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Final Year Internship

How can the Supply Chain help reach the needs of the customers, meeting the requirements of the shareholders?

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Final Year Internship references

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This internship at Citwell has been a great stepping stone to launch my career. I will now keep working to improve the skills and knowledge I have recently learned as it is a great base that will help me reach my future career objectives.

Résumé du rapport :

Ce rapport présente mon stage chez Citwell Consulting. Citwell est une société de conseil en management spécialisée dans la Supply Chain qui aide ses clients de nombreux secteurs à transformer leurs organisations, processus et systèmes d'information.

La mission sur laquelle je suis intervenue consiste en une gestion du changement à grande échelle d'une entreprise du secteur industriel de l'abrasif en acier. Cette entreprise vise à restructurer sa Supply Chain pour améliorer la satisfaction de ses clients et en même temps satisfaire les actionnaires, qui mettent la pression pour améliorer ventes et bénéfices.

Ce rapport vise à répondre, à travers l'illustration du développement de la mission, à la question de savoir comment la Supply Chain peut aider à atteindre les besoins des clients tout en répondant aux besoins des actionnaires. Pour répondre à cette question, ce rapport est structuré en deux parties.

Le but du premier axe est d'expliquer comment répondre aux besoins du client. Tout d'abord, l'indicateur de l'OTIF est étudié pour mesurer la satisfaction actuelle du client. L'OTIF met en lumière la nécessité de segmenter le marché en fonction du client et de proposer une offre différenciée pour chaque segment de clientèle. Pour décider quels services offrir à chaque segment, la promesse actuelle du client est étudiée, en interne au moyen des entretiens et de données, et les besoins du client sont recueillis au moyen d'entretiens et de questionnaires. Enfin, une nouvelle offre client est construite, associant différents services aux différents segments.

L'objectif du deuxième axe est d'illustrer comment améliorer la Supply Chain pour la rendre plus compétitive et au même temps la réaligner par rapport à l'offre client. Cette deuxième partie aborde, au travers d'analyses quantitatives et d'entretiens, le diagnostic de la Supply Chain. Il aborde les différents axes de la Supply Chain, tant au niveau de la production (S&OP, Planning and Scheduling, point de découplage), de la distribution (DRP et objectifs du stock) que des ventes (Forecast, Order Entry). Pour chaque sous-projet, les points forts des améliorations sont mis en évidence et la stratégie de transformation future est définie. A la fin, les nombreux sous-projets sont rassemblés dans une feuille de route, en les coordonnant pour que les délais, les approches, les ressources et les périmètres soient respectés.

La dernière partie de ce rapport explique comment le projet global a été géré afin d'aligner les orientations des différents individus, en mettant en place une méthodologie et un calendrier clairs, et en réalisant des réunions et des ateliers de travail réguliers.

Mots-clés :

Conseil ; Supply Chain ; Promesse du client ; OTIF ; Diagnostic de la chaîne d'approvisionnement ; Prévision à S&OP ; Planification et ordonnancement ; Entrée de commandes ; DRP ; Stock ; Conception de réseaux logistiques ; Feuille de route

Abstract:

This report presents the internship I carried out at Citwell Consulting. Citwell is a management consulting company specialized in Supply Chain that assists customers of many sectors in transforming their organizations, processes and information systems.

The mission I worked on consists of a large-scale change management of a company of the industrial steel-abrasive sector. This company aims at changing its Supply Chain to improve the satisfaction of its customers and at the same time satisfy the shareholders, who put the pressure to meet and beat sales and profit projections.

This report aims at answering, through the illustration of the development of the mission, the question of how the Supply Chain can help reach the needs of the customers and at the same time meet the requirements of the shareholders. To give an answer to this question, this report is structured in two axes.

The purpose of the first axis is to explain how to meet the needs of the customer. First, the OTIF indicator is studied to measure the current satisfaction of the customer. The OTIF brings into light the need to segment the market in a customer-oriented way and to propose a differentiate offers for each customer segment. To decide which services to offer to each segment, the current customer promise is studied internally, through interviews and analysis, and the customer needs are gathered through interviews and questionnaires. Finally, a new customer offer is built, associating different services to the different segments.

The target of the second axis is to illustrate how to improve the Supply Chain to make it more competitive and at the same time to realign it with the customer offer. This second part addresses, through quantitative analysis and interviews, the diagnosis of the Supply Chain. It addresses different axes of the Supply Chain, from both production (Sales & Operation Planning , Planning and Scheduling, Decoupling Point), distribution (Distribution Requirement Planning and Stock objectives) and sales (Forecast, Order Entry). For each sub-project, the findings of improvement are highlighted, and the strategy of its future transformation is defined. At the end, the numerous sub-projects are gathered in a roadmap, coordinating them so that the deadlines, approaches, resources and perimeters are respected.

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The last part of this report explains how the global project has been managed in order to align the directions of the different individuals, setting up a clear methodology and a clear timeline, and conducting continuous meetings and workshops.

Keywords:

Consulting; Supply Chain; Customer promise; OTIF; Diagnosis of the Supply Chain; Forecast to S&OP; Planning and Scheduling; Order Entry; DRP; Stock; Logistic Network Design; Roadmap

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Introduction

The final year internship is the last stage of my second year of Master of Industrial Engineering at the Polytechnic University of Catalonia in Barcelona, and at the same time is the last stage of my one-year exchange program in the Ecole Centrale of Lyon. The project consists of a 6-month internship that allows the student to apply the skills acquired during those years of education and at the same time learn much more about them. I have done my internship at Citwell Consulting, a consulting firm specialized in Supply Chain.

Why did I choose to realize the internship in consulting? For the variety of missions that are proposed. The fact of being constantly with new customers, new organizations and new issues is really stimulating for a young engineer. Moreover, dealing with changing companies, with different work environments and challenging yourself with customer relations is clearly dynamic and motivating. In addition, the fact of working as a team to achieve a common goal is really interesting, and it gives the young engineer the possibility to learn a lot from the others.
Why did I choose a company whose heart business is the Supply Chain? Because it is a transversal subject that cuts across many fields and interrelate them. My master back in Barcelona is specialized in management, so I also wanted to give continuity to the topic of the master and be able to see its impact in the real life.
Why did I choose Citwell? First of all because it is a consulting firm specialized in Supply Chain, in full growth and whose values correspond to mines. The human scale and familiar character that defines the company made me choose it, because this size allows to gain in autonomy while being supervised by experienced managers.

The objective of this internship was to discover the daily life of a consultant and the different projects he can carry out, an objective I have been able to achieve during my internship, working in a main mission but at the same time realizing other smaller missions of a variety of subjects.

This report presents the main mission in which I have been collaborating on, a mission in a big company of the industrial steel-based abrasive sector, named, from now on, *Company X*.
At first, this report contains a presentation of Citwell and a presentation of the *Company X*, including the context and objectives of the mission. The main objective is to improve the satisfaction of its customers while satisfying the need of the shareholders. So, a question is thrown in the air: How can the Supply Chain help reach the needs of the customers while meeting the requirements of the shareholders?
The second part of the report focalizes in the first part of the question: reach the needs of the customer. It explains, through the example of the *Company X*, how to measure the satisfaction of the customer and how to build a customer-oriented service offer in order to satisfy the different needs of the different customers.
The third section is centered on the second part of the question: meet the needs of the shareholders, who would look for efficiency, less inventory and logistic costs and at the end: more profit. So, this section illustrates how to improve the Supply Chain to make it more efficient and simultaneously realign it with the customer offer.
The fourth and last part of the project explains how to manage a complete project in order to align the directions of the different individuals, different departments and different countries.
So, this report contains the methodologies followed, explains part of the analysis done and highlights some of the more important findings and recommendations done during the mission.

This report explains the work done by all the team I worked with (a manager and a senior consultant), so as to have the general view of the project and understand its problem and solutions. Nevertheless, the parts in which I collaborated the most, are explained in a more detailed way.

1 Presentation

1.1 Presentation of Citwell

Citwell is the company where I have done my 6 months of internship. It is a management consulting company founded in 2005 specialized in Supply Chain, Operations, Customer services and Change management. His mission is to speed-up business transformation, supporting his customers in France and abroad. Until now, the company has accompanied around 200 customers on more than 500 projects, dealing with a different range of topics such as the optimization of their production, the management of logistic flows, the reduction of stocks and the improvement of the information system.
To successfully conduct their projects, they operate in all the departments involved in the Supply Chain process like product marketing, production, finances, sales, procurement, human resources and information systems. Nowadays, Citwell employs nearly 40 people distributed in 5 offices, the offices of Paris and Lyon being the largest ones. The company has an annual turnover of 5 M€ and keeps on growing.

As for the values, Citwell is based on four principles:

- **Confidence creator**: They work daily to build a quality relationship with their customers, based on transparency of exchanges, respect for their interlocutors and independence on solution selection.
- **Performance driver:** Guided by the achievement of rapid benefits, their actions are reinforced by personalized change support to entrench the results in long term and encourage the mobilization of all stakeholders.
- **Innovations catalyst**: At the forefront of trends in Supply Chain Management, their consultants are trained in the latest methods and tools to ensure a sharp support from the diagnosis to the implementation of the projects.
- **Knowledge distributor**: Knowledge sharing is one of the key principles of the board vision. They bring good practices within organizations, through tools, know-how and soft skills.

Following these principles, Citwell has distinguished in the French market as a player whose approach is centered on the collaboration, the membership and the sustainability of the changes made with its customers; which means that the company insists on the importance of integrating his customers in the implementation of their projects to build together and to facilitate the consumer's later appropriation of the project. Citwell's added value is outlined in the next figure:

Figure 1: Citwell added value

The main areas of competences of the company can be arranged in the following four groups:

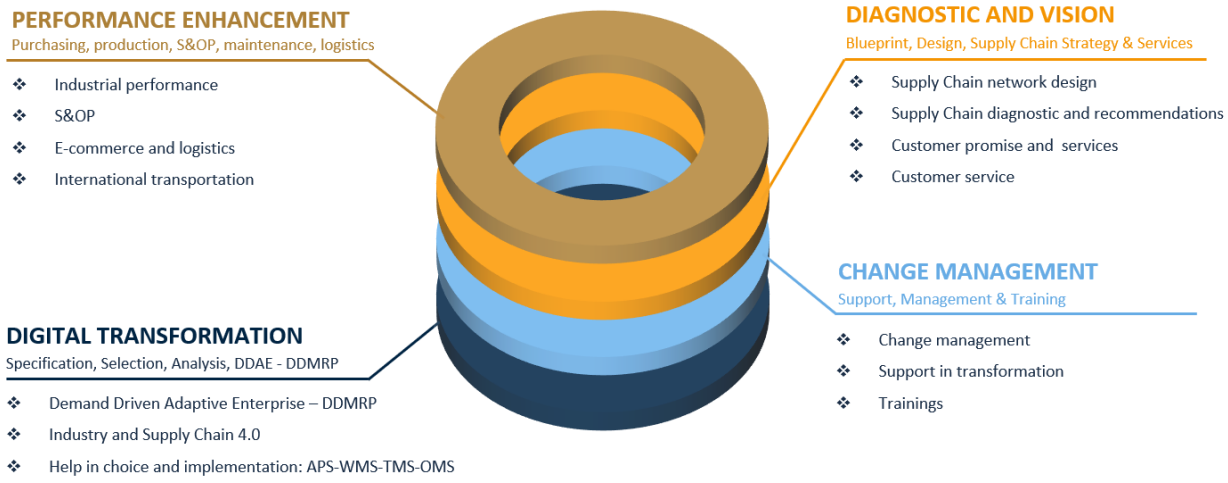

Figure 2: Citwell areas of competences

The Citwell team area of expertise in 9 main sectors, which are: aeronautics and defense, industry, luxury industry, fast moving consumer goods, food, pharmaceutical and chemistry, automotive and equipment, transport and services and retail and distribution. Some of their customers are listed below:

Figure 3: Citwell customers

As for the organization, in Citwell there are different levels: junior consultant (from 0 to 5 years of experience), senior consultant (from 5 to 10 years of experience) and manager (more than 10 years of experience). Citwell involves in its missions a manager, to guarantee deliverables of quality and high added value.
The missions are carried out at different levels, both at the operational and strategic levels. This allows the company to be efficient on both sides: it offers solutions that manage to combine the search for operational productivity with a long-term strategic vision.

1.2 My participation in Citwell

During the first days of my internship I did an integration into the company to discover Citwell's working methods as well as some of the many tools used during the various missions. Throughout the following days they introduced me to the mission in which I have been working during a large part of my internship, until the end of July. It is a mission developed in a company of the industrial steel-based abrasive sector, the *Company X*. This is the mission this report is about.
The mission had started 6 months before my arrival in Citwell. So, when I arrived, I joined the team of the two Citwell consultants (a senior consultant and a manager) who were in charge of this mission.
At the beginning I spent some time to understand the context of the mission and the work that had already been done. Then I started working with the two Citwell consultants in a collaborative way. This report contains not only what I have actively done, but what all the group has done. This way it is possible to understand which the problem is, and which are the proposed solutions.

1.3 Presentation of the Company X

It is necessary to know which the working field of the customer of the mission is, in order to understand the context.
The *Company X* manufactures and distributes steel abrasives to industries all around the world for cleaning operations, preparing surfaces, shots peening and cutting granite. Their customers are mainly industrial firms (automotive, foundries, stainless steel industries, oil and gas industries and granite cutting) and some of the customers are distributors.
As for the company's size, it has about 1050 employees, they did 342 M€ on sales in 2014 and their number of customers is approximately 10000, representing more than 40% of the global market share.

In Europe they have three plants located in Spain, Slovenia and France, being this last one the biggest one. Every factory produces standard shots and grits from different mother sizes. In France they usually produce big quantities and, in the others, smaller quantities.
The final product is obtained using scrap as a raw material. This scrap is subjected to a sequence of different processes: atomizing, quenching, screening and heat treatment to obtain shots and grits of different sizes and harnesses.

Figure 4: Shots and grits

Then the final product is packaged. Once the product is packaged, it is sent to the customer. From the factory, it can go directly to the customer or it can also be sent to a subsidiary or to a warehouse inside or outside the country, to be then stocked or sent to the customer.

1.4 Context of the mission

The activity of the *Company X* is concentrated in Europe, so the company wants to maintain his growth in Europe by optimizing practices and finding new development leads. Although the company has already launched a Supply Chain excellence program to support his strategy, there are still new levers to perform. So, this project consists of a large-scale change management, which will impact the whole of the company, focusing on the European market.
The *Company X* launched this project because they wanted to reach the needs of their customers and at the same time meet the financial needs of the shareholders, who put the pressure to meet sales and profit projections. To do this project the *Company X* asked Citwell for assistance.

1.5 Question: How can the Supply Chain help to reach the objectives?

After knowing the context of the mission, there is an important question to be addressed: How can the Supply Chain (the heart of the business of Citwell) help to reach the needs of the customers, meeting, at the same time, the requirements of the shareholders?
To give an answer to this question, first of all it is necessary to clarify what the Supply Chain is.

1.5.1 A Supply Chain definition

The Supply Chain is defined as the management of flows, both physical and information, involved in moving the product or service from supplier to customer. So it includes the entire network of entities that directly or indirectly are interlinked and interdependent in delivering to the customer. It encompasses the vendors that supply raw material, the production that convert the material into products, the warehouses that store and the distribution who delivers the product [1]. The used products may re-enter the supply chain at any point where residual value is recyclable. It also includes coordination and collaboration between all the actors.
Below is a diagram of the Supply Chain perimeter.

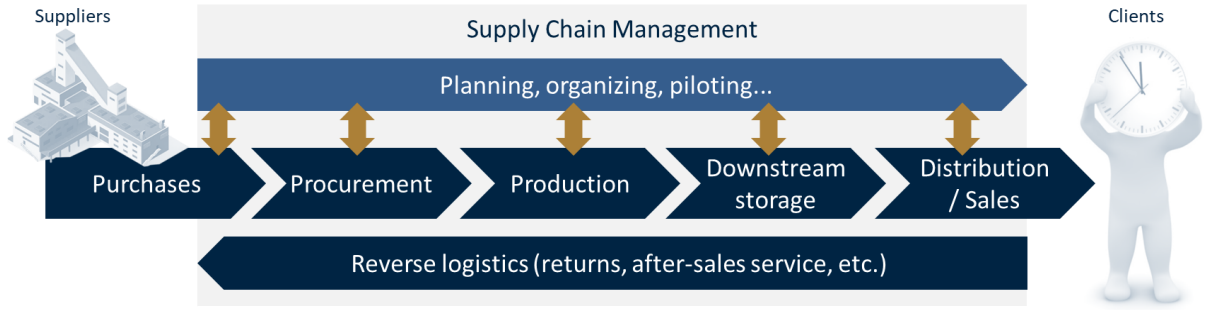

Figure 5: Supply Chain perimeter

For most of us, when thinking about Supply Chain, the image that comes to our minds is the image of an industry. One example could be the production of jam: all starts with the purchase of the fruits and the procurement of them, then the fruits arrive to the production process where the sugar is added, the pasteurization of fruits is done, and the jam is produced and filled into jars. After this, the jars are stocked in the plant, then in the supermarket and they finally arrive to the customer. The Supply Chain covers all this process.

Figure 6: The process of the production of jam

Another more exotic example could be the production of a movie: all starts with the casting of the actors and the purchase of materials. When all is ready to start, the filming is done, which

correspond to the production. Then the film can be stocked in a shop, or in the internet and finally it is distributed to the customer, who can be a single person, a cinema, etc. The Supply Chain is in charge of the management of all flows within this process.

Figure 7: The process of producing a movie

In the case of the *Company X*, the scrap is the raw material that is purchased. The production of the grits and shots is done by a process of atomizing, quenching, screening and heat treatment, from which shots and grits of different sizes and hardness's are obtained. Then the product is stored next to the plants and distributed directly to the customer or to a warehouse, where it is stocked before being sent to the customer. The Supply Chain covers all the entire process.

Figure 8: The process of the *Company X*

At the end, as it has been seen in the examples, the Supply Chain is present in almost all the processes, coordinating the processes from the supplier to the customer.

1.5.2 Definition of 2 axes for Supply Chain improvement

After understanding what the Supply Chain is, we can detect two axes to be addressed in order to give an answer to the question presented before, which was: How can the Supply help to reach the needs of the customers, meeting, at the same time, the requirements of the shareholders?

The first axis is focused on the customers in order to meet their needs and build loyalty.
In this axis, the first step is to set a measure of customers' satisfaction to know their current level of satisfaction, and also to be able to evaluate it constantly and improve it.
To know the list of services that can be offered to the customer two elements should be matched: on the one hand the actual promise the *Company X* is offering and on the other the services the customers want (known through interviews, study of the competitors and benchmark). With those two elements we can find the equilibrium between the capacities of the company and the willing of his customers.

We will see that not all the customers have the same needs and not all the services can be offered to everyone, so it is appropriate to implement a market segmentation to decide which services to offer to each group of customers in order to meet their different behaviors and their different needs.

The second axis to give an answer to the question consists on making the company more competitive by optimizing their processes. By the optimization of their processes it is possible to increase the satisfaction of the customers, by realigning it with the customer offer, and at the same time meet the requirements of the shareholders. To be able to optimize, first it is necessary to analyze the current process to find the most important points to focus on and study how to improve them. Then it is important to determine the action plans that are necessary in order to improve the processes. At the end, the different sub-projects should be gathered in a roadmap, in order to coordinate them so that the deadlines and perimeters are respected. The ROI should also be calculated, to see if the project is meeting the requirements of the shareholders and is thus generating a profit for the company.

There is a topic that embraces those two axes: the alignment of the directions of the different departments and people involved in the change. To make it possible, it is mandatory that everyone moves towards the same common objective and sees that the change is possible.

Those three topics are going to be addressed over the course of the report.

2 First axis for Supply Chain improvement: Meet the customer's needs

2.1 Measure the satisfaction of the customer, OTIF

To know if a company is meeting their customer's needs it is necessary to have a way to measure their satisfaction. A good indicator for this is the OTIF, acronym for On Time In Full.

The OTIF is an indicator that measures the supplier ability to get the order right the first time, which means to deliver the expected product, in the quantity ordered, at the correct place and at the time expected by the customer.
In this environment, controlling costs is crucial, and price is primordial, but service level remains always the order winner, and getting what the customers want when they need remains the service gold standard.

The **importance of OTIF** [2] resides in different axes. The fact of getting it right the first time improves service and lower costs, which is extremely important for the company. Moreover, the OTIF acts as a whole organizational metric: it is much more than a delivery service record; it measures the ability and the performance of the whole organization (sales order, manufacturing, receiving, picking, loading, delivery, invoicing…).
In addition, and perhaps even more important, it helps to identify the root causes of failures. Answering the question of why the OTIF failed shows the true value of the indicator, helping to identify if it was due to a vendor issue (late shipments, partial shipments or wrong items sent), a customer issue (wrong delivery information provided by the customer, last-minute changes) or internal issue (sales order entry mistakes, inventory out-of-stocks, manufacturing error). Identifying the root causes allows to focus on what matters most right now, so that the company can work to address and fix the problem, step by step, permanently, doing a continuous improvement.

As for the measurement, **OTIF can be measured** in different ways, but what is crucial is that the whole company must have a uniform way to measure it.

To measure if the order was On Time (OT), it is necessary to compare the date the customer receives the product (delivery date) to another date. This other date can be either the date desired for the customer or the date promised by the company. Let's say one product was desired for the *day X* but the company detected he would not be able to deliver it the *day X* and promises to deliver it the *day X + Y*. So, we can use the *day X* or the *day X+Y* and compare it to the real delivery date. Usually it is better to use the date promised by the company, because what is important is to measure if the company can do what he said he would when he said he would. This shows that the company is reliable so that their customers can count on them. Consequently, the more credible the company becomes, the less anxious the customers are and the more realistic their orders become. Meaning that maybe before, as they were not sure of having the product on time, they asked for it some weeks before they needed, or they asked for more quantity than needed.

The second part of the indicator is In Full (IF) which measures order accuracy. It is important to determine how to measure it: according to the quantity of the product, to the reference of the product or to the entire order. To better understand this, an example is shown as following.
Imagine that there are 2 customers, A and B, who set an order, composed from one to three different articles (x,y,z). We supposed that they are delivered On Time. The quantities of the orders are shown below:

Customer	Article	Quantity ordered	Quantity delivered
A	x	100 T	95 T
	y	5 T	5 T
	z	5 T	5 T
B	z	10 T	10 T

Figure 9: Example to calculate OTIF

If the OTIF is measured according to the quantity of the product, we would say it is 96% (there were delivered 115 T out of 120 T). If instead we measure it by line, we would agree with an OTIF of 75 % (3 lines out of 4 are correct). If we measure it by product we would say the OTIF is 33% (only the product z is delivered in the quantity desired). To know the best way to measure OTIF, it is important to decide what does really matters to the customer. Did the customer A get what he really wanted? No. Did the customer B get what he really wanted? Yes. So, the OTIF should be 50%, showing that only the 50% of the customers got what they wanted. The first customer got 105 T out of 110 T, so he did not get what he wanted.

Then every company can decide if they want to measure different OTIF, for example an internal one and an external one. Decide if they want to set up a tolerance, meaning that delivering X days after/ before is accepted; or if they want to calculate an OTIF for categories or for families of products.

2.1.1 OTIF situation of the *Company* X: an OTIF lower than expected

Current situation and problem detected: OTIF lower than thought

At the beginning of the mission, the *Company X* said they had an OTIF of **95%**, and they wanted to improve it to reach **98%**.

After a diagnosis of the situation, it was seen that the parameters of calculation were not the correct ones, they were not representing the whole organization.

They were measuring the OTIF at week level, instead of a day level, meaning that if the customer received the product the same week he asked for it, the delivery was On Time, when maybe it was some days late. Moreover, they were measuring the delivery date at the shipping date, without considering the time the order was in the truck, so possible the customer was receiving it later than expected. On top, there was no rigorous methodology to calculate the OTIF, so there was no homogeneity within the subsidiaries.

Their database was studied, and it was obtained that their OTIF as the estimated delivery date with 2 days of tolerance (the tolerance that is used in most of the companies) was of **50%**, much different than what they expected.

In the end, two big problems were detected: they were having problems in meeting their customers' needs (OTIF of 50%) and they did not have a homogeneous and rigorous way to calculate the OTIF.

Solution and action plans: market segmentation and rigorous method of calculation

To give a solution to the first point: problems in meeting their customer's needs; the market segmentation was studied (this topic will be addressed in the point 2.2).
The second problem: lack of a rigorous way to calculate OTIF; was addressed in a workshop in which the sales assistants of different subsidiaries took part. The workshop was about the whole order entry process. We addressed the topic of the OTIF with an exercise and we made all the participants calculate the OTIF. Many different answers were obtained, and we could see that everyone had his own way to calculate it. After that, the concept was explained, and it was commonly decided a consistent and uniform way to calculate it. It was decided to calculate the OTIF at order level, so the order is only going to be In Full if all the products are delivered in the quantity asked. As for the On Time, it was decided to calculate it at the delivery date instead of the shipping date.

After the workshop, some action plans were pointed out, as for example set a measure to record the delivery date of the products (dispatch date + standard delivery time), to be able to calculate the On Time.

2.2 Group the customers, segment the market

As seen before, the OTIF of the *Company X* showed there was a problem in meeting the customers' needs. That is why we studied the possibility of a market segmentation.

Market segmentation is the activity of dividing the customers into sub-groups based on some type of shared characteristics. There are many ways to group customers: it can be regarding their buying patterns (how they place orders, their size of the orders), their behavior (loyalty and attitude to risk), their location (town, regions and countries), etc.

If there is no market segmentation or if the segmentation is not customer oriented, there is the danger of trying to treat all the customers the same way, trying to serve all of them giving them the same service level. When, in fact, not all of them require the same level of service: not all the customers will expect the same lead time, the same extra services, the same product quality, not even the same price. Probably some of them will agree to receive the product later as long as they are aware of the precise delivery date, or some of them will give green light to have less quality if that means a lower price.

However, the fact of segmenting the customers into groups according to their behavior and level of maturity has several advantages:[3] it allows to improve service to better meet the customer's expectation, it helps to identify the most and least profitable customers so that the company can focus on the customers who will be most likely to buy and can build loyal relationships with them. This can consequently increase customer's satisfaction and reduce costs and wasted

efforts. Moreover, it can help to create a distinct competitive advantage getting ahead of the competitors in specific parts of the market.

A Harvard Business Reference [4] indicates that most industrial marketers use segmentation as a way to explain results rather than as a way to plan. When, in fact, industrial segmentation can assist companies in several areas as analysis of the market, the selection of key markets and the management of marketing.

2.2.1 The situation of the market segmentation of the *Company X*, the study of a customer-oriented segmentation

Current situation and problem detected: Segmentation by sector and activity

In the case of the *Company X*, the current customer segmentation was done by sector and activity. So for the sector they had industry (all the products used for industry) and granite (a separated and more specific market). And for activity, they separated the customers depending on the final use of the product: preparing, cleaning, peening or cutting surfaces. So, they were not looking to the behavior of each customer. And maybe some clients of different sectors or different activities had the same needs and behaviors, so should be treated the same way.

Solution and action plans: Customer-oriented segmentation

To do a segmentation customer-oriented first of all we saw that the *Company X* had four different types of customers: industry (all the industries that use the product for themselves) , distribution (they act as an intermediate, they buy and sell the products that the *Company X* creates), granite (it includes a separated market, especially located in Spain) and export (all the customers located outside Europe).

For the **industry** it was necessary to create categories to determine different customer's behaviors through the analysis of the database. Firstly, it was important to choose the parameters to segment the customers. We did this through workshops with people from different departments and different countries. The chosen parameters where the following:

- Frequency: The customers who order often should not be treated the same way as those who order once or twice a year.
- Volume: It is important to differentiate the customers who order big volumes and the ones who order small volumes, they do not have the same importance for the company.
- Corrected price: It is the margin per ton of each customer, so the profit the company gets.
- Turnover: The money the company gets from each customer for a whole year. So the customers who generate a high profit for the Company should have more advantages.

Following those parameters, a total of four categories were identified:

PREMIUM CUSTOMERS: Those are the strategic customers, the ones that generates the biggest profit. They are medium to big customers which order high quantities of products and will likely buy premium products. They are the ones that require the best service level and the highest possible flexibility.

TURTLES: They are medium to big customers which are mature in terms of Supply Chain. They frequently order big volumes, so they can provide visibility.

RABBITS: They are small to medium customers which have less Supply Chain maturity. When they order they want the product as soon as possible, and if they don't have it they will order to another supplier.

PRICE: Those customers are too volatile to allow negotiation. They will always look for the cheapest product, without showing any special interest to the service level. They do not generate a lot of profit for the company, so they have a lower strategic interest to invest energy.

A matrix with the chosen criteria can clearly classify the customers: the premium are the ones who generate the highest turnover; the price ones are the ones with the lowest profit per ton; and in between, the rabbits differ from the turtles because they ask for a lower volume.
These criteria allowed to do a first classification of all the customers of the different countries. Then a revision by the people in charge of the commercial service was needed in order to do some readjustments of the model for each country. An example of a matrix is shown below:

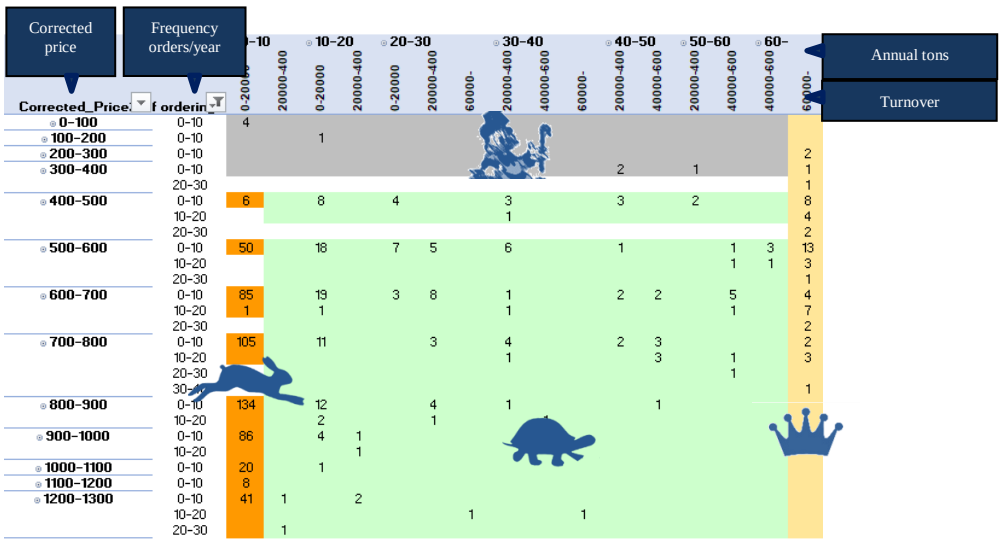

Figure 10: Market segmentation of the Company X for France. It is shown the number of customers for each match of criteria

The **distribution** customers were easier to segment. The market segmentation of the distribution was also done in the workshop, and the categories were:

TRADERS: Distributors who are likely to sell competitors' products as well, they have no loyalty to the *Company X*.

CUSTOMERS: Distributors who have the same behavior as rabbits.

DISTRIBUTORS: They are the preferred distributors, they act as a subsidiary, they have loyalty to the brand.

For the distribution, this segmentation was enough. And for granite and export there was no need of a more detailed market segmentation.

The next step after classifying the customers is to study the list of services that the *Company X* can provide and to assign the offer of services to the different segments.

2.3 Services that can be offered to the customer

In this section I will present a general list of the services that can be offered to the customer. As all the services have a cost, there must be a way to choose which services to offer. First, it is necessary to do a diagnosis of the current situation, then to analyze the needs of the customers and with these both ingredients chose which services to involve in a mission. Then, as we cannot offer all the services to all the customers, we must study the possibility to do different levels of offer.

2.3.1 Standard catalogue of services

Here below there is a standard catalogue of services that Citwell has gather, as services that can be offered to the customer.

Figure 11: Standard catalogue of services of Citwell

The list of services can be grouped in six groups:

- **Delivery lead time and service level:** all the services that are related to the delivery: Cut-off, fixed days of delivery, night delivery, specific hour delivery or express delivery.
- **Management of the order:** considering all the services related in how to treat the order: order status tracking or EDI.
- **Stock management:** encompasses the different levels of stock policies: reserved stock, co-VMI, VMI or consigned stock.
- **Product properties and packaging:** all the services that include the different needs of product properties the customer could have: specific labelling, specific packaging, specific shelf-life, same batch delivery, temperature traceability, RFID, technical certificates, technical training, packaging or pallets return.

- **Information and additional services:** refers to the different levels of communication the customer wants to receive and the extra services: email, fax, phone, alerts in case of issue, order acknowledgment, online ordering, standing orders, online delivery notice, active call, dash button or dedicated customer contact.
- **Logistic operations:** all the services related to the transport logistics: minimum order quantity, full truck load and less than one truck load, exworks, geo-tracking or special unloading equipment.

2.3.2 Work needed to choose the services to offer: Diagnosis of the customer promise & gather the needs of the customers

The Supply Chain can be arranged to answer to all the services shown before, however, offering all the services can be really expensive for a company. That is why it is mandatory to find a way to know which services to offer. First of all, it is important to do a diagnosis of the current offer to study the situation of the company and at the same time study the real need of the customer.

2.3.2.1 How to do a diagnosis of the customer promise

After seeing the catalogue of services, it is important to study the actual promise of the company.
This analysis was started by studying the services they offer nowadays. Then a matrix of strengths and weaknesses was done, to analyze for each topic which are the points they already do well, and which are the points that should be improved. We did another interesting grid, the maturity grid, that is used for business or organizations as a benchmark to know how mature their processes are, and how well they are embedded in their culture. Doing analysis of this type is a good way to better understand a business and its markets.

2.3.2.1.1 Which is the diagnosis of the customer promise of the *Company X*

We did a diagnosis to analyze which services were already a standard promise and which were not standard. We saw that a lot of services of the catalogue are not standard, such as the OTIF, which has been analyzed in a previous point. We detected that the current offer is focused on products and technical services, as technical services are the most standardized ones. As for the transport, the full truck load and the grouping delivery are also standardized. The chart below shows a summary of the current promise:

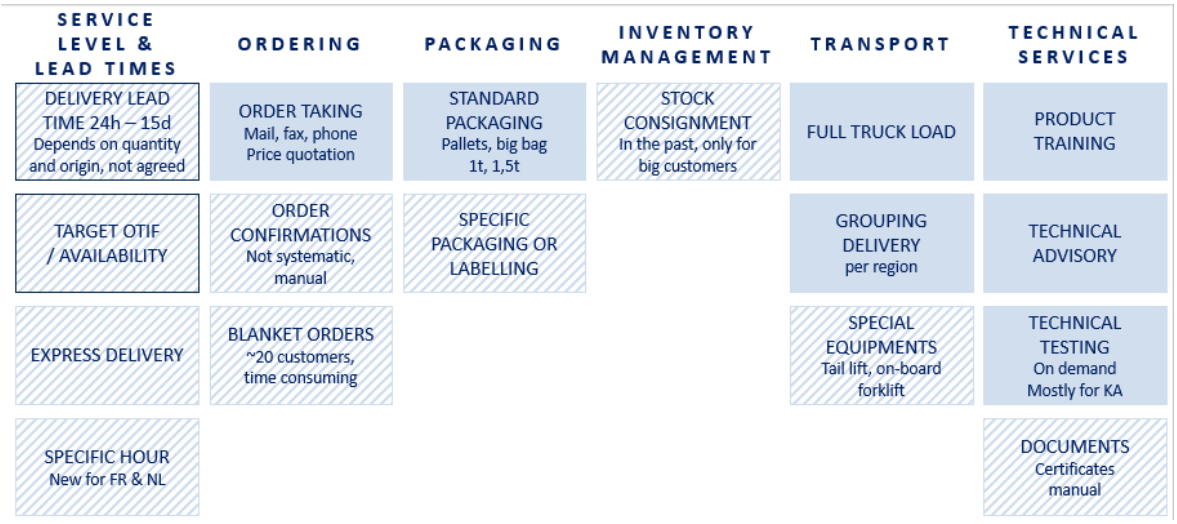

Figure 12: Current customer promise of the *Company X*; the filled boxes correspond to the standard services and the striped boxes to the not standard processes

The next step was to analyze the customer offer detecting the strengths and weaknesses. The biggest strength is their product and technical offer, which is mature regarding the market. On the other hand, there is still a lot to do: there is an important lack of visibility during all the process, from ordering to transportation, and the lead time is not accurate enough. Moreover, the offer is not clearly defined, and it is not communicated. A summary of the strengths and weaknesses analysis is shown as following:

		STRENGTHS	WEAKNESSES
Voice of customer		The SPHINX customer survey provides synthetic additional information	Customer survey was for key accounts only, pre-validated
Offer definition and commitment		Product and technical service offer are very mature for the market and are competitive advantages	**Customer SLAs** are not defined, not communicated
SLA and adherence		Delivery lead times depend on products packaging and quantity	**Internal SLA** are defined but not agreed upon
	Ordering policies	*Sales admin teams anticipate customer orders and place some projected ones in the system*	**Lack of visibility** for internal and external customers **No real prioritization rules** No cut-off for order entry
	Lead times		The SLA is **not accurate enough** to be a real promise (mostly at weekly bucket), and only addressed to internal teams
	Transportation	Freight negotiation centralized and separated from operational teams	**Lack of visibility** in transportation
	Additional services	Flexibility	**Consignment, reservation and blanket orders are just commercial incentives**, but not helping for supply chain and do not provide revenue
Performance measurement		85% of customers are satisfied, according to the field barometer	OTIF is not trusted as it measures the internal performanc

Figure 13: Analysis of strengths and weaknesses of the customer promise of the *Company X*

The maturity grid is a grid that is used to know how mature a process is. The process is classified in a scale from 1 to 4, if the process is at the level 1 it is not mature and if it is at the level 4 it is mature. The maturity grid of the *Company X* reinforces the points seen as weaknesses, showing that there is a huge need to invest time in an offer definition, so that it is not necessary to work on a reactive mode. There is also the need to invest time in the process of order entry, because nowadays there are no rules, no visibility and a lack of internal and external communication. It also shows the recommendation to work on the additional services so that they can provide added value. Here below it is shown the grid of maturity for the customer offer:

	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Voice of customer	No customer survey	Roughly defined, based on sales and marketing feeling	Customer requirements are recorded through regular surveys	Customer requirements are analysed in detail, and innovative solutions are proposed
Offer definition and commitment	The offer does not exist and everyone does his best in a reactive mode	Defined but not shared or applied or incomplete	The offer is defined, shared but not fully applied	The offer is fully shared and applied
SLA and adherence	No SLA or framework	Guidelines are existing, but many mismatches in processes alignment	SLAs are robust but defined in silos and need more integration	The SLAs offer an end-to-end framework for working
Ordering policies	Orders are placed when customer requests, and processed as fast as possible	Standard order processing for most customers, with a minimum level of visibility and rules, but not always shared	Order lifecycle can be followed internally to provide customer information on demand; cut-off on line with MTO/MTS, quantities and lead times	Customer has full visibility on order policies and can choose one ordering method consequently (speed/cost…)
Lead times	Each delivery has its own variable lead time	There is at least a minimum delivery lead time, but cannot be contractual	Quite accurate lead times definition, but some special flows need adaptation	Very accurate and differentiated lead times
Transportation	Uncontrolled freight	SLA framework defined but hardly ever controlled	Standard SLA framework, rather good application	Adapted SLA to fit the customer promise
Additional services	None, or very simple	A simple list of services quite standard but efficient that can differentiate the offer	Additional services adapted with the customer segmentation, providing added value	Very innovative, added-value for customers, cost controlled
Performance measurement	None or untrusted	OTIF at supplier door, rather good performance	OTIF at supplier door, plus delivery lead time estimate, good performance	OTIF at customer door, good performance

Figure 14: Grid of maturity of the customer promise of the *Company X*

2.3.2.2 How to gather the needs of the customers

After knowing all the catalogue of the services and the current offer of the company it is necessary to have a better understanding of the total market, in order to know the customers' expectations and understand what they really want. Field surveys and interviews clarify actual customer's needs. It is also advisable to study the market positioning (leader, follower…) and observe competitive practices in the country and abroad. A benchmark study can also be done in order to exchange feedbacks with companies of different activities that may encounter similar problems. Those practices enrich reflection.

2.3.2.2.1 Which are the needs of the customers of the *Company X*

In the case of the *Company X*, numerous interviews were realized in order to gather customer needs and priorities. A total of 40 customers, both industry and distributors, from 7 different countries were interviewed and 20 other interviews were held with the general manager or the purchasing, the procurement and the Supply Chain. A questionnaire of 32 questions was done, asking questions about the delivery lead time, the means to place an order, the inventory management, the transportation, the packaging and the competition practices.

A summary of the answers of the most important questions is shown below:

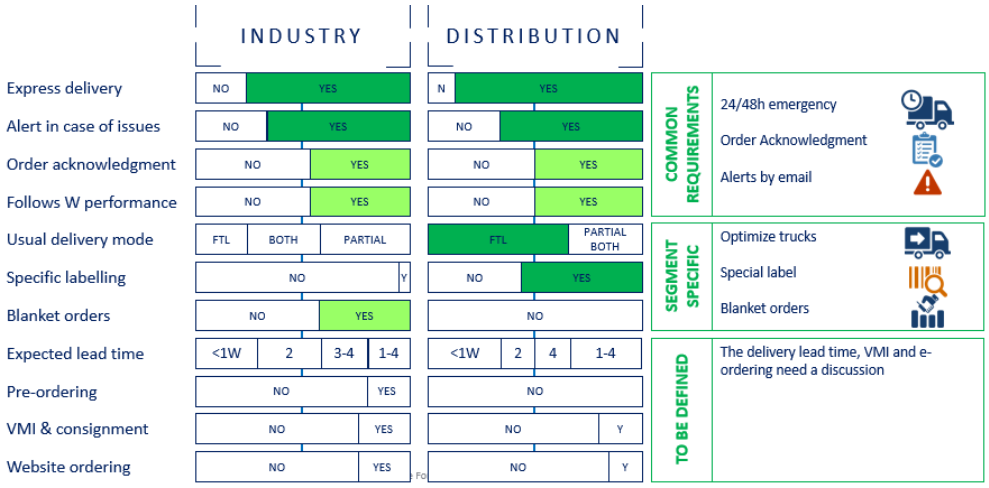

Figure 15: Summary of the answers of the questionnaire done in the *Company X*

The most important remark is that the customer really appreciates to have information (being alerted in case of issue, have order acknowledgment and continuous acknowledgment of the process the product is following). As for the lead time, there are customers who want the product fast, in less than one week, and others who can wait more to have it. However, most of them would appreciate to have express deliveries.
Regarding the truck load, the distributors would prefer an FTL (Full Load Truck)
Finally, the possibility of additional services (blanket orders, VMI and consignment stock, between others) should be studied and defined.

We also did a benchmark and a study of the competition, and some interesting services were detected, principally extra services.

It is interesting to point out that the needs the customers said they have are not always their real needs. Sometimes, they want some services and when they receive them they are not satisfied at all. Although this is a topic that will not be addressed in this project, it is a subject to always have in mind.

2.3.3 Services involved in the mission of the *Company X* from the standard catalogue of services

Once seen both the situation of the current offer and the needs of the customers of the *Company X* we are ready to decide which services are interesting to be offered. In the following figure, in grey are the services the company already applies, mostly related with the technical offer: specific packaging, same batch delivery, technical certificates and technical training. In dark blue we can see the services more related to the distributors.

Among the rest of the services, the most interesting services to be offered to the industry customers (regarding the needs of the customers) are marked and separated into different packs:

- **Communication**: We saw that one of the weaknesses of the *Company X* was the lack of internal and external communication, and the interviews also reveal the customer's

will of having more information. The services in this group are highlighted in red: email/fax/phone, alerts in case of issue, order acknowledgment, online ordering and online delivery notice. [See point 2.3.3.1, pg. 26]

- **Lead time and express shipments**: The lead time is not accurate enough to be a real promise, and the customers do not really know when they are going to receive the products. The services related to this topic are marked in blue: cut-off, fixed days of delivery and express delivery. [See point 2.3.3.2 pg. 27]

- **Stock policies and extra services**: highlighted in orange: reserved stock, co-VMI, VMI, and consigned stock as stock policies, and dash button, active calls and standing orders as other services. Those are extra services that can clearly add value for the customer and nowadays it is just a commercial incentive that does not provide revenue. [See point 2.3.3.3 pg. 28]

Figure 16: Services involved in the mission of the *Company X*: services already applied (grey), distributors services (dark blue), communication services (red), LT and express (blue), stock polices and extra services (orange)

In the following points (2.3.3.X), those three groups are going to be detailed, explaining why they are important and showing this importance through the example of the *Company X*.

2.3.3.1 The importance of the communication

In a company both the external and the internal communication are mandatory. It is clear that an internal communication program can help to improve productivity and employee involvement. Nevertheless, this section focuses on another important communication, the external communication, because it plays a role in customer's satisfaction.
The fact of communicating with the customer can help to gain clarity (transmit the message wanted and avoid ambiguities), can help to reinforce the sale and to stay in touch (let the customer know in which phase of the process his product is and inform of any unexpected delay). It can also serve to have a feedback of the current performance.

2.3.3.1.1 Communication situation of the *Company X*

Current situation and problem detected: Lack of some external information

At the moment there is a lack of external information. When the customer enters an order, there is no systematic order acknowledgment to let the customer know that his order is going to be treated.
Then he is informed of an expected shipping date, but the date is not accurate. After that, he is not informed of any change or not even informed of the step of the process his order is going through.
Up to a point that the *Company X* knows when the product has been shipped but does not know when it is actually arriving to the customer. So he is aware that something has gone wrong when the customer decides to send a message saying his order has not been delivered yet.
There is a clear problem of communication.

Solutions and action plans: Workshop

This situation was treated in the order entry workshop, with sales assistants from the different countries all around Europe.
First of all the different external information levels were presented: order acknowledgment (let the customer know his order has arrived), order confirmation (lead time confirmation), delay information (if there has been a delay, inform of the new lead time), pick pack (the product has been packed, it is going to be delivered soon), shipment information (the product has left the warehouse) and delivery note (proof of delivery).
Then, we drew a time line of all the order entry process and through a brainstorming we decided what and when to communicate with the customer. Among all the levels, it was decided that the most important things to communicate were:

- Order acknowledgment
- Lead time confirmation
- Shipment
- Delivery notice
- If issue, new lead time

As action plans there are still things to be done: it must be better studied the feasibility of this order tracking and the different levels of communication must be validated with the customer. And if it is feasible; it has to be implemented.

2.3.3.2 Lead time and express shipment

The lead time is the duration between the initiation and the execution of a process, in this case is the duration between the placement of an order and its delivery.

2.3.3.2.1 Lead time situation of the *Company X*

Current situation and problem detected: Lead time not standardized

Nowadays the lead time is not standardized, and not homogeneous from one site to another one. A delay of one week is a normal situation, meaning that many customers receive their product one week after the promised date.

As it is possible to see with some of the answers obtained from the customer survey, customers expect more from Supply Chain and confirm some disfunctions with the current system. Some of their complaints were:

- *"Deliver faster"*
- *"Deliveries on X product can take up to 2 weeks from sending order and receiving goods, other companies can supply within 2-3 days"*
- *"Deliveries arrived so late that production almost stopped"*
- *"Even with anticipated orders, order confirmations are only received little time before delivery"*
- *"When placing an order with XX we received partial deliveries as we are told they are waiting for delivery from France, and it seems to be getting worse."*

Solutions and action plans: 4 days LT for rabbits, 14 for other customer segments

To standardize the lead time, it was necessary to segment the time invested from the arrival of an order to the delivery of it. It was done in a workshop, with some members of the *Company X*.

The result was that the time spent depends on the product, if it is MTS (make to stock) or MTO (make to order). A product MTS is much faster, because it can be already in stock, while a product MTO is produced once the customer order is received.

We detected that the rabbits' customers, the ones that want to receive the product fast, normally ask for standard products that are already in stock.

Regarding the needs of each segment of the market segmentation, we determined that the lead time for the rabbits was going to be of 4 days (1 day to treat the order and check its stock availability, 1 day to pick pack and ship, and 2 days to transport it). For the rest of customers, it was agreed a lead time of 14 days, considering the possibility of not having the product on stock.

We studied the possibility of having an express delivery of less than 48 hours (0,5 days to process the order, 0,5 days to pick pack and ship and 1 day to transport it), as it has been seen in the survey that most of the customers wanted the possibility to receive an express service. This can only be possible if those orders are treated in priority and are MTS (already on stock).

The importance to set a lead time is also to be able to communicate with the customer so that he is aware of the day his order is expected to be delivered.

2.3.3.3 What are stock policies and extra services

Both stock policies and extra services are services that can add value to the offer, creating a distinctive advantage.

Stock policies are different ways to manage the customer inventory, there are many different levels of collaboration for customer inventory management:

- The first level is when the customer manages his own inventory, so the supplier anticipates customer needs through forecasts.

- The second level is the reserved stock, in this case the customer is also responsible for his stock replenishment, but the supplier sizes a dedicated reserved inventory to absorb demand variability, so the supplier assumes product availability to the customer.
- The third level is the Co VMI (Co -Vendor Managed Inventory) the customer is still responsible of his stock replenishment, but the supplier has access to the customer inventory level and consumption and propose replenishment orders.
- The forth level is the VMI (Vendor Managed Inventory). In this level the supplier is responsible for the customer stock replenishment, he has access to customer inventory level, forecast and consumption and pushes replenishment orders.
- The fifth and last level is the VMI + Consignment stock, where a consignment stock is added, meaning that the supplier owns the inventory, and it is put next to the customer.

As for the extra services, there are several possible extra services to be offered; three examples are presented: the blanket orders, the active calls and the dash button. These three services can be interesting for customers who order regularly.

A blanket order or standing order is when the customer gives the visibility of the orders he needs (for example if a customer asks for a monthly delivery of an order). This situation can be a win-win relationship between the customer and supplier. On one hand, the supplier has the visibility in advance and on the other hand, the customer receives a better service level. Some advantages to the customer can be given, as for example a longer horizon in which to modify the quantity of the order.

An active call is a service through which the company calls his customers to ask them if they have any new order to place. So, it acts as a reminder for the customer. For the company it helps to plan and at the same time it lowers the number of emergencies and express.

The dash button is a service were the customer can place an order by only doing a click on the button. It sends the order automatically to the company.

2.3.3.3.1 Stock policies and extra services situation of the *Company X*

<u>Current situation and problem detected: problem with reserved stock and blanket orders</u>
As for the stock, nowadays there is a problem in the management of the inventory, because the warehouses of the company have some reserved stock for some customers that they don't necessary use it, but as it is reserved, it cannot be attributed to another customer. This generates a bigger delay to some customers. For the moment, they do not offer neither Co – VMI nor VMI.
As for the blanket orders, nowadays those orders are not treated differently, which means that even though a customer places an order some months before the desired delivery date the order may still delivered late. In other words, he has no advantage in placing the order in advance. The active calls and the dash button are services that the company does not have, but that can be interesting for the future.

<u>Solutions and action plans: VMI, different levels of collaboration</u>
As for the stock policies, the work done has been focused on explaining the advantages of the VMI, also for an internal use in order to control all the stock from one place.

Then we studied the possibility to offer the different levels of collaboration depending on the segment of the customers. [See point 2.4]
Regarding the blanket orders, after explaining the concept, we studied the segment of customers which could be interested on it, in order to propose them this service. On the other hand, the active calls and the dash button, are two services that will be studied in a future step.

2.4 Need to differentiate the levels of service to be offered

In the previous point we saw the current performance of the company and the actual needs of the customers, both useful in order to define the services to offer.

At this point it is important to know that we cannot offer everything to everyone, and that there are some services for which the customers will have to pay an extra cost.

Regarding the previous market segmentation, the aim of this point is to decide which services offer to each segment, knowing that:

Good and fast can't be cheap
Fast and cheap can't be good
Cheap and good can't be fast [5]

So, if someone wants the product as fast as possible and as cheap as possible, he cannot expect a really good level of service. And if someone wants a high service level and not an expensive product, he will probably have to wait more. If he wants it good and fast, he will probably have to pay more.

2.4.1 Levels of services to be offered in the case of the *Company X*

As a reminder, the following figure shows the customer segmentation done before. [See point 2.2.1, pg. 19]

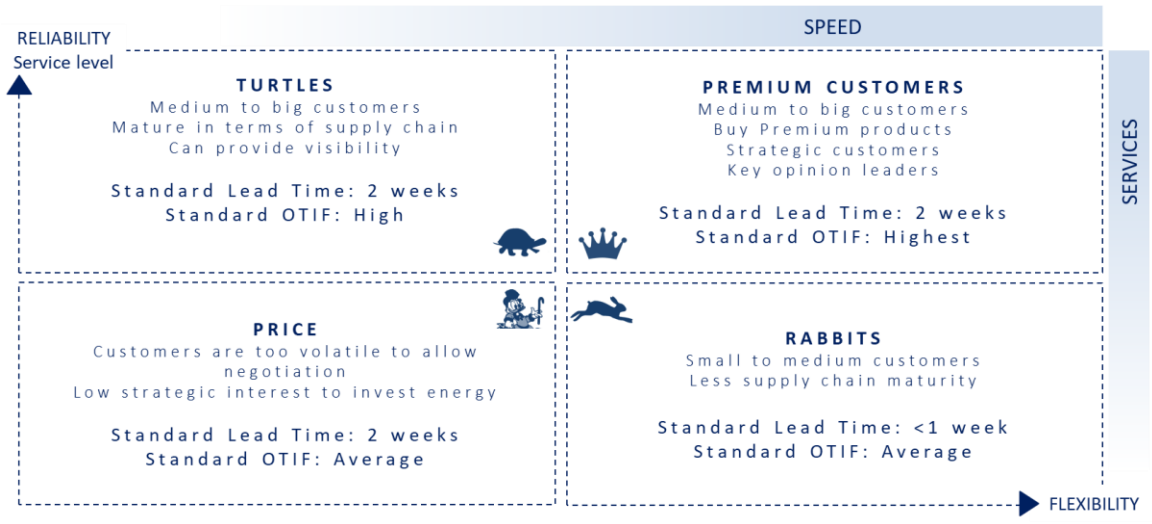

Figure 17: New customer segmentation of the *Company X*

When doing the customer segmentation, all the customers have been sorted following this segmentation. At this point, different contract for each segment can be done, with some services included and some services invoiced.

As for the services, here is a summary of the services for each segment:

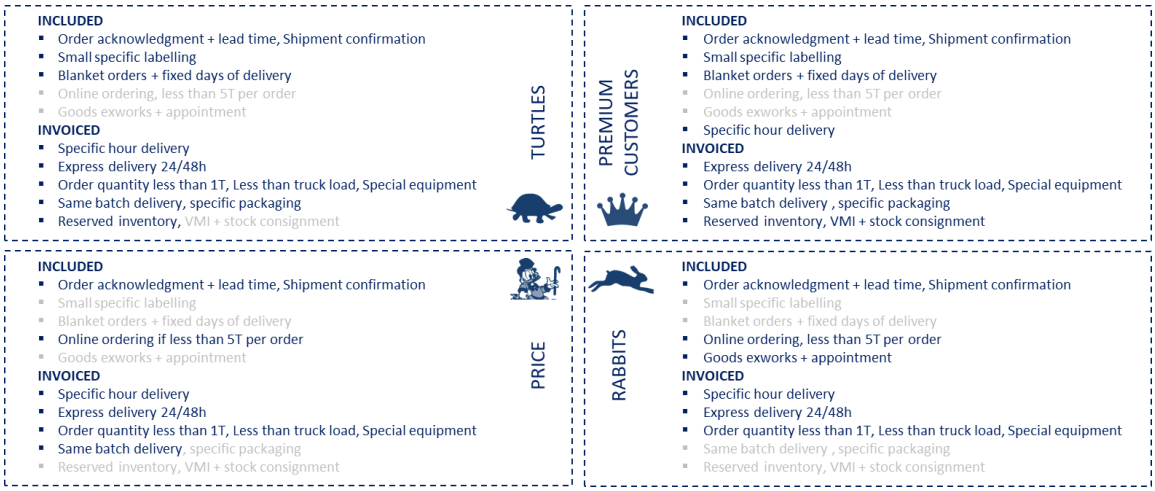

Figure 18: Levels of services to be offered to the different segments of the Company X

The higher commercial effort will be focused on turtles and premium customers, because they are the ones that generate a higher profit for the Company. So they will be given the option to ask for small specific labelling, to set blanket orders and to have specific days of delivery. If they pay an extra cost, they will have the option to choose a specific packaging and to have reserved stock, while rabbits and price customers will not be given these option, because on one hand it is not efficient to focus effort here and on the other hand, rabbits and price customers will not be looking for it. The VMI will be only dedicated to premium customers.

To sum up, premium customers have the best service level, turtles have the services that enable reliability and collaboration, rabbits all the services focused on quick response and price customers have the lowest level of service within the customers.

This segmentation is important not only to know which services to offer to each category, but it is also crucial for the next steps of the project. One example is the prioritization of products: during shortage, the segment of the customer will be consulted in order to decide where to allocate the product (premium customers will have priority compared to turtles; turtles compared to rabbits and rabbits compared to price).
It will also be used when optimizing some processes of the Supply Chain, for example, if a new logistic network design needs to be studied, it is important to know where the different segments of customers are located so that the logistic network can be optimized (both warehouses and transportation) and can be in line with new service offer.

2.5 Conclusion: Meet the customer's needs

As seen, it is mandatory to evolve trying to satisfy the customer. Usually a company cannot give everything to everyone, because if it tries, the result can be to do it but not in a good service level (maybe delivering later than expected, or with lower quality…). Moreover, this can bring to treat all the customers the same way, when, in fact, they may probably have different behaviors. Market segmentation can give an answer to this, segmenting the market to then offer the services depending on the segment of the customer.

There is a large catalogue of services that can be offered to the customer but trying to give all the services can be really expensive and maybe not appropriate. To decide which services to offer, two ingredients are necessary: on one hand the current situation of the company (study which is their differentiating point, what does he already offers, what should he improve…) And on the other hand, the customers' needs and expectations, gathered through interviews.
With this information it is then possible to do a good allocation of the services among the different customers' segments.

On top of that, it is important to set a way to measure the satisfaction of the customers, and OTIF (On Time In Full) is clearly appropriate for this. Moreover, OTIF should be a KPI to measure the evolution of the satisfaction of the customers.

The case of the *Company X*
In the case of the *Company X*, they said they OTIF was of 95%. We calculated it and we figured out it was actually 50%. This showed that the customers were not satisfied so we did a market segmentation customer-oriented in order to separate different behaviors and different needs. We separate the customers in premium (strategic customers), turtles (also strategic, they frequently order big volumes), rabbits (based on quick response) and price (only interested on low price). Then we studied the services which were possible to be offered to the different segments of customers. To do this we studied the current offer and we did interviews to gather the needs of the clients. As a conclusion, we detected the need to invest on communication, on order definition and on additional services to provide added value. So the services were studied and then attributed to the different segments.

3 Second axis for the Supply Chain improvement: How to make the Supply Chain more competitive

This second axis is focused on studying the Supply Chain in order to optimize processes. This optimization has to be in line with the objectives of the project, in order to optimize in the desired direction.

To be able to optimize the Supply Chain, the first step is to perform a full diagnosis of its performance, though interviews and data analysis, in order to provide findings and highlight the opportunities of improvement.

To have a complete diagnosis it is necessary to analyze the full scope of the Supply Chain, going through supply, manufacturing, distribution and sales and studying all strategic, tactical, operations and physical levels. Here is an example of what could be the scope of a Supply Chain analysis:

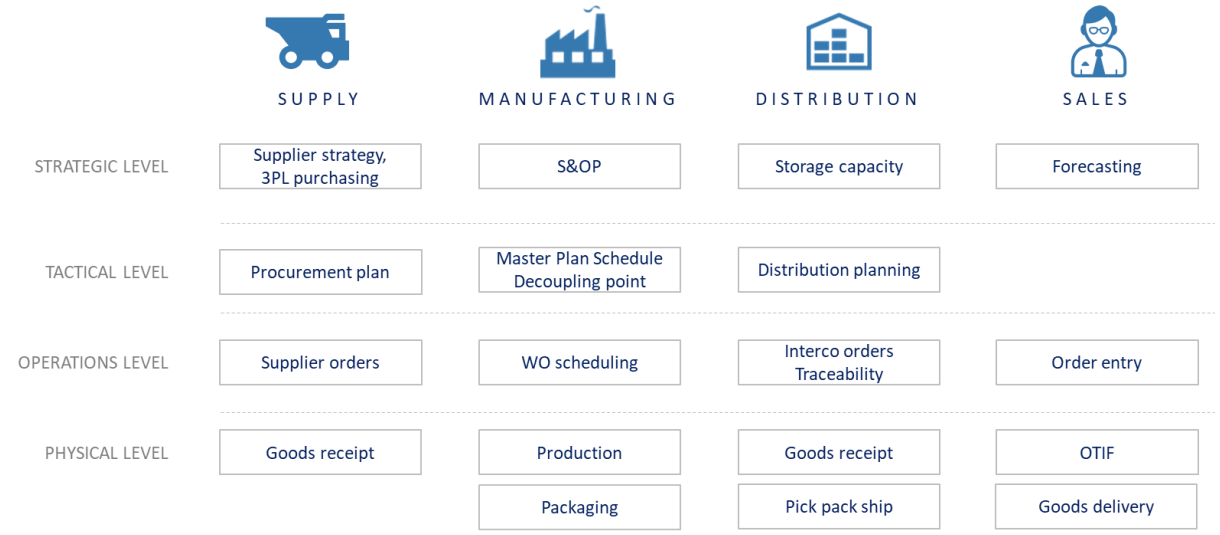

Figure 19: Scope of a Supply Chain analysis

For the Supply, the strategic level comes when deciding the supplier strategy, the tactical level when deciding the procurement plan and the operational level when ordering to the supplier the materials.

As for the manufacturing, the S&OP decides the strategy of the production. Then it is done the planning and scheduling which will be followed by the production.

In terms of the distribution, the storage capacity of the different warehouses delimits the boundaries of the distribution planning, and after that it is determined the distribution planning.

Finally, regarding the sales, as a strategic level it is done the forecast, to predict which are going to be the sales. At operations level it is done the Order Entry, to treat the orders the company is receiving.

3.1 Diagnosis of the Supply Chain of the Company X

3.1.1 Topics chosen for the diagnosis of the Supply Chain of the *Company X*

As we said, the optimization of the Supply Chain has to be in line with the objectives of the project. In the case of the *Company X*, the optimization relies on two concepts: on the one hand the new customer promise, seen in the previous point, and on the other the objectives of the shareholders.

The principal objective of the customer promise is to increase the satisfaction of the customer, measured through the OTIF. Differently, the shareholders would mainly look for an increase of the revenues and of the productivity, and a decrease of the inventory and logistics costs (both warehousing and transportation). Because the fact of reducing the inventory and the logistics would highly suppose a reduction of costs so an increase in terms of profit.

So, all the topics chosen for the diagnosis are aligned to reach the objectives of the customers and the shareholders.

For the diagnosis of the *Company X*, the scope was grouped in 7 sets, all of them being interrelated. The groups are shown below:

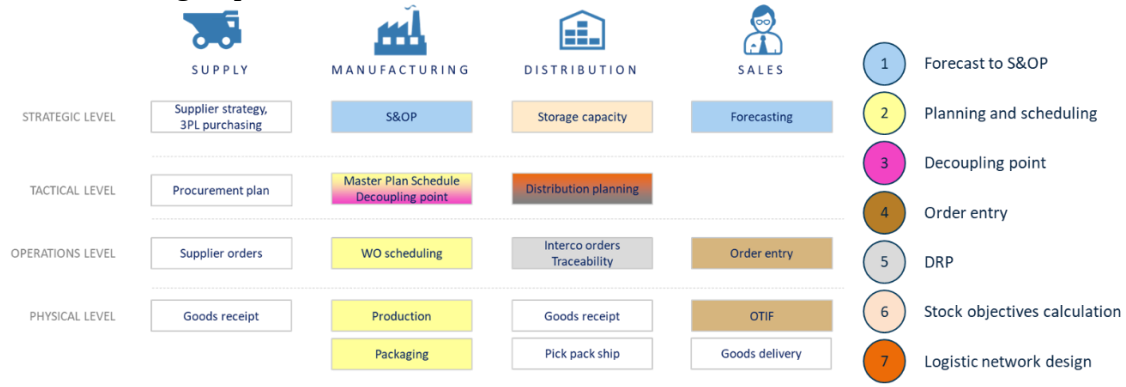

Figure 20: Scope of the Supply Chain analysis of the *Company X*

3.1.2 Contribution of each topic to the final objectives

As remarked, it is important to have a clear idea of the contribution of each subject to the final objectives. In the next figure the topics are linked with the objectives they are aimed at improving, showing the relations which influence the most. In addition, it is also joined the collaboration of the new customer promise and the new services, topic treated in the previous point of meet the needs of the customers.

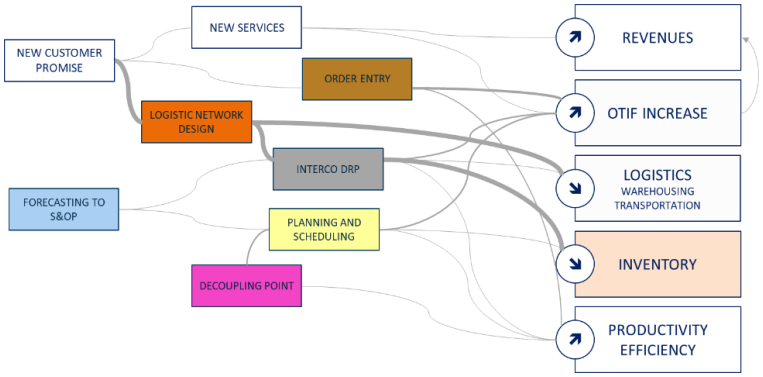

Figure 21: Relation between Supply Chain topics and the objectives of the project in the *Company X*

1. The first group is the **forecast and the S&OP**, the S&OP determines the strategy at mid-term that the company is going to follow (the strategy at long term is determined by the business plan). So the S&OP guides the planning and scheduling of the production and the distribution planning. The forecast enables to do the prediction of sales at an aggregated level, useful for the S&OP. [See point 3.1.3.1, pg. 36]

2. The second point is the **planning and scheduling**, this process enables the process of production for each product and helps to improve the satisfaction of the customer (he is more likely to have the product On Time). Having a better planning and scheduling makes the process of production more efficient. [See point 3.1.3.2, pg. 38]

3. The third subject is a **decoupling point**, which simplifies the planning and scheduling of the production. [See point 3.1.3.3, pg. 39]

4. To do a good forecast for the S&OP it is necessary to have the demand. The fourth point is focused on the process of **order entry**, so on gathering and treating the orders of the customers. This subject is linked to the OTIF, because the fact of following the customers' orders rises the probability to meet customers' expectations. A good management of the order entry process increases at the same time the efficiency of the company. [See point 3.1.3.4, pg. 40]

5. It is not only necessary to have the demand of the customers, but also of the subsidiaries. The fifth point is the **DRP**, the distribution requirement planning, which determines how to allocate the products from the plants within the warehouses. A good DRP dynamizes the process and reduces the level of stock (there is a higher probability to have the stock when and where needed). [See point 3.1.3.5, pg. 43]

6. To do a good DRP it is mandatory to know how to calculate storage parameters in order to have the correct frame. The sixth point is about **stock objectives calculation**. [See point 3.1.3.6, pg. 44]

7. Finally, the last point is the **logistic network design**, this topic goes in hand with the DRP. Maybe not all the warehouses are needed and/or maybe they are not in the ideal place, so it is recommended to study the logistic network and see if it needs to be redesigned. Having a better logistic network helps to increase the satisfaction of the customer (would be easier to receive the product On Time), increase productivity and decrease the inventory levels. Moreover, through a redesign of the logistic network, the logistics costs could be lowered (both warehousing and transportation). [See point 3.1.3.7, pg. 47]

It has been seen that the topics are all interrelated, in the figure below the relations already explained are outlined in order to have a clearer idea of them:

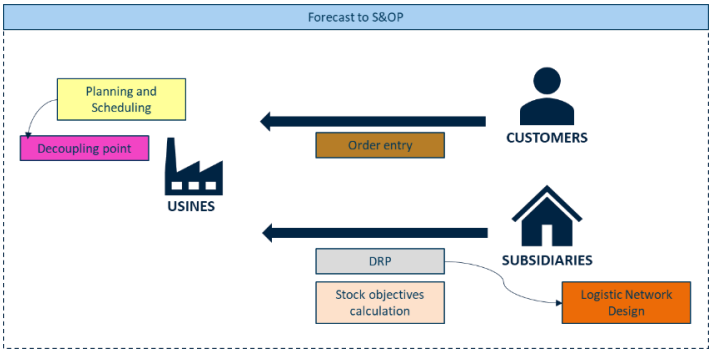

Figure 22: Interrelations between the topics

3.1.3 Detailed explanation of the topics of the diagnosis of the *Company X*

In the following points, the 7 topics seen are going to be explained in a more detailed way. Each point is going to include an explanation of the topic, the most important findings and recommendations that were done in the frame of the *Company X* in order to do the process more efficient, the work done to improve those topics and the work planned for the future.

The diagnosis was based on the interviews of 18 people from different services and the visit of the 3 factories.

The points in which I have been working the most are going to be explained in a more detailed way.

3.1.3.1 Forecast to S&OP

The forecast helps to do the S&OP, which is not only based on sales forecast but also on the market and the economic situation.

The forecast is the prediction of the future based on past and present data and most commonly based on the analysis of trends. So, it helps management in its attempts to cope with the uncertainty of the future.

Sales and Operations Planning (S&OP) is a process where executive level management regularly meets (usually once a month) and review projections for demand, supply, and the resulting financial impact. So, the S&OP serves to coordinate and align the different strategies of the company's departments around a common axis, which will then guide the daily execution of the activities. [6]
Planning at this level allows to focus on the crucial factors while identifying risk. It also optimizes the installed capacities, the service rate and controls the inventory. So, it improves the performance of the company.

3.1.3.1.1 Findings and highlights of the *Company X*: need to redefine the decision process and tools

For the *Company X*, the decision process and the tools used to do the process of both forecasting and S&OP needed to be redefined.
As the more remarkable highlights we saw that the forecast level for the S&OP was not adequate. We also saw that the S&OP process was taking place too late in the month. Another important remark was that the S&OP process needed the collaboration of different departments of all the European group, which was not the case. Those three subjects are explained below:

First finding: Level of doing the forecast
To analyze the level of forecasting, both data of sales and forecast were analyzed. After sorting and wiping all the data, the data coming from sales and from forecast was cross-matched to identify the gap between them and determine if the data was reliable enough to continue with the study. So, just the consistent data was taken to consolidate the scope of the analysis.

This data was analyzed by internal tools to determine the forecast error and the sales variability. The sales variability is the variability of sales during a period, it enables to see if sales evolve a lot from one period to another and to identify sales tendencies as seasonality.
Calculating the forecast error is the process of determining the precision of the forecast that has been done in the past, to see how close the forecast was to the customer demand, so to determine if the forecasting method is adequate or not. Although the forecast is never perfect, if the sales variability is not too high, controlling the forecast can help to avoid stock-outs, to maintain adequate inventory levels and to optimize an effective Supply Chain.

The diagnosis shows that the *Company X* forecasts the sales for each couple "product - customer". Which means a lot of effort to predict for each couple the quantity that is going to be sold. Then this quantity is aggregated at subsidiary level, so "product – subsidiary", and it is in this level that the weighted average is calculated.
We did the analysis of aggregating all the "product- subsidiaries" to see the result at mother size level in order to know for each mother size the quantity sold and be able to evaluate the forecast error and the average sales variability. After doing the analysis, we saw that the forecast error was 60% and the sales variability was of approximately 30%. This brought into light that it made no sense to forecast at the level "product-customer" and then aggregate, because the forecast error was worse than the variability of the sales.

After that we simulated a sales forecasting at mother size, which means to aggregate all the products at mother size and then do the forecast for each mother size, which represents much less effort. Let's say not to forecast all the products and then group them at mother size level, but to group them and then do the forecast. With this simulation both the forecast error and the sales variability were close to 10%, much better than before, because the differences within the products of the same mother size compensate each other.
So, the company should rather forecast at mother size level for S&OP purpose. This change would suppose much less effort than forecasting in a more detailed level, and also better results.

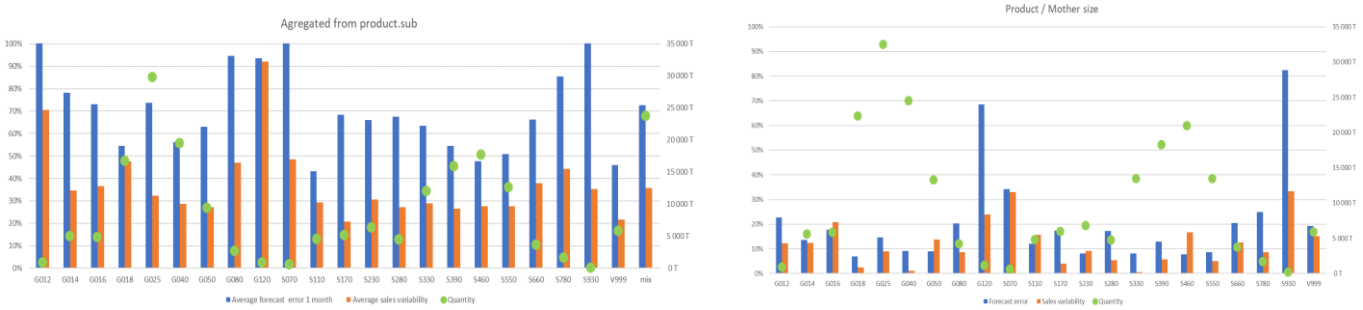

Figure 23: On the left, forecast error (blue) and sales variability (orange) when forecasting at the "product customer" level and in the right when forecasting at mother size level. In green the quantity sold. Both axis on the graph have the same scale.

Second finding: When to do the S&OP
Nowadays, the *Company X* obtains its daily plan around the 12th of the month for what should be produced from the 1st of the same month, it is too late. S&OP should be done before in order to have it ready by the beginning of the month.
Actually, they do the pre-calculation local forecasting around the last days of the previous month, but after that it is reviewed for each zone, all the products are consolidated, and it is done an S&OP for the east and for the west. So, the final version comes too late, and moreover it is only focused on the current month.

Third finding: Need of collaboration
The S&OP needs the participation of different departments: sales, manufacturing, supply chain, finance… but it cannot be done only with the Supply Chain. Moreover, it needs the collaboration at Europe level, in order to act as a group.
Changing the vision from looking only for a warehouse or plant to looking at group level is mandatory. And then communicate, commit and monitor the decisions.

3.1.3.1.2 Action plans: redefine the S&OP process and perform KPI

This topic was decided to be implemented as soon as possible. So, the next steps to perform with the responsible of the topic of the *Company X*, is to redefine the process of S&OP (to address the recommendations seen, between others), and to perform KPI in order to measure the evolution of the parameters and implement steering rituals to make the process possible.

3.1.3.2 Planning and Scheduling

As it has been seen, in a Supply Chain process the business plan determines the long-term strategy of the company, the S&OP determines the middle-term strategy, which guides the planning in a tactical level and the scheduling in an operational level.
Planning and scheduling are thus two different processes, but both collaborate to rise the OTIF (with a good planning and scheduling the customer is more likely to have the product when needed), and to optimize the supply chain, lowering the inventory and rising the efficiency.

In the case of production, planning should be done once a week and it consists of selecting the orders from a large pool of orders and assigning them to a plant and to a week. It decides what to produce and how to produce it. The planning set means and prioritizations and helps to anticipate by detecting load spikes and tendencies. [7]
Scheduling should be done every day; this process consists of detailing the sequence of production. The scheduling decides where and when to produce. This process attempts to satisfy the demand and the supply chain constraints and helps reacting by seeing where delays occur.
The next figure explains the difference between the two processes:

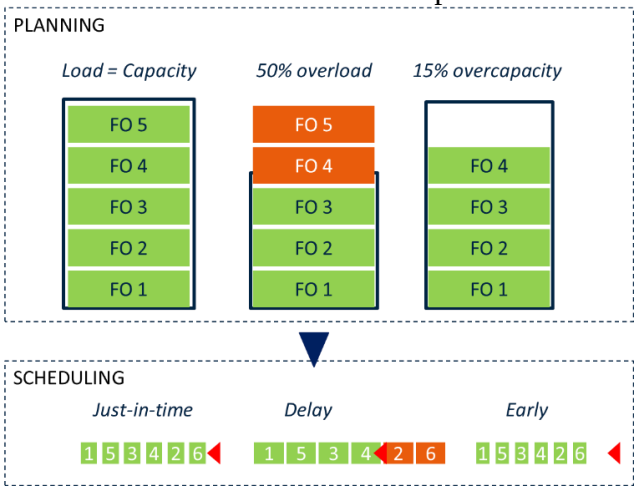

Figure 24: Planning decides what to produce, scheduling decides in which sequence. In the left a load situation, in the center an overload situation and in the right an overcapacity situation are exemplified.

Actually, the process of Planning and Scheduling is found not only in production but in the other process as well: it is also necessary to plan and schedule the picking, the shipping, the transportation, etc.

3.1.3.2.1 Findings and highlights of the *Company X*: need to redefine process and tools

When studying the plant in France we saw that scheduling was not under Supply Chain control, and that decisions where not always taken to satisfy the order book. We also saw that the tools used were not giving projections. So, we decided that both the process and the tools were needed to be redefined.

As both processes require the coordination of operations in all stages of the chain, exchanging information and interacting with others in various ways, we decided to design the process in a workshop (Planning & Scheduling workshop), so that the different departments could contribute to it.
In this workshop we decided for each level (S&OP, Planning, Scheduling) and for each part of the process (atomizing, crushing, heat treatment, packaging and shipping), which decisions to take and who should take them. So this creates an important framework for all the company.

3.1.3.2.2 Action plans: plan the implementation of the decisions taken in the workshop

As next steps, the different subjects decided in the workshop for planning and scheduling should be mastered, which means to analyze capacity and constraints to be able to model them. Test the tool and when all is well set, implement a professional tool capable to do this.
At the same time, steering rituals should be implemented to provide visibility of the processes for all actors.

3.1.3.3 Decoupling point

A decoupling point plays a crucial role in production and logistics. It is an inventory buffer, a point in the system where the "push" (forecast driven) and the "pull" (demand-driven) elements of the Supply Chain meet, disconnecting the material flow into sub-flows and thus enabling more focused and local flow-management.

3.1.3.3.1 Findings and highlights of the *Company X*: a decoupling point could help decision

When analyzing all the process, we found that in the plant in France there was no decoupling point from atomizing to the finished packaged product. Sometimes, a product is produced not because it is needed but because the silo needs to be emptied (they do not have a lot of silos to store the material of different mother sizes, so it they want to produce another mother size and all the silos are filled, it is necessary to empty one of them before producing another mother size). After emptying the silo and continuing the process, the final products are packed in any packaging and stocked. We saw there is stock available at the good mother size and hardness which is already packaged, but it cannot be assigned to a customer because it is not the package he desires. After studying it, we determined that if a better control of scheduling was done during packaging, it would be possible to achieve 75% less backlog for the same mother size and same hardness. So, a decoupling point could postpone the packaging choice and help to decide the packaging.

3.1.3.3.2 Action plans: decoupling point in the future

It is necessary to study the possibility to implement a decoupling point in the process to allow more industrial flexibility. To do this it is necessary to estimate the cost and to launch an industrial project to implement them. For the moment it seems it is too expensive to do it, so it remains as an opportunity for the future.

3.1.3.4 Order Entry Process

The order entry process is necessary to gather the orders of the customers. It represents all the process followed from the arrival of an order to the delivery of it. Its objective is to ensure that all the promises made to customers will be confirmed on time and achieved in accordance with agreed service level for each specific customer segmentation.
To be competitive in the marketplace, it is important to optimize the process so that the customer segmentation promise can be achieved, and the OTIF can thus be raised.

3.1.3.4.1 Findings and highlights of the *Company X*: need to set up rules

As for the order entry process of the *Company X,* at a first time we found that data and KPIs were missing, that is why we highlighted the need to build data in order to have a consistent customer database.
It was also found that there was no business function to determine the allocation of materials and resources. Other companies have ATP [8] (Available - To - Promise) which is a business function that, taking into account the stock, the work in progress and the demand, gives a date for which the product should be available to promise, so it allocates the products to the customers. The fact of not having ATP, makes harder for sales administration teams to confirm a customer request when the product is not on hand.
This difficulty highlights the need of reviewing the order entry process and to set up rules to optimize and homogenize the process in the whole group. To do this, the order entry process must be clarified: among the things to do, the rules of prioritization must be defined, the cut-offs have to be determined, and the horizons have to be fixed.

The importance of defining prioritization rules, and how was done in the *Company X*
The rules of prioritization are important because if there are no rules, each warehouse can process the orders as they want, giving priority to what they know by experience and not according to the customer segmentation promise. In addition, they allow to lose less time and to stipulate the process to be more efficient.

In the *Company X* there were no rules of prioritization and all was done by experience. So, in each warehouse, the ones who were in charge of the allocation process decided where to allocate guided by their experience. But in the end, the more people insisted, the more they obtained the products. So, the development of an order-processing method was necessary in order to avoid serving first the ones that insist the most.
The question at this point was how to prioritize when everything is a priority, because for each sales administration person, his customers were going to be the ones with more priority and urgency to be served.

The topic of prioritization was treated at the workshop order entry with the sales administration of different warehouses within the participants. In this workshop we explained the importance of rules and some ideas of criteria of prioritization were presented.

The prioritization can be assign, for example, at customer level: serving first the premium customers, then the turtles, then the rabbits and at the end the price. Other criteria could be the quantity ordered, serving first the customers that order a higher amount of product. The prioritization can also be done depending on the complexity of the product, to serve at the beginning the easier products (standard products) and then the more complex products. It can also be done depending on the dates: the date they ordered, the date they wanted the product, the date the system proposed to give them the product, etc.
So in this workshop the different levels of priority were decided: it was decided that the first level would be the customer segmentation, then the quantity, then the customer requested date (date their order entered to the system), then the transit time (gives idea of the complexity of the product), then the stock availability check (to see if the product is available) and at the end the stock reservation (to reserve the stock for this customer). The different criteria are shown in the following figure.

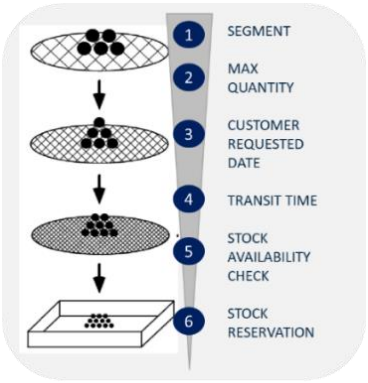

Figure 25: Levels of priority decided in the workshop for the *Company X*

This figure has to be understood as if all the customers of the first customer segment go through; among those, the ones with the maximum quantity go through, and the process is followed until only one order remains. This order has the higher priority, and then the process is repeated for the rest of orders.
It can clearly be seen that the choice of the criteria and the way to sort them determine the result of the prioritization.

The importance of the cut-offs and where to set them in the *Company X*
The cut off is a deadline, for example a precise moment in which to run a process. The cut-offs help to minimize the waiting times, to work more efficiently by doing the right things at the right time and to communicate clear rules to customers. Therefore several cut offs can be applied in the order entry process: for example a customer request cut-off (say to the customer that he can only order before an hour of the day), or prioritization cut-off (so at a precise hour of the day, take all the orders and do the prioritization to allocate the products on stock), or carrier cut-off (all has to be ready for a precise hour, when the carrier comes to ship the product), etc.

The *Company X* had no cut-off, they were treating each order when it entered to the system and they were consulting the stock availability at that moment. So maybe they were facing the situation of having a customer 1 who ordered X tons of a product, they had Y tons on stock (Y > X), so they were allocating X tons for this customer; and just after treating the order of the customer 2, who ordered Z tons of the same product (Y>Z, (Y-X)<Z), so not having enough on stock to serve the customer 2. And maybe the customer 2 was a premium customer and the customer 1 was a price customer, so the customer 2 was more important than the customer 1.

The fact of having a cut-off for the prioritization could then help to avoid this situation. Let's say that all the orders would be entered to the system and at a precise hour all of them would be submitted to the prioritization process. So, in the example explained before, the customer 2 would automatically go through the first filter of prioritization (customer segmentation) before the customer 1 and he would get the quantity Z of product on stock. The topic of the cut-off was also treated in the order entry process, and it was decided to set a cut off before the prioritization.

The importance of horizons and how they were determined in the *Company X*

The horizons are artificial boundaries used to separate periods for planning and scheduling purposes. Fixing those horizons helps to make the order entry process more competitive, because it adds rules to the process, making it more efficient. Three different horizons can be detected:

- Liquid horizon: Is the farthest out on the time horizon. New orders or modifications can be entered with ease as long as the schedule remains within the production plan constraints.

- Slush horizon: Its time fence is usually a few periods beyond the frozen phase. Order entry in this phase necessitate trade-offs but is less costly or disruptive than the frozen phase. A change in delivery date or order quantity must be arbitrated.

- Frozen horizon: Is the near-term phase which is so soon that the delivery of a new order would be impossible, or only possible using very costly or extraordinary options to reroute, reschedule and perform additional steps.

The diagnosis showed that no clear horizon is defined in the *Company X*, so some late changes in the orders are accepted, causing changes in the production that can delay the delivery of other orders, even orders from more important customers.
This topic was also addressed during the order entry workshop, and we decided the horizon for each type of orders: the standard orders of 4 days lead time for rabbits, the standard orders of 14 days for the rest of customers and the express. For the standard orders it was decided that the frozen horizon would be the cut-off of the prioritization, so before the cut-off it would be liquid horizon and after the cut-off, frozen horizon. For the express it would all be frozen, as there is no time for changes.

The horizons can then be communicated to the customers so that they are aware of the conditions and they can know when the changes in the orders are allowed. This can help to have less urgencies and less changes in the last moment, and consequently have a simpler process.

3.1.3.4.2 Action plans: fine tune the decisions taken in the workshop and evolve to an ATP

After presenting all the topics in the order entry workshop, it is necessary to define in a more detailed way the local cut off, the horizons and the standard lead time in the system. Then it is also necessary to fine tune order entry rules for big orders and for standing orders. All of this would serve as a base for the ATP, so as a next step, a local ATP should be implemented and then an extended ATP. Finally, there are also all the topics related with order entry seen in the first part: meet the needs of the customer, like implement the customer segmentation, customer communication and the OTIF calculation.

3.1.3.5 DRP, Distribution Requirement Planning

The distribution requirement planning (DRP) is a key tool for the planning and control of a company's distribution activities. The order entry allows to have the demand of the customers, while the DRP enables to have the demand of the warehouses.
In many companies with different levels of warehousing (primary warehouses that serve a network of secondary warehouses), it is the level of warehouses which is closer to the customer that decides what to order from the primary warehouses, in what quantity and at what frequency. So, this mode of supply has limitations: for example, in a shortage situation this can lead to replenishing a stock while a customer from another warehouse is out of stock. Or it can concentrate the replenishment orders from different warehouses in the same period, when they could be better distributed among the periods, and this can consequently cause a really irregular demand to manufacturing.
The DRP aims precisely at avoiding this type of situation by favoring the integration of the Supply Chain. In practice, the DRP is a systematic process that takes into account different parameters (the forecast requirements of each warehouse, the procurement lead times…) and determines which products, in what quantity and in which warehouse should be allocated from the plant. [9]
So, with a better distribution and optimization, the total level of inventory could be lowered and the OTIF could be improved (minimizing stock-outs).

3.1.3.5.1 Findings and highlights of the *Company X*: the subsidiaries pull to get inventory

In the case of the *Company X*, every subsidiary is pulling to get more inventory. The supply cannot provide visibility so there is a problem when allocating, which leads to a low service level. This lack of visibility generates stress.

To see the difference between the different warehouses, we calculated the OTIF and the stock coverage for each of them, and as a result we saw that in the warehouses of the East side of Europe, the stock coverage was lower than in the West, while the OTIF was higher. In other words, the East side was better managing their inventories.
Contrary to the West, the East side was managing the inventories in a centralized way, they were doing a kind of DRP, that is why they were achieving better results than the West.

The topic of the DRP was treated in a workshop, with people from different warehouses and different fields (supply chain, sales assistants, production…). First of all, we did an exercise to understand the importance of the DRP for the replenishment of subsidiaries. In this exercise, they were separated in different groups (representing different subsidiaries) and they were asking for replenishments to the primary warehouse. At the end all the orders were consolidated, and we saw that the total result was really irregular among the periods. We saw that if it would have been centralized to the primary warehouse and it would have been given the visibility of the different warehouses to the primary one, it could all have been optimized.

3.1.3.5.2 Action plans: implement replenishment rules, tool and process

This topic was evaluated at having a lot of value (savings in stock, improvement of OTIF) not really difficult to implement. So as next steps it is necessary to implement the replenishment rules, tool and process between primary and secondary warehouses, to make DRP possible.

3.1.3.6 Stock objectives calculation

The topic of stock is really linked to the DRP, as it allows to calculate stock parameters that will then be useful for the DRP.
Stock refers to all goods owned by a company that are not yet consumed or sold. Stock is necessary in order to meet customer needs while protecting against upstream and downstream variability (supplier, transport, consumption…). Its existence is also due to economic reasons, for example the minimum order quantity imposed by suppliers can consequently create stock, or it can be interesting to have stock to reduce transport costs. Moreover, there are also commercial reasons, such as price discounts and sales.
However, it is mandatory to control the stock because if stock is too high there is a risk of financial immobilization, of increasing the handling costs and a risk of deterioration. On the other hand, if the stock level is too low there can be a risk of shortage and non-response to customer requests.
To measure inventory and Supply Chain management effectiveness it is important to analyze data and set up indicators.

An important parameter is the safety stock. In fact, the stock is divided in two parts: the safety stock and the rotating stock.
The **safety stock** is the one that should be maintained to assure a minimum level of stock to mitigate risk of stockouts due to uncertainties in supply and demand. **The rotating stock** is the one that changes depending on the demand, the order amount and the frequency of ordering.
It is important to dimension the safety stock properly to have the adequate level of it, because if not it can evolve to a situation of overstock, hiding other problems the company may have, as the following figure shows.

Figure 26: Problems that the stock can hide

The basic formula for safety stock is SS= Z * σ, where Z is linked to the % of times safety stock will be enough to cover the parameter variability and σ is the standard deviation of the variable parameter we need safety stock for.

For example, a Z of 1,65, corresponding to a service level of 95% in a normal distribution, means that 50% of the time the safety stock is not needed, the 45% of the time the safety stock is helpful and the 5% of the time the safety stock is not enough [10].

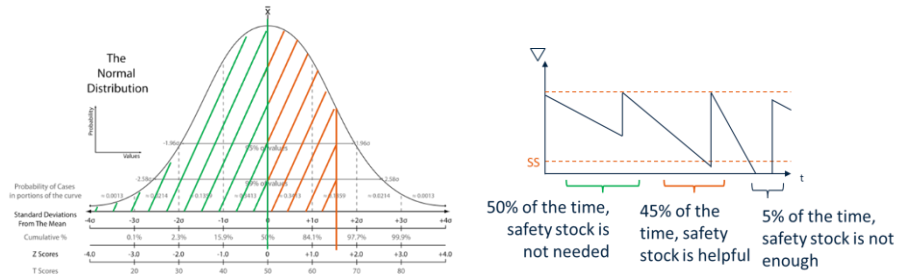

Figure 27: Example of the meaning of the Z used in the Safety Stock formula

As for the σ, the standard deviation of the variable parameter we need safety stock for, it can be demand variability or lead time variability. The demand variability corresponds to changes in the demand, for example an over-consumption can cause a use of safety stock. The same happens with the lead time: a late delivery causes the use of safety stock.
The following formulas serve to calculate safety stock in the case of demand variability and in the case of lead time variability:

$$SS_D = Z * \sqrt{\frac{PC}{T1}} * \sigma_D \qquad SS_{LT} = Z * \sigma_{LT} * D_{avg}$$

Figure 28: On the left safety stock (demand variability) and on the right safety stock (LT) [10]

Where PC is the procurement cycle, T1 is the period used for the calculation and Davg is the average demand.

The safety stock is differently dimensioned if both demand and lead time are dependent or independent:

$$SS = SS_D + SS_{LT} \qquad SS = \sqrt{{SS_D}^2 + {SS_{LT}}^2}$$

Figure 29: On the left safety stock (dependent) and on the right safety stock (independent) [10]

Another important indicator is the stock coverage, which indicates the number of days the stock can cover the average of customer's needs.

3.1.3.6.1 Findings and highlights of the *Company X*: Safety stock and stock coverage

For the *Company X*, the data of stocks was analyzed, comparing stocks with sales in order to have an idea of how stock levels and policies were controlled. Both the safety stock and the days of cover were studied.

Safety stock: need to update safety stock calculation, differentiate product categories
The safety stock of the *Company X* was more or less 40% of the total stock.
So, what we did in the analysis was to calculate, for each product, the safety stock in the way it has been explained in the previous point and to compare it with the 40% of the average stock.
After that we drew a matrix to see for each product and warehouse, the difference between the safety stock calculated per month and their current average of safety stock per month. In the following figure it is seen that there are places where there is more safety stock than what it should (in green) and the opposite situation, where there is less safety stock than what it should (in red). There are also some products that are in a red situation in one warehouse and in a green situation in another, so the stock should be redistributed.

Étiqı	WHA	DWA	MIL	MTB	MUT	WAP	KVB	TFM	Total général
G012	-19 T	1 T	-2 T	-2 T	-8 T	-2 T	-6 T		-38 T
G014	3 T	17 T	-3 T	-11 T	-42 T	-2 T	7 T	-24 T	-55 T
G016	-47 T	6 T	10 T	0 T	-43 T	-5 T	-3 T	-28 T	-109 T
G018	10 T	51 T	9 T	-5 T	-48 T	8 T	0 T	-117 T	-91 T
G025	-155 T	56 T	-17 T	-7 T	-85 T	-3 T	-7 T	-112 T	-329 T
G040	-90 T	16 T	9 T	21 T	-39 T	3 T	9 T	-286 T	-358 T
G050	-65 T	12 T	16 T	8 T	-36 T	-4 T	7 T	-22 T	-83 T
G080	-27 T	-8 T	-3 T	-7 T	-21 T	1 T	2 T	-12 T	-76 T
G120	-9 T	1 T	-1 T	-4 T	-4 T	0 T	-3 T	-1 T	-20 T
G200	-1 T	0 T	0 T						-1 T
mix	-80 T	84 T	-2 T	30 T	-75 T	-1 T	-11 T	-165 T	-219 T
S070	-14 T	-3 T	-5 T	-3 T	-10 T	0 T	0 T	-7 T	-41 T
S110	-65 T	17 T	-4 T	-2 T	-33 T	-1 T	0 T	-20 T	-107 T
S170	-51 T	-7 T	2 T	-4 T	-59 T	-4 T	2 T	-35 T	-155 T
S230	-115 T	18 T	-9 T	-11 T	-48 T	-5 T	20 T	-35 T	-184 T
S280	-131 T	4 T	0 T	-1 T	-20 T	0 T	-3 T	-27 T	-178 T
S330	-202 T	14 T	14 T	34 T	-37 T	6 T	19 T	-63 T	-214 T
S390	-136 T	21 T	9 T	58 T	-27 T	10 T	14 T	-71 T	-123 T
S460	-204 T	38 T	16 T	24 T	-36 T	11 T	26 T	-233 T	-358 T
S550	-114 T	15 T	6 T	27 T	-34 T	-1 T	10 T	-194 T	-284 T
S660	-69 T	30 T	-2 T	-10 T	-11 T	2 T	-4 T	-13 T	-77 T
S780	-24 T	1 T	9 T	3 T	-9 T		-1 T	-14 T	-34 T
S930	-1 T				-2 T	0 T	2 T		-2 T
V999	-35 T	0 T	-8 T	-1 T	-31 T	8 T	-4 T	-3 T	-73 T
Total g	-1 640 T	386 T	45 T	137 T	-757 T	23 T	75 T	-1 480 T	-3 212 T

Figure 30: Safety stock matrix: for each mother size and warehouse, tons of gap between the two ways of calculating the safety stock. In green there is more safety stock than what it should, in red there is less safety stock than what it should.

After this analysis it was highlighted the need of updating the safety stock calculation and of implementing stock objectives according to service level (Z), sales and lead time, and not only according to the total stock.

So to update the safety stock calculation, it is necessary to know that not all the products should be treated the same way, there are different product categories and different replenishment models that can be applied according to the category.

In the workshop of DRP it was treated the topic of stock, explaining stock policies and replenishment models.

To see the different **product categories**, we did a classification ABC-XYZ of the products. The goal of this analysis was to sort the items to identify under which stock strategy they should be, and which were the items for which it is more important to control the stock levels. The ABC analysis divides an inventory into three pareto categories: A products represent 80% of the total volume sold, the B products 80% to 95% and the C products correspond to the last 5% of tons sold. The XYZ analysis divides the items according to its consumption frequency: X items are consumed frequently (in the case of this analysis we considered from 11 to 12 months during the year), Y items are consumed less frequently (5 to 10 months in the case of this analysis) and Z items are not frequently consumed (0 to 4 months over a year).

Then, the different product categories should be treated differently: for example, the AX products are the easiest ones to forecast, as they represent a high volume of sales and they are consumed in a high frequency. The CZ products are the products that represent small volumes and are not frequently consumed, so a constant level of stock can be set and consumed when necessary. And for the AZ products maybe risk assessment should be implemented, because they are products that are going to be consumed in a high quantity but not often, so it is important to partially anticipate its production quantities.

As for the **replenishment models**, in the workshop we presented different ways to replenish depending on several factors: fixed or variable quantity and fixed or variable frequency.

Stock coverage: homogenize the way of managing the stock
The number of days of stock coverage was calculated dividing the average stock of the last year, 2017, for the average of sales of the same year.
After analyzing the stock coverage of the different warehouses, it was seen that the East side of Europe was obtaining a better OTIF with less days of stock coverage whereas the West side had a worse OTIF with more days of stock coverage. So, it was seen the need of setting up objectives and homogenizing the way of managing the stock.

3.1.3.6.2 Action plans: implement a pilot and extend it all over Europe

After the workshop, an inventory pilot was done. It was done in Italy, showing to the sales administration of Italy how to do an ABC-XYZ analysis, how to calculate the safety stock for each product and how to set replenishment rules depending on the current stock level, the incoming orders, the threshold and the order quantity. So that then it can be extended all over Europe.

3.1.3.7 Logistic network design

The last topic is also related with the distribution system.
The business requirements of a network can change over time, this can be due to mergers and acquisitions, entering new markets, expanding product ranges or even changes to the regulatory environment. [11]
As a result, if a company has not studied their distribution network, there is a high degree of risk that the inventory investment is abnormally high and that the stocking locations are not in the ideal place to best serve the customers. Moreover, there is also a risk of the network cost to be higher than expected, and not to be properly aligned with the market share and customer base.
As a result, the company is possibly spending unnecessary transports and cost, is not providing the best service level, is rising the lead time from the stock to the customer and is probably not having the availability of the product where he needs.

So, the fact of studying the logistic network can help to optimize the process, to improve service and to reduce costs.

3.1.3.7.1 Findings and highlights of the *Company X*: redesign a new logistic network and optimize trucks

There was a need to redesign a new logistic network and to optimize the charge of the trucks load. The explanation of those two topics is coming up next.

New logistic network: decide the scenario
The diagnosis showed that the *Company X* has 13 warehouses and 3 factories all around Europe, as the following image shows:

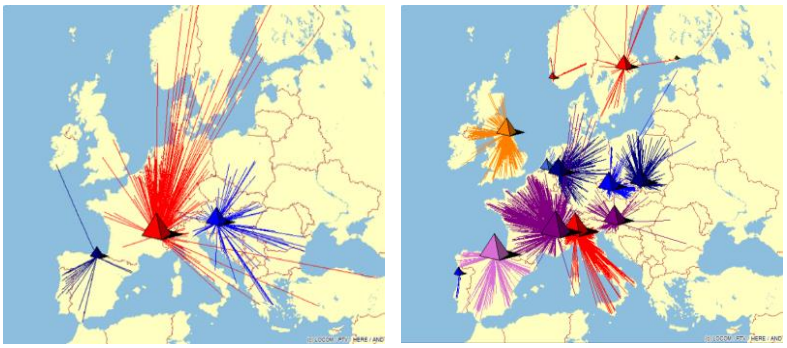

Figure 31: On the left the 3 plants of the Company X and on the right the 13 warehouses

More warehouses within the network means more inventory in the total system, more fixed cost, and less opportunity to consolidate the inbound and outbound shipments of the warehouses.
It was evident that costs needed to be reduced and inventory availability needed to be increased through a full logistics network redesign and implementation. So, the aim of this new logistic network was to optimize the number of warehouses to reach the service level and optimize distribution costs.

It was clear that the new logistic network had to be in line with the customer segmentation, in order to meet the customer promise of 4 days lead time for rabbits and 14 days of lead time for price, turtles and premium customers, with a shorter lead time for express deliveries. So, the warehouses should be located close to the rabbits customers in order to deliver within 2 days of transport. The other customers can be served in a longer period. So, all the customers were represented in order to know their location:

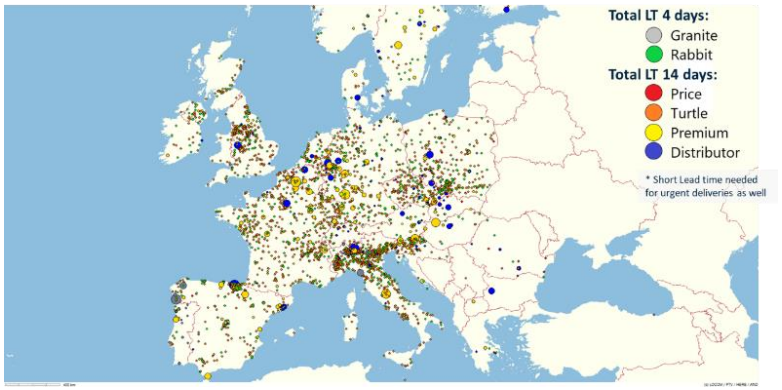

Figure 32: Location of the customers identifying their segment

To design the new logistic network the first step was to do a baseline, which means to represent the actual scenario, with the actual flows, in order to compare the model costs with actual costs from finance. This was the most complicated part because there are many different types of flows. To have a base for comparison, the growth projection was estimated for the year of implementation of the new logistic network and was applied to the baseline. It was optimized, and finally the different scenarios with different number of warehouses were modelled, as to see the logistic network benefits of each.

We saw that between 5 and 9 warehouses, the cost was almost constant and minimum in comparison with the other possible combinations. So, after modeling 16 different scenarios and studying their impact, the ones that were kept for discussion were:

- Only 3 warehouses located at the plants
- Only 3 warehouses located anywhere
- 5 warehouses anywhere
- 5 warehouses anywhere and 3 warehouses at plants

In this figure we can see the overview of the different scenarios:

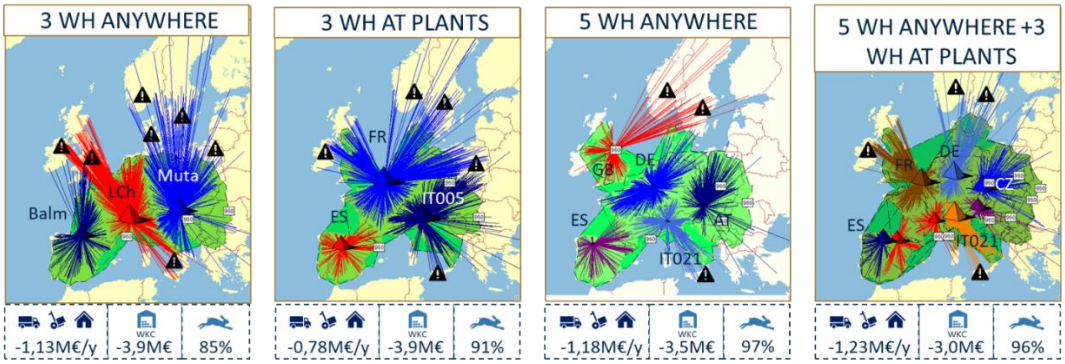

Figure 33: Logistic Network scenarios kept for discussion

In all of them, the green area shows the reachable destinations that can be attained within 2 days of transport (necessary for rabbit customers). In the figure above, we added the information of savings (transport and warehouses) and the percentage of rabbits served.

The first two scenarios shown were not ideal because a lot of rabbits cannot be served with only 2 days of transport. So, the discussion was centered in the last two models, both were covering more or less the same rabbits customers (maybe less risk for customers in Grand Britain using the 5 warehouses model). As for the rabbits in Scandinavia, another way to serve them should be found because none of the scenarios can serve them properly. So, on the one hand the 5 warehouses model was simpler than the 5+3 model, and on the other, the 5+3 model had more warehouses, so less change management was going to be needed.
Finally, the model chosen was the 5 warehouses, validated for service, savings and simplicity (it covers more rabbits, more working capital of savings and not a lot of warehouses to move – the five warehouses are close to some of the actual ones-).

Truck load: study the potential of savings by optimizing trucks

Studying the truck load is necessary to know the cost of transport and thus be able to optimize it.
In the case of the *Company X*, the truck is considered fully charged (FTL, Full Truck Load), if it is charged from 16 to 24 T or not full if the payload is less than 16 T (LTL, Less than Truck Load).
To reduce the cost of the transport, we studied the potential of using FTL instead of LTL when possible, because with the contract they currently have, it is cheaper to completely charge a truck than using several trucks not fully charged. So this calculation was done to see the potential of savings.
To do this study, first of all we calculated the amount of money which had been spent during 2017 in the flows to customers for each type of truck weight. Then, we studied all the paths done by an LTL in order to see if they could have been optimized.

In the case there was an FTL going from the same source to the same destination (or to a close destination) the same day, we measured the difference of euros per ton spent between the current LTL and the FTL, considering that it could have been optimized. However, if there was no FTL but an LTL with the same source and destination, the current LTL price per ton was compared to the minimum LTL price per ton.
Then we gathered all the gaps. The next figure shows the savings that would have represented the fact of optimizing the charge of the transport, taking into account different gaps. This difference was done considering that it would be easier to change the transports in which the gap is smaller, because a higher gap can represent an express or an emergency. In the graph below also shows the percentage of total LTL shipments optimized.

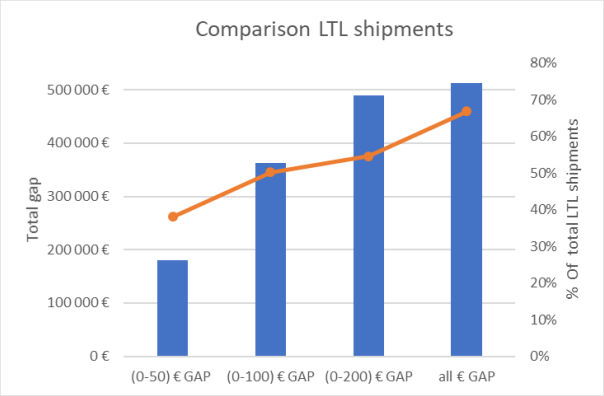

Figure 34: Potential of savings optimizing the LTL transport

To calculate the potential of savings, we took into account the gaps between 0 and 100 euros, which represent a savings of 363 k€ in one year, affecting the 50% of the shipments of 2017. To be more conservative, we considered half of the potential.

So, the fact of optimizing the transport, trying to gather the deliveries and trying to charge the trucks as much as possible, has a true potential of savings in the case of the *Company X*. And considering that the logistic network is going to be simplified through a reduction of the number of warehouses, it becomes easier to optimize the transport.

3.1.3.7.2 Action plans: a detailed study of the scenario chosen

The topic of a new logistic network has a lot of value, a lot of potential, but at the same time it is a complex topic. The next steps are focused on doing a detailed study of the scenario chosen (see if the location of the warehouses has to be adjusted) and decide how to treat the customers from Scandinavia. Then the carrier has to be studied to choose the best option.
After that, the stock is going to be transferred in the warehouses one to one, to finally achieve the new logistic network design.

3.1.4 Roadmap and ROI: an overview of the project

Once all the topics were analyzed and treated, the transformation roadmap was built.
A project roadmap is a high level overview of the project's goals and deliverables presented on a timeline. It is a useful tool for managing shareholders expectations, as well as for communicating plans and coordinating resources.

The roadmap contains project goals and objectives, a timeline indicating the schedule, and the important milestones, deliverables and dependencies. [12]

To design the roadmap, we gathered all the action plans, and for each topic we built a detailed timeline containing the duration of each action and the moment to launch it. We did it according to the availability of the resources and the dependencies between the different actions within the same topic. Then, all the timelines were compiled together in order to do the final roadmap. Taking into account the dependencies between the different subjects and the availability of resources, we obtained a roadmap over 4 years of horizon.
To do the roadmap it was also necessary to do a matrix of value, to see which subjects were the once that represented a higher value for the company.
Apart from all the topics mentioned, the roadmap contains another section: project governance: which is in charge of controlling and ensuring that the project is being developed properly. The roadmap is shown as following:

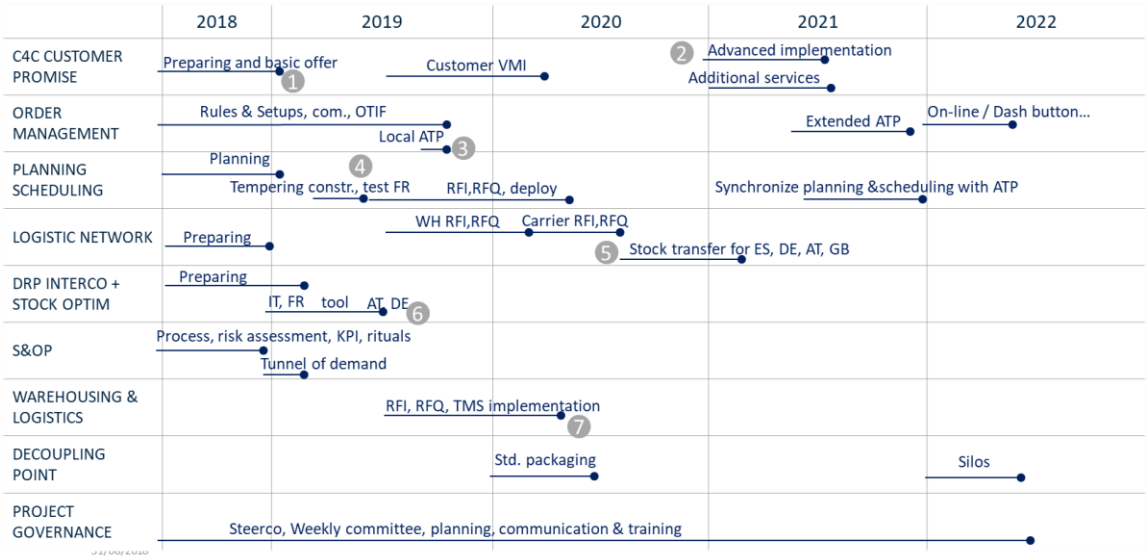

Figure 35: Roadmap of the project at the *Company X*

Beside the roadmap, there is another important deliverable: the ROI, Return On Investment. It is a profitability ratio that calculates the profits of an investment as a percentage of the original cost. So it shows investors how efficiently each euro invested in a project is at producing a profit. Hence, the ROI is a deliverable the stockholders would look at not only to measure how well the investment is supposed to perform, but also to compare the performance of the different subjects in terms of investments.
The detail of the ROI is not shown in this report to avoid reporting the monetary value of the project. But in the way it is planned, the payback is supposed to be in 2020.

3.2 Conclusion: Be competitive

To be more efficient and more competitive the Supply Chain needs to be optimized. So that the company can produce and deliver finished products to end consumers in a more cost effective and timely manner.
Not only to evolve in order to achieve the needs of the customers but also to meet the requirements of the stockholders, who would invest if they see a real profit on the project, for example if the ROI (Return Of Investment) convince them.

Having the needs of the customers and the objectives of the stockholders in mind, we can decide in which aspects of the Supply Chain the project should be optimized. Then it is important to study and analyze those topics in order to identify the major changes to be implemented.

For each subject, regarding the availability of resources, a timeline can be done with all the action plans to see how much time it was needed. Then, gathering all the subjects and considering the dependencies between them, a roadmap can be built, allowing to have a general overview of the project and its most important milestones.

The case of the *Company X*
The Supply Chain of the *Company X* was studied. The objectives of the *Company X* were to increase the satisfaction of the customers (increase the OTIF) and meet the requirements of the shareholders (more revenue, less logistics and inventory costs and more productivity and efficiency).
To meet the objectives the Supply Chain diagnosis was focused on 7 topics:

- Forecast to Sales & Operation Planning
- Planning and scheduling
- Decoupling point
- Order Entry
- Distribution Requirement Planning
- Stock objectives calculation
- Logistic Network Design

We studied all of this topics in a detailed way and we found points of improvement. We highlighted the action plans that are needed in order to do those improvements.
Then those points were gathered, and we built a roadmap in a 4 years horizon.
We also calculated the Return Of Investment, which showed that the payback is supposed to be 2 years after launch the project.

4 How to align directions

Until now we saw the different subjects that were treated in the mission of the *Company X* in order to improve performance and thus be able to meet the objectives of both the customers and the shareholders.
Many of these subjects require changes: changes of processes (implementing an S&OP, redesigning the process of Planning and Scheduling…), changes of roles and responsibilities, (changing responsibilities of replenishment with DRP…) and changes of technology use (changing the way of calculation stock objectives, of doing the forecast…). Some of these changes can seem ease to apply and others can seem extremely complex, for example the implementation of the new logistic network. But at the end, not matter if they are small or big, they are changes, so they require a change in the way of doing. So it is actually the employees who have to ultimately change how they do their jobs. If these individuals are unsuccessful in their personal transitions, if they do not feel as part of the project, if they do not embrace and adopt changes required, the initiative will fail.
So the way the project has been planned and has been driven up is really important in order to make people embrace the project and make them see it possible.

It is necessary to find a name to the project, a name of the community, to create an environment and involve people in it. The project was named **C4C: Care For Customers,** to put emphasis on the importance of the customer.

At a first step, it was important that the C4C project had a **clear methodology** to follow. This way we could all have in mind the overview of the project, with all the past, present and future sections. This methodology was shown in each step of the project as a reminder. The methodology followed is shown below, it contains 2 stages: the stage I is mostly focused on the first part of the report (how to meet the needs of the customer), so it studies the current offer and the customer's needs to finally define the new service offer. The stage II contains the full diagnosis of the Supply Chain, so the second part of the report (be competitive) is centered on what was done in this second stage: the diagnosis to highlight findings and recommendations, the 3 workshops, the cash-based ROI and the roadmap between others. In the methodology it was also highlighted this need of change management to make project feasible.

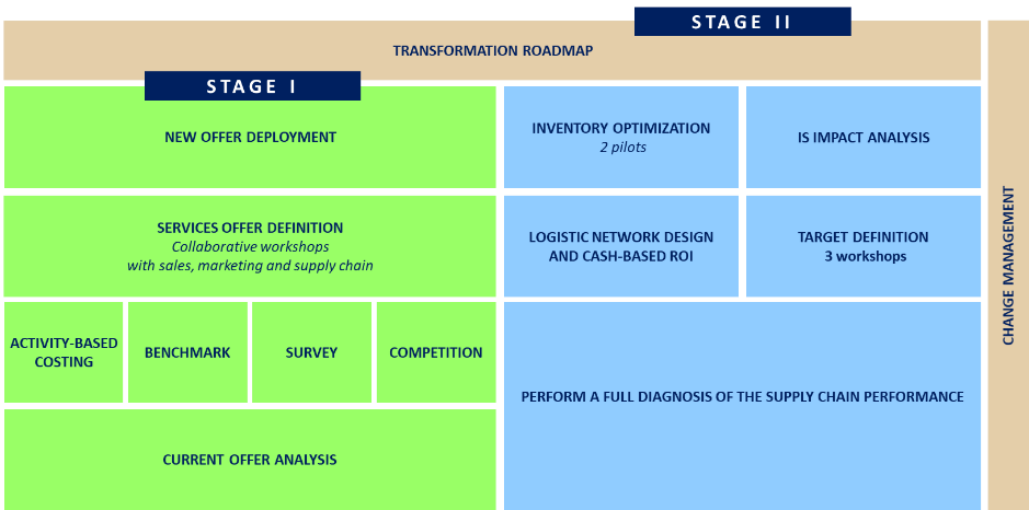

Figure 36: Methodology followed in the C4C project

It is necessary not only to have a clear methodology but to also have a **clear timeline** to sequence the tasks and work on them in order, setting up objectives and milestones that add up to the overall deliverable. Here there is an example of the timeline of a part of the project (last part of the stage I and the whole stage II).

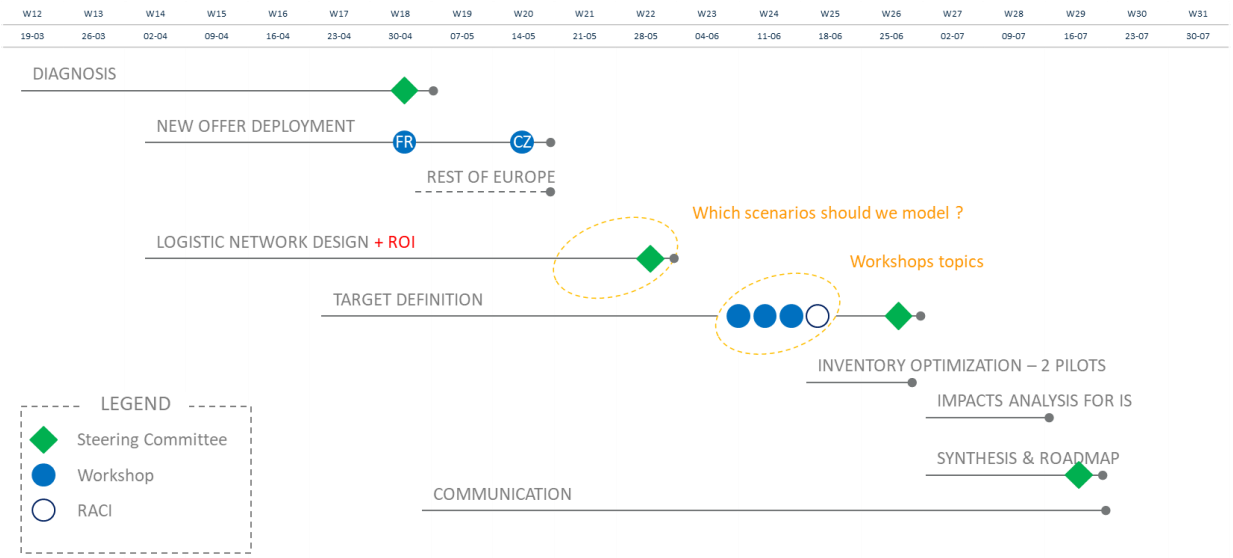

Figure 37: Example of a timeline of the C4C project of the *Company X*

In the timeline we identified 3 types of milestones: The Steering Committees, the workshops and the RACI. All of them are necessary in order to align directions of the people and involve them on the project.

- **Steering committees**: The steering committees are meetings done every 3 to 4 weeks, at the end of each important step of the methodology. In these meetings, the findings and the intermediate conclusions of the current step of the methodology are explained to all the main participants of the C4C project. The steering committee is used to validate the work done and to make some important decisions. For example, in the steering committee after the new logistic network design, the middle conclusions were presented but it was in there that it was chosen the final scenario which is more likely to be implemented. It is important to remark that all the steps and the conclusions presented in every steering committee have been done in hand with the *Company X*, validating each of the steps with them. And the oral presentation has usually been done in a participative way too.
  After each steering committee we did a communication support:

  - **Communication supports**: The communication support is a summary of the work presented in the steering committee with the conclusions made. This communication support was distributed to each person of the C4C project after each steering committee, this way everyone could be aware of the things that were done and could feel that the project was alive.

- **Workshops**: Workshops are interactive trainings where participants carry out activities rather than passively listen to a lecture. In the case of the *Company X* several workshops were carried out, both in the Stage I and in the Stage II of the project. In the Stage I we did two workshops to decide the customer segmentation and the new offer deployment. In the Stage II, we did three workshops, and I had the opportunity to help prepare and present them. One was about the Order Entry process, another about the DRP and the stock objectives and another about Planning and Scheduling. In those workshops employees from different countries and disciplines were present.
  The workshops have several objectives: first, they let people understand the problem and talk and explain their point of view of the subject. It lets them explain what blocks them, what they would change and how they would change it. This lets everyone be aware of how the process is done in other countries, know the opinions of others and learn from the others. Finally, having a better understanding of the subject and of the problem, and having the vision of the whole of the participants, the decisions can be taken all together. The fact of constructing in a participative way is very important because it involves people in the project, it makes them work and find solutions and on top it aligns the directions of the different departments to a common objective.

- **RACI**: The RACI is a responsibility assignment matrix, especially useful in clarifying roles and responsibilities in projects. It describes what should be done and by whom to make a transformation process happen: who is the **R**esponsible (who does the work to complete the task), the **A**ccountable (who approves the work the responsible provides), the **C**onsulted (the subject matter expert whose opinion is sought) and the **I**nformed (who is up-to-date on progress). In the case of the *Company X*, we assigned one responsible for each of the 7 subjects seen in the diagnosis, and several actors to help to implement the subject.
  It is mandatory to give responsibilities in order to make people in charge of a topic and make them control that this topic is going to be developed properly.

So the **role of the consultants** in all of this, in all the C4C project is to put two ingredients: the know-how and the soft skills. The know-how is all the knowledge, the experience, the view from the outside, and the methodologies, which some of them have been explained throughout the report (analysis, matrix, roadmap, modes of calculation, etc.). The soft skills refer to the change management, the way of managing the project. The fact of being close to the customer, to let them talk and listen to them, to find the equilibrium between be available and let the customer work on their own solutions as well. And also, the way of preparing the trainings and leading the workshops. The role of the consultant is also to know where it is important to focus the energy and to put the KPI in the good place to guide the group. Then the consultants are there to give the impulse, to prepare and support individuals, teams and organizations in preparing and making the change, but it is the company who will have to be autonomous in a near future, that is why it is highly important to work in a collaborative way.

Conclusion of the mission

During the report I addressed the answer to the question of how the Supply Chain can help to reach the needs of the customers meeting, at the same time, the requirements of the shareholders.
I explained the importance of the customer, of evolving trying to satisfy their needs. However, we saw that if we try to give everything to everyone, this will probably lead to a low service level (maybe late deliveries or lower quality). Moreover, this can bring to treat all the customers the same way, when, in fact, they may probably have different behaviors. Here is where the interest of the customer segmentation lies, allowing to classify the customers regarding their behavior and being able to personalize the offer depending on the different customers segments.

On the other side, to meet the needs of the shareholders, it is necessary to increase processes efficiency, to lower the inventories levels, the logistic costs to, in the end, rise the profit of the company. We saw that different axes of the supply chain can be improved and optimized in order to gain in competitivity and effectiveness.
All the numerous points of improvement have been gathered in a roadmap, structuring the deadlines and the perimeters, in order to have a guide for the future transformation.

The final roadmap has been presented, and also the last version of the ROI, so as to see the financial impact of the project. Now the *Company X* is taking its time to decide when does it want to launch the project regarding the availability of the resources, and if it wants to do it completely or partially. It is highly possible that in the following months the *Company X* will decide to launch it, and will maybe ask for help to Citwell, so that the consulting firm can help in terms of both project and change management, sharing their expertise and advices.

Personal assessment

The main objective of the internship was to find out what the job of a consultant entailed, how to manage customer relationships, and what the regular change of environment and subject of work was like. Being considered as a junior consultant, I was able to quickly understand these various points through the six-months of internship.

I have been given the possibility to work in a large-scale mission, involving many different subjects of the Supply Chain. This has let me learn a lot about these subjects and at the same time see its influence in a real project. This project has awakened my interest throughout all these different subjects.

Having the opportunity to work with two Citwell consultants, really experienced in the field, has given me the chance to learn from them: the methodologies, the ways to do the analysis, the way of addressing the customer relations and the way to manage the project.

This mission has also brought me a little bit of experience on detecting conflicts and of being critical in front of the information the company provides.

So, well beyond the know-how, this mission has showed me many soft skills. The fact of being able to attend numerous meetings and workshops has made me see how the different individuals interact. When doing a large-scale change management project, there are always those who see it possible, those who don't want to change their habits, those that at the beginning see the change possible but at the moment of diving into the pool they throw themselves back… The fact of dealing with those different behaviors and seeing how my colleagues acted in order to align their directions has been very enriching for me. It has also been interesting to see the different point of view of the different departments, which have different personal objectives, so see the change in a different way.

So, if I had to illustrate my internship, I would say that I arrived with a luggage full of disorganized concepts of the Supply Chain, because those concepts had only been **told** to me: some of them in Catalan learned in my master back in Barcelona, others in Italian learned during my exchange in the Polytechnic University of Milan, and other in French learned during the third year in the Ecole Centrale of Lyon. Now I can say that I leave with a luggage where the concepts are arranged, because I have been able to **see** their impact and to be **involved** in them.

Tell *me and I will forget*
show *me and I may remember*
involve *me and I'll understand.*
- Benjamin Franklin -

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Most of the methodologies that have been used and some of the explanations of concepts given in the report come from the Knowledge Management of Citwell (either intern documents from the company or knowledge that my colleagues have shared with me during my internship). In addition, the following bibliography has been consulted during the development of this report:

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Glossary of terms

ATP: Available To Promise
C4C: Care For Customers
DRP: Distribution Requirement Planning
EDI : (Echange de données informatisé)
FTL: Full Truck Load
IF: In Full
IS: Information System
KPI: Key Indicator Performance
LT: Lead Time
LTL: Less than Truck Load
MTO: Make To Order
MTS: Make to Stock
OT: On Time
OTIF: On Time In Full
RACI: Responsible, Accountable, Consulted, Informed
RFID: (Radio-Frequency Identification)
ROI: Return On Investment
S&OP: Sales and Operations Planning
SLA: Service Level Agreement
SS: Safety Stock
VMI: Vendor Managed Inventory
WO: Work Order