain generic models”, some practical criteria (presented in section 8.9) and some tips presented in sections 14.4.1 to 14.4.2:

##### **14.4.1 Supply Chain Framework and value proposal**

When supply chain framework and value proposal are misaligned or when product value proposal and service value proposal are misaligned (They have different dominant supply chains), it's important to evaluate if unique value proposal satisfies customer's requirements. In this situation is highly probably that company's market understanding is wrong.

##### **14.4.2 Gap, a competitive advantage or a misalignment that must be fixed?**

In order to define if a gap is a competitive advantage or a misalignment, there are some questions that should be discussed by the team involved in the strategy discussion:

- How is affected the value proposal by the gap?
- If the answer to previous question is positive:
  - Do the customers perceive the gap effects as relevant element of unique value proposal?
- Are there elements of supply chain profile affected by the gap?
- What would happen if gap is solved? (under customers perspective and company's performance perspective).

#### **14.5 Update and deployment**

After gap analysis is done, Map tool (Figure 53) is updated according to team's consensus, and it is used as element for training and deployment purposes, closing the supply chain strategy assessment, map and rethink cycle



Figure 59, Three-step method's cycle  
Source: Own elaboration

*Supply Chain Strategy is a field in evolution, normally so complex and it is the most important contribution of supply chain roadmap, a systematic and analytical approach to understand and rethink supply chain strategy of industrial companies.*

*Supply Chain Roadmap pretends to change the way companies define supply chain strategy, doing easier, simpler the process of understanding and definition of supply chain strategy for everybody at any level and/or function at the organization.*

*A future, the method will be deployed for a massive use by a networking approach using internet, looking for:*

- Update of factors and supply chain generic models based on recommendations of users.*
- Sharing of results / cases using the model.*

***Supply Chain Roadmap changing the way companies define supply chain strategy!!***



## **Acknowledgements**

This project is the result of several years of previous work as a professional in supply chain and as professor of these topics in several universities in Colombia, however, this work would not have been possible without the support of a lot of friends and my family. I like to express my acknowledgements to Sandra, Isabella and Simon, for their love and patience during those long days and endless weekends, without them this work would haven't be possible. To Cristina for her advice, patience and support over many years. In La Sabana University, to Jairo Guzman, for his confidence and support during these years, to Jairo Montoya and Luis Alejandro Rodriguez, for his comments, suggestions and advice for improving this work. In MIT, to Edgar and his team for their invaluable lessons about supply chain. Finally, a special gratitude to Luis and Alex, to allowed me to apply "Supply Chain Roadmap" in their companies and its invaluable feedback.

## Appendix

### A1. Definition of the terms of reference

With the purpose of unifying concepts used throughout the document, the following terms of reference are defined:

- **Supply chain:** The combination of processes, functions, activities, relationships and flows throughout which the products, information and financial transactions move within and among the organizations. (Adapted from **Gattorna 2006**)
- **Supply Chain Strategy:** *Process factors and connections among the processes* Throughout the supply chain, *enhancing and optimizing efforts* to create differentiated value proposals in accordance with the factors that describe the business environment.
- **Supply chain generic models (MGCS, generic chains or generic Supply chains):** A specific approach for administrating the *supply chain*, in which processes, functions, activities, relationships and flows are typified, with the purpose of developing specific functional competencies in the supply chain. Functional competencies and their level of development vary from one generic model to another.
- **Factors of the business environment:** Elements surrounding the supply chain being studied, affecting its design and/or performance.
- **Business strategy:** The deliberate selection of a set of different activities for providing a unique combination of value (**Porter 1980**).
- **Generic business strategy:** Specific approach of the *business strategy* that allows the creation of a long-life defendable positioning in order to surpass other organizations in the same industry where one competes. Positioning can be a result of the individual combination or application of: (1) leadership in costs, (2) differentiation, and (3) Segmentation. (Adapted from **Porter 1980**)
- **Environment-Profile Matrix:** The combination of *Supply chain framework factors* and *the supply chain profile*, where the optimal performance of a specific *supply chain generic model* is achieved.
- **Alignment matrix:** Analysis of the environment-profile of a specific supply chain, with the purpose of discovering the gaps with respect to its performance potential.
- **Supply chain profile:** A set of variables that define a business's supply chain strategy.
- **Supply chain environment:** A set of supply chain framework factors that affect the design and /or performance of a business's supply chain.

## **A2. References**

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