

LUISS



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Degree Program in Strategic Management
Course of Business Modeling and Planning

“How to implement best practices in order to make teams more efficient by doing benchmarking activities with similar working groups to understand who is accomplishing tasks in a more, and who in a less, efficient way than the preset ones.”

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“To my family, my strength, my motivation. To my mum who taught me how to dream, to my dad who taught me how to make them become real, to my sister who’s always willing to listen, to my grandmother with her positivity and love, to my cousins, my future. To my Marta who brought the smile on my face without even knowing how.”

“only boring people get bored”

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Introduction

In the industrialized nations over the two thirds of adults need or want to use glasses while there are around other 2 billion individuals spread among India, Africa and other third world countries, considered markets where the progress has yet to come, who might be the new target customers and the fuel needed to boost the industry for the future. (EssilorLuxottica 2022). Moreover, nowadays the majority of teenagers and young adults, belonging to gen Z and onwards, need and use glasses as stated from The Guardian (2022), highlighting a fast pacing and exploding up-trend. This is just a quick overview of a growing market that is seeing his golden age thanks to fashion, capitalism and technology; those three phenomena are shaping the way we see the world, ourselves and our needs; eyewear is now perceived as an extension of our style, personality and status.

The world market leader, which is literally ruling this multibillionaire industry, is an Italian group who lays his roots in the Dolomites and is currently providing vision solutions to around 100 million customers every year with revenues skyrocketing YoY and beating the best optimist stakeholder's expectations, showing healthy profit margins.

This is *EssilorLuxottica* Group, a 188.000 employees company spread among 150 countries with multiple selling channels ranging from more than 9.000 private physical stores, more e-commerce platforms and a huge external net of wholesalers to rely on. The group provides vision solutions from sport and high performances sunglasses to more iconic and classic fashion models like *Rayban Wayfarer*, it is estimated that today 1.4billion people around the world wear Luxottica's glasses. Luxottica has been founded by Leonardo Del Vecchio as a frames producer and has been a single and successful independent company until a few years ago when it merged with the leader company in the ophthalmic lenses segment, the French company Essilor which provides medical lenses to the group. Moreover, the eye contact lenses recently became a selling segment of the company with the acquisition of *Grandvision*. (EssilorLuxottica 2023).

In a huge multinational company like this one there are many teams that have to be highly coordinated in order to achieve the more and more ambitious goals that the management sets every year. I recently joined the company as an industrial planning intern for the Italian production of plastic and crystal Sun Lenses. My team has to, along with all the other people part of the supply chain, production and logistic planning, make sure that the products will reach the company's shops and, in general, every client on time, satisfying all the quality requirements that everyone is expecting from brands like *Rayban* and *Oakley*.

To be specific the team deals with the industrial planning activity of the lenses production scheduled in Lauriano (TO, Italy) and Castel Sant' Angelo (PE, Italy), also called "Barberini", deciding on how much, where and which type of lenses the plants are going to produce in the following weeks. The team has to balance the trade-off between in house lenses production or outsourcing to external suppliers able to help us meeting the production targets when the company's production lines do not keep up with the scheduled industrial plan. Moreover, it has to deal with all the capacity constraints that every production site has with his production lines, personnel, issues, absenteeism and working shifts.

In the company there are similar teams that deal with the same type of activities as the Sun Lenses Capacity one but taking care of the production of other components, the frames. The company offers to customers three main types of frames that can be distinguished in *metal*, *injected plastic* and "*acetate*" frames technologies. Hence, there are around other 20 people executing the same capacity planning activities; four teams are needed just to deal with the Italian sunglasses capacity planning production.

In this regard it was decided to structure the whole paper around an apparently simple, and maybe not even easy to spot, development problem with the aim to solve it and enhance the spreading of best practices from one team to the other. A thing that I could realize during my first months working in Luxottica was that there are so many thinking heads who should do and solve the same tasks, as capacity planners all belonging to the same typology of teams, to achieve the same goals but, at the end, they somehow do not follow the preset flow of actions and meet the target goal through different ways that, over time, might become deep routed practices making people forgetting about the real course of actions that they are supposed to take in order simplify the controlling and supervising jobs of managers. Hence, it can happen that some teams start doing other activities that seem useful and more effective to what they do and for what they want to achieve that might not be part of the recommended capacity planning activities. This phenomenon might lead to diversification in the operation flows among the 4 teams generating, at company level, some inefficiencies that do increase over time. The developed practices might be both less or more efficient than the ones suggested by the procedures, hence, in those cases the formers must be spotted and corrected while the latters should be analyzed and replicated through the other teams in order to never stop the endless improving tendency towards efficiency of this group.

Hence, the purpose of this thesis is to focus on a benchmarking activity aimed at interviewing the other capacity planning teams to spot, understand and maybe implement someone's best practices among all the other teams, members of the industrial planning department. Some individuals belonging to each team will be interviewed and will be asked specific questions to understand their weekly routine and a "*white space analysis*" will be filled with the final goal of underlining different procedures and routines that must be understood and analyzed. In second place, all the data collected will be discussed with the aim of taking away possible efficiency improvements, speeding up decision making processes and consolidating the smartest workflows.

In the final chapter all the conclusions will be summed up with the aim of informing everyone who is concerned about this field of how his team is performing its activities compared to the others and what can be done to improve the efficiency of a small but essential part of the Luxottica's supply chain information flow.

1. EssilorLuxottica

1.1 The Company: turnover and business model

The EssilorLuxottica Group is the global market leader in the eyewear industry for what the design, production, distribution of luxury, sportive high-quality sunglasses and frames under the stylish and technical point of view along with ophthalmic and contact lenses. The group spreads among around 150 countries with over 190.000 employees and a capillary web of more than 18.000 company owned shops thanks to his long and persisting *vertical integration* activity that has characterized the business modeling of the company and multiple e-commerce websites able to catch the attention of 600 million visitors in 2023. In the financial year 2023, the Group recorded a revenue of €25.4 billion, with an adjusted operating profit close to €4.2 billion. The comparison between the 2022 and 2023 financial years shows the impressive performances of the company, *image 1.1.1*. (EssilorLuxottica 2024).

€ million	FY 2023	FY 2022	Change at constant exchange rates	Change at current exchange rates
North America	11,637	11,492	+4.2%	+1.3%
Professional Solutions	5,337	5,243	+4.8%	+1.8%
Direct To Consumer	6,300	6,249	+3.8%	+0.8%
EMEA	9,184	8,749	+8.2%	+5.0%
Professional Solutions	3,949	3,802	+6.9%	+3.9%
Direct To Consumer	5,235	4,947	+9.2%	+5.8%
Asia-Pacific	3,036	2,842	+14.3%	+6.8%
Professional Solutions	2,088	1,943	+15.0%	+7.5%
Direct To Consumer	948	899	+12.7%	+5.4%
Latin America	1,537	1,410	+9.9%	+9.0%
Professional Solutions	825	781	+8.8%	+5.5%
Direct To Consumer	712	629	+11.3%	+13.2%
EssilorLuxottica	25,395	24,494	+7.1%	+3.7%

Image 1.1.1 – Luxottica Financial Report. (2023). “Financial Year revenue by region and segment, 2023 vs 2022”

The group owns the most known and recognized eyewear brands including Ray-Ban, the most loved eyewear brand in the world, Oakley, the leading global sport performance brand, Persol, Oliver Peoples, Vogue Eyewear, Arnette, Alain Mikli, Costa, Bliz, Bolon and Foster Grant. Licensed eyewear brands include Giorgio Armani, Brunello Cucinelli, Burberry, Chanel, Coach, Dolce&Gabbana, Ferrari, Jimmy Choo, Michael Kors, Moncler, Prada,

Ralph Lauren, Starck Biotech Paris, Swarovski, Tiffany & Co., Tory Burch and Versace for eyewear. The Group’s portfolio also includes a range of innovative lens technologies, including Varilux, the number one progressive lenses brands recommended by eyecare professionals: Transitions, the photochromic brand worn by over 60 million people worldwide, Crizal, Eyezen, Xperio and most recently, Stellest, *image 1.1.2*; along with a solid partnership with Nikon focused on designing solutions to correct vision, protect the eyes or improve comfort and performance to develop groundbreaking ophthalmic lenses. Further enriching the portfolio is the perpetual global license agreement signed with Eastman Kodak in 2023. To sum up the group portfolio is made of over 150 major brands and 13.000 patents. (EssilorLuxottica 2024).



Imagine 1.1.2 – Luxottica’s Financial Report. (2023). “Portfolio of lenses patents”

Also friendly called “EssiLux”, by Leonardo Del Vecchio, the group is a fully integrated player addressing the world’s evolving vision needs covering every step of the value chain, starting with a powerful R&D platform, made up of 44 R&D facilities worldwide, to design and innovate. Talking about manufacturing it owns 48 mass production facilities between lenses (35) and frames (13) and 3 main warehouses located in Italy, China and USA. The base country is Italy where the company was born and expanded acquiring many other competitors in the eyewear maker industry, from brands to lens producers. Today Luxottica has 7 production plants spread over the country: the operations Head Quarter in Agordo (BL), one in Cencenighe (BL), one in Sedico (BL), Pederobba (BL), Lauriano (TO) the plastic sun lenses maker, Castel Sant’Angelo (PE) the crystal lenses maker. On the other hand, there is one production plant in China, one in Brazil and one in the United States; one in India, to serve the local market, and one in Thailand. The group has three new laboratories in Europe, North America and Asia-Pacific, fully integrated with its logistics centers dedicated to the production of ophthalmic lenses, *image 1.1.3*. Talking again about

production numbers Italy is, in fact, the largest producer country with a 43,3% of the overall EssilorLuxottica's production, which is translated in 38,8 million glasses manufactured every year; it is closely followed by China with 38% of the production. (EssilorLuxottica 2024).



Imagine 1.1.3 – Luxottica's Supply Chain presentation (2022). "Worldwide group's facilities". Leonardo, Science for a new Vision

For what concerns sales: EssilorLuxottica is a leader, as well, in the optical retail business with LensCrafters and Pearle Vision chains in North America; Apollo, Vision Express, Pearle, Générale d'Optique, Atasun Optik, Salmoiraghi & Viganò, David Clulow and Synoptik in EMEA; OPSM and Mujosh in Asia-Pacific; MasVisión, GMO and Óticas Carol in Latin America; as well as banners present on a global scale such as Sunglass Hut, Ray-Ban and Oakley. The Group also operates its licensed optical retail brand Target Optical in North America as well as one of the fastest-growing managed vision care companies in the US, EyeMed Vision Care. EssilorLuxottica's distribution channels are complemented by its branded e-commerce platforms, including "Ray-Ban.com", "Oakley.com", "SunglassHut.com" and "OliverPeoples.com" as well as pure digital players like "EyeBuyDirect" and "FramesDirect.com" in North America, "VisionDirect", "Lenstore" and "Glasses direct" in EMEA as well as Clearly in Asia-Pacific. A true *omnichannel approach* to distribution replicates the magic of the Group's stores in the digital space, enabling consumers to enjoy everything from product customization to an endless aisle of frames.

The main company KPIs that drive the whole business are: the *service level* and the *quality standards*, while the fundamental and core value embodied by Luxottica has always been the *vertical integration tendency*. This has always been part of Leonardo Del Vecchio's vision who took every occasion as he could to acquire other businesses to expand his own.

Hence, he built a frames maker company in the seventies and left it 50 years later as a complete sunglasses company that carries out all the possible activities starting from producing all the parts of glasses: from the sand for crystal lenses to raw metal for manufacturing metal frames up to displaying the finished goods in the company’s luxury shops located around the world. Luxottica now uses only a minimal part of the help of third-party suppliers. Now the company designs and invents new products, takes care of their development, the production, logistics and distribution. Luxottica is open to new ideas and points of view, models and cultures, to continue to improve and maximize the development of the group's potential in increasingly competitive global markets. The Group aims at continuously expanding in the eyewear and vision care markets, as mentioned before, thanks to the growth of its business, both organically and through acquisitions, and by leveraging as well other pillars of growth such as design and technological innovation, brand portfolio management, international expansion and with the creation and licensing with strong brands, capable of evolving and excite consumers. Hence, the EssilorLuxottica is investing towards this direction to strengthen and balance the portfolio with new acquisitions and licensing contracts, to attract increasingly larger segments of consumers around the world with different tastes and lifestyles. Hence, Luxottica's expansion passes as well through the strengthening of the retail business, the consolidation of the wholesale network and a growing presence in e-commerce, department stores and travel retail. Here there is a brief description of the most famous company’s brands both acquired or under license agreements and their story on how they became part of Essilux’s portfolio, *image 1.1.4*:



Imagine 1.1.4 – Luxottica’s Financial Report (2023). “Luxottica’s brands portfolio”

Ray – Ban – bought – is a timeless style, simplicity and freedom of expression are the key values of RayBan, a leader in sunglasses and prescription eyewear for generations. Founded in Rochester, New York, in 1937, Ray-Ban was created by American company Bausch & Lomb, which was the first company in the US to produce optical glasses. During the First World War, the demand for optical instruments increased, and the company began to diversify its products by using the knowledge gained by its founders through their researches into optics in military field. By having already created special lenses designed to limit glare, tested by Army Air Corps, Bausch & Lomb began to create similar glasses aimed to be used by mass consumers. In 1937, the aviator-style metal sunglasses were introduced to the market, later renamed as “Ray-Ban Aviator”. The brand's surge in popularity was due to a large popularity in Hollywood, where classic Ray-Ban shapes frequented famous films of the time such as *Breakfast at Tiffany's*, becoming a icon of Hollywood, pop culture and a reflection of the American spirit that continued to play a part in elevating famous characters' elusive coolness. After a brief decline in the 1970s, Ray-Ban once again propelled into popularity in the 80s by Tom Cruise wearing the Wayfarer in *Top Gun* and again in *Risky Business*. Acquired by Luxottica Group in 1999 for 640 million dollars, after one year of deep restyling Rayban eyewear started selling it again in 2001; it is now the most important sunglasses brand of the world. (Rayban 2024).

Oakley – bought - was founded by Jim Jannard in 1975 as a motorbikes grips maker, was acquired by Luxottica in 2007 along with the recently acquired brand Oliver Peoples. It is now one of the most important names in sports eyewear on which world-class athletes have been relying on for the past thirty years. All Oakley's products are designed and manufactured in the famous California plant of Foothill Ranch, known for its lens technology research labs where the famous Prizm[®] patent was invented and developed along with other revolutionary patents such as the High Definition Optics[®] (HDO[®]) one. In addition to sunglasses, normal glasses and ski goggles, the Oakley brand is present with collections of clothing and accessories aimed at satisfying sports enthusiasts and casual style lovers. The brand's international distribution includes “O” Stores and Oakley Vault Stores outlets. (Leonardo, Science for a New Vision 2024).

Giorgio Armani – license agreement - signed the first ever *partnership agreement* between a fashion “maison” and a glasses maker in 1988. The brand Emporio Armani transformed the concept of sunglasses reshaping the common perception of people who used to link

glasses and sunglasses only to medical use. Armani's stylistic signature revisited in a fresh style, with innovative designs and trendy colors sunglasses that became part of everybody's outfit and giving a lot of importance to the design and style rather than the functionality. The longest Luxottica's partnership had to be interrupted in 2003 due to different strategic visions between Armani and Del Vecchio but started again in 2011 and it is currently secured by a contract until 2038. (Armani 2024).

Persol – bought - is a brand born and invented Turin in 1917 and was *acquired by Luxottica in 1995* with its production plant in Lauriano (TO) which was the second company plant after the main one in Agordo. Persol is a legendary Made in Italy eyewear brand, its evocative name is derived from the Italian words “Per Sole” which means “for the Sun”, those are identified glasses that inherit and preserve a culture of excellence, artisanal manufacturing and perfect alchemy between aesthetics and technology. The charm of Persol's design and high quality make of this brand a classy fashion items producer, with a worldwide appreciated style confirmed by the special link with the world of cinema and Hollywood. (Persol 2024).

Chanel – license agreement - signed a *partnership agreement in 1999* with Luxottica who was the first licensee for the production of Chanel eyewear collections. The product line is aimed at sophisticated customers and reflects the essential values of the brand: innovation, fashion, elegance and refinement. The two companies have been operating for more than 20 years and have lately renewed their agreement with a five-year license effective from January 1st 2020 until December 31st 2024, with the option of a three-year extension from January 1st 2025 until December 31st 2027. (EssilorLuxottica 2024).

Dolce & Gabbana – license agreement - is a world-renowned Italian fashion brand known for its luxurious and bold style. Founded in 1985 by Domenico Dolce and Stefano Gabbana, the brand has created a wide range of products, including clothing, accessories, and fragrances. Their first success came with their "Sicilian Dress" collection in 1986, which caught the attention from the press and public thanks to its unique style and their ability to combine tradition and innovation. The essence of Dolce & Gabbana, that lies in its contrasting yet complementary aspects, joined the Luxottica's style with a license agreement in 2006, launching eyewear collections characterized by innovative shapes

combined with luxurious materials and details. The two companies have strengthened their bond with a new contract started in 2020 and ending in 2029. (EssilorLuxottica 2024).

Oliver Peoples – bought - is a heritage brand born in the heart of West Hollywood in 1987 with the opening of its first boutique. Oliver Peoples has never relied on a logo but instead on fostering relationships with like-minded consumers who appreciate classy items; all the glasses are handmade using the best quality materials and applying exclusive colors and designs of the brand, the frames are produced in limited quantities. The brand was acquired for \$46.7 million in 2006 by Oakley which was consequently bought the following year by Luxottica which now manages high-end Oliver Peoples stores contributing to transform the brand into the most prestigious in the portfolio. (Oliver Peoples 2024).

Prada Group – license agreement - introduced the pioneering concept of eyewear as a fashion accessory, featuring it across its brands' collections. In 2000, the Group launched the first Prada and Miu Miu eyewear collection and, in 2003, a *licensing agreement* with the Luxottica Group was signed. Over the years and through cutting-edge communication projects this partnership led to the creation of the iconic collections Prada Minimal Baroque, Prada Cinéma, Prada Journal, Prada Ultravox, Prada Linea Rossa Impavid, Miu Miu Noir, Miu Miu Rasoir, Miu Miu Scenique, Miu Miu La Mondaine. The brand represents the best of Italian culture and tradition. At the same time Prada is one of the most innovative, prestigious and recognized brands in the world of fashion and luxury, with a strong attention to detail and new trends. The Prada eyewear collections reflect this union between style and refined elegance. The current licensing agreement has been renewed multiple times since 2003: in 2013, 2017 and is going to expire at the end of 2025. (Prada 2024).

Versace – license agreement - is a prestigious lifestyle and fashion brand, symbol of Italian luxury in the world, dedicated to those who want a contemporary and sophisticated style with a strong personality. Founded in 1978, the Gianni Versace S.r.l., under the Artistic Direction of Donatella Versace since 1997: designs, manufactures and distributes fashion and lifestyle products including haute couture, women and men ready-to-wear, jewelry, watches, accessories, fragrances and home collection. They introduced eyewear collections in 2003 by signing a licensing agreement with Luxottica which allowed the brand to express in a new way the aesthetics of the decorative elements that have always distinguished Versace; this partnership has recently been renewed with another 10 years contract that will expire in 2029. (Versace 2020).

1.2 Leonardo Del Vecchio, the Founder

Leonardo Del Vecchio was born in Milan in the thirties in a family emigrated from Puglia. He never got to know his father since died a few years later after Leonardo was born due to illness, for this reason his mother Grazia had to send him to an orphanage in Milan called “Martinit” at the age of 7 years old, in 1942, since her job didn’t allow her to raise him. Del Vecchio ended his academic path with the 5th grade and started learning a new job, he got hired at “Johnson and Johnson” in Milan at the young age of 14 years old; he worked there for a few years.

At the age of 26 years old he decided to start a company to work on his own and found an opportunity to do it in a small town located in the Dolomites, called Agordo; where a visionary mayor had the idea to give away for free the land to whoever would have wanted to establish a business there. The aim of this mayor was to create jobs and fight the dangerous depopulation trend due to the definitive closure of the mining activities in 1962 that represented the only and main income source of valley. For this reason, in 1961 Leonardo Del Vecchio packed his things and left Milan for the unknown directed to the Dolomites, followed by his small family.

Luxottica was legally founded in “Piazza Emanuele II” in Belluno the 16th of May of that year where Del Vecchio signed a contract with two other entrepreneurs, at that time owners of the glasses maker company Metalflex, who wanted to invest their capital to build a subsidiary company supplier of metal frames, although Leonardo asked to have the complete operational control of his activities and participated with his capital to own one third of Luxottica. As part of the agreement Leonardo had to take care and satisfy Metalflex’s production requirements, taking care of procurement and stocking activities for the parent company that, in exchange, was assuring him daily orders. As an external supplier he could also sell components to other clients, in case of exceeding production capacity. The Luxottica company was started with a capital of 500.000 Lires, the actual value of 6.000 Euros today.

Since the first days he put in place his entrepreneurial attitude by meeting as many people as possible, understanding the market and which kind of frames people liked more. All the people who met him always said that they were surprised by his remarkable kindness and dedication to his company, he was leveraging a lot on his soft skills. He worked for a few years with Metalflex as his only client but then he started selling a lot to external and new

businesses who were appreciating the quality of his manufactured goods. He soon realized that there was no comparison between the margins he was earning from selling to external clients compared to the ones earned by selling to Metalflex. The first time he thought he could make it on his own was when the American importer Boris Kliot, owner of an American eyewear shops chain called “Riviera Eyewear”, visited his company and left with a good impression of Del Vecchio so that he became the first American client of Luxottica. Hence, in the late sixties Leonardo’s two partners started worrying about his independence since his revenues coming from some American external and direct clients were surpassing the ones coming from Metalflex, giving him trust and confidence.

At that time Leonardo decided to launch his first collection of glasses by integrating the production and kitting of lenses in the company and selling them with the Luxottica’s logo. The relationship between Leonardo and his two other partners came to an end in 1969 when he decided to buy them out offering 45 million Lires each, for a company that was worth 500.000 only few years before. And from that Del Vecchio started his solo trip towards success with his beloved company. He encountered real success and a boost of sales in 1970 when he introduced and displayed his first collection at the MIDO (Mostra Internazionale Di Ottica) in Milan, at a lower price than all the other competitors in order to introduce his brand to the market. Surprisingly many visitors were attracted by the collection and by the style and class of his products resulting in a success in terms of sales. A week later he came back to Agordo with more orders than his production capacity could satisfy in a two years period. The following decade represented the boom for Luxottica with an increasing demand of sunglasses with a rate of 20% year over year and with an export rate of 90%, meaning that Luxottica was basically unknown in Italy. In 1972 Luxottica hits the symbolical target of 1.000.000 glasses manufactured in a year, of which 95% sold to non-Italian clients. To solve this huge lack of presence in the Italian market Del Vecchio decided to take the short-cut and made his first move towards vertical integration by buying a big Italian glasses wholesaler from Turin, called Scarrone SpA, allowing him to gain a bigger slice of market share in his home country.

In 1978 the company had a value of 950 million Lires with annual revenues of 15 billion Lires with a margin of almost 1,5 billion. In 1981 Luxottica could rely on 853 employees and, the same year Del Vecchio bought for 11 million dollars half of the American company “Avant-Grade Optics” becoming partner of one of the biggest wholesaler of the world in the glasses industry helping Luxottica to become the biggest glasses and sunglasses seller

on the US market with a 7% share. In 1983 he founded Luxottica Spain, in 1984 Luxottica UK and in 1985 he bought the second half of Avant-Garde. As a result of all these operations the company's revenues grew by ten times in only 5 years, from 1979 to 1984 increasing from 16 billion to 155 billion Lires a year.

The following milestone for Luxottica was the partnership agreement with Giorgio Armani in 1988 when the stylist didn't just want 10% on the margin made from the sales of his Luxottica's sunglasses signed with his brand but he wanted to become a partner of Leonardo who agreed to let him take 5% of his company. This was another revolutionary move made by Del Vecchio who was able to link in the consumers' mind the sunglasses as a fashion item that has to be part of everyone's outfit and style. Introducing the Armani collections resulted in an unexpected revenues boost since all Armani sunglasses alone ended up representing 50% of Luxottica's income. From the following decade Del Vecchio hence decided to expand his brand portfolio licenses.

On January 24th 1990 Leonardo, now a fifty-five years old man, flies to New York to make a new disrupting move for his company's history by taking Luxottica public on Wall Street. This move marked a significant step in Luxottica's journey, launching it into the global spotlight and consolidating its status as a powerhouse in the eyewear industry. It was traded on the New York Stock Exchange (NYSE) and, by going public, Del Vecchio aimed to unlock new opportunities for growth, raise capital for further expansion, and enhance the company's visibility on the international stage. The initial public offering (IPO) of Luxottica on Wall Street was welcomed with great participation and enthusiasm from investors with the stock price soaring on its first day of trading. The 23% of the company was put on the market and the company's shares were highly demanded, reflecting investor confidence in its long-term prospects and Del Vecchio's leadership. The IPO not only provided Luxottica with access to capital to fuel its ambitious growth plans but also showed its arrival as a global player in the eyewear industry. This move resulted in a 24% year over year growth rate in the nineties.

What contributed to make Luxottica a worldwide famous sunglasses maker was the Ray-Ban acquisition along with the one of "US Shoe Corporation" in 1995, the owner company of the largest glasses seller chain of the world "LensCrafters", bidding a record-high offer of 1,4 billion dollars to buy the group. This operation resulted in doubling Luxottica's revenues in only one year. The first decade of the XXI century has been represented by the

impressive development of the China's market, the development and implementation of SAP, the new software system for companies and the acquisition of Oakley in 2007. Since June 2004 though, Leonardo, at the age of 65 years old decided to step down as a CEO and leave the lead to a new and young manager called Andrea Guerra, a man who contributed to bring and spread a new philosophy and a new company structure to Luxottica. Guerra kept leading the company for another ten years but then was fired by Del Vecchio, who never actually left the managing role, due to different point of view regarding some strategic and private life visions. He took back his manager role, in 2014, for a few years right before the biggest move ever made by Luxottica, at that time, a 8billion revenues company with about 640million euros of profit, selling nearly 80 million glasses each year. The patron of Luxottica was thinking about expanding his group following his vertical integration vision and decided to absorb the biggest lenses maker of the planet: Essilor.

The merger between Luxottica and Essilor happened in January 2017, a 50billion euros deal, creating the EssilorLuxottica group which today basically owns around 20% of the industry. This merger brought together two industry giants, Luxottica and Essilor, the ophthalmic lenses global leader maker. This operation has been the result of years of mutual respect and collaboration between the two companies. Luxottica and Essilor had long been partners, with Luxottica relying on Essilor for the supply of lenses and Essilor on Luxottica's extensive distribution network. The aim of this merge was creating a vertically integrated eyewear giant that could offer and cover every possible need of any customer worldwide. However, the merger presented some regulatory challenges since it was required to be approved from antitrust authorities in several countries, including the European Union and the United States, due to the size and scale of the combined entity. For the first three years as a group, the contract was stating and giving the same powers to Del Vecchio and Huber, the former Essilor owner; although the new group had to be traded on the Paris stock market but 32% of the ownership were kept by Leonardo, along with 31% of voting rights, resulting the controlling partner. And at the end of the third year, all the participation weights finally counted, hence, Del Vecchio with his majority decided to appoint as new CEO of the finally merged EssilorLuxottica Group, the actual president Francesco Milleri.

Leonardo Del Vecchio passed away only one year and a half after his lifelong dream achievement on June 27th 2022 at the age of 87 years old and he is now resting in his

hometown, where everything begun, in Agordo. He left a multibillion dollars group, glasses market leader on a worldwide scale and with ambitions to keep revolutionizing it, going towards sustainability and equality, providing eyewear solutions to help everybody in the world to increase their life quality. (Ebhardt 2021).

1.3 Fashion Eyewear Industry, trends and adaptability

Luxottica Group mainly operates in the sun eyewear industry which has a significative bond with the fashion market since sunglasses do not have specific properties but are mainly about style and trends. This strong link between these industries begun when, as mentioned before, Leonardo Del Vecchio, started to sign partnership agreements with fashion maisons such as Armani.

As widely known the fashion industry is affected by volatility related to consumer’s behavior, influenced by the easiest things, constantly evolving, reflecting the dynamic interplay between innovative design and practical functionality. For this reason, the sunglasses eyewear is now strictly following these fast changing trends trying to adapt with its issues and peculiarities to the fashion market demand and oscillations. As a result of this union the eyewear industry can be analyzed under a fashion point of view trying to find common links with the clothing and bags segments that might underline emerging tendencies of the market. As shown in the next graph, the trends of the fashion industry are highlighted by geographical region, image 1.3.1.

The Middle East and North America are expected to be the regions with the highest growth potential in 2023

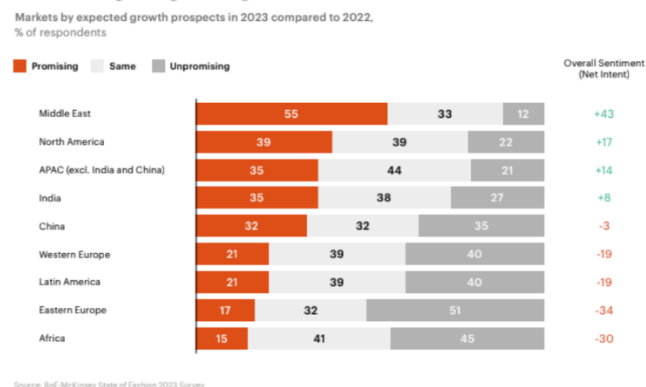


Image 1.3.1 - McKinsey & Company (2023). “The State of Fashion” - Fashion Growth potential by region.

Over these last years, for example, it could have been highlighted that there are five main trends that reflect the fashion eyewear industry in general, such as the tendency of costumers to wear:

- bold and *oversized frames*, *image 1.3.2*.



Image 1.3.2 – Luxottica’s New Collection presentation (2022). “Versace’s typical oversized frames”. Leonardo, Science for a new Vision

Oversized frames have made a striking comeback, offering a bold statement piece for any outfit, reflecting the more and more popular trend of looking for outfits that can easily make you recognizable. These larger frames don't just elevate the style; they also provide broader coverage for eyes. Oversized options can suit almost every face shape and style preference, an iconic brand that is launching many oversize collections is Versace, known for its baroque and flashy style.

- The *retro revival vintage-inspired* designs taking the fashion scene once again, bringing back the charm of past decades with a modern twist. Persol and Oliver Peoples are the two important brands that base the launch of their new collections on classy and retro styles, *image 1.3.3*. (EssilorLuxottica 2022).



Image 1.3.3 – Luxottica’s New Collection presentation (2022). “Oliver People’s vintage frames”. Leonardo, Science for a new Vision

These retro frames bridge the gap between nostalgic appeal and contemporary fashion. The third trend is about wearing *transparent and pastel frames* for those who favor a more understated look, these subtle yet chic options blend seamlessly with any look, offering versatility and elegance. The light and clear materials also give a fresh, airy feel to your appearance, perfect for any season.

- Wearing frames made of *sustainable materials* is another fast-growing trend along with the general increase in the demand for eco-friendly options. Brands are increasingly utilizing recycled plastics, biodegradable materials, such as polyamide BIO, and responsibly sourced wood and bamboo. This trend is not just about looking good; it's about feeling good by making environmentally conscious choices.
- A lately trending type of sunglasses is the “*Smart Eyewear*” where technology is integrated into the frames, to ease the connection between real life and virtual world with Rayban as a leading brand for this category thanks to the collaboration with Meta, *image 1.3.4*. These high-tech glasses offer various functionalities, from augmented reality experiences to health monitoring features, all while maintaining a fashionable look. (Fashion Network 2024).



Image 1.3.4 – Luxottica’s New Collection presentation (2022). “RayBan x Facebook collection”. Leonardo, Science for a new Vision

Talking about the economic side of the fashion industry, it has experienced a substantial growth over 2021, a huge rebound from the first year of Covid-19 when the crisis happened, showing strength to the market and sending a safe and sound signal of great interest from the wealthy public that has not, apparently, been affected by the economical regression. The numbers speak for themselves with a 21% of revenues growth from 2020

to 2021 and an EBITDA margin doubled with respect to the previous year. Unluckily, events that happened in 2022 contributed to slow down the whole market a bit at the beginning of the Russia-Ukraine war and rising inflation rates. Overall, this is still a safe and healthy industry with really promising growth projections among continents in the coming years. Nevertheless, this industry was projected to grow between 5 and 10% in 2023 by Mckinsey and has been valued as much as 107 billion euros only on the Italian market by “Confindustria Moda” at the end of the same year.

In a forecasted market where companies’ incomes largely depend from household incomes, a lot of attention has to be paid on low income customers who might be more likely to cut expenses regarding apparel and all the other discretionary spending. Secondly, the new generations are more keen to cost savings in order to manage their finances and this is what has been stated by some voters belonging to gen Z compared to other millennials or baby boomers. In third place, another sales driver might be how companies plan to address issues that matter to consumers and lastly on how to cut costs and run cost controlling activities without stopping investments useful to maintain strategic positions in the market like Luxottica’s. Lastly, an eye should be kept on physical shops due to a larger trend that saw the shifting of the demand through e-commerce channels since shoppers got used to buy more online during Covid 19, McKinsey also pointed out, though, how in the luxury world brick and mortar shops are still so important since the purchasing experience justifies the high prices and makes the difference between a high-end fashion brand and the competitors. For these exact reasons managers are trying to develop nuanced customer profiles basing their studies on demographics and locations in order to provide new selling and communication channels, price strategies and product categories. Moreover, investigating on how to capture value from new advertising channels without diluting brand value and, lastly, evaluate how model like Releases, Rentals and Repairs can be integrated into the value proposition. (McKinsey & Company 2023).

2. Luxottica Supply Chain, current structure

2.1 Supply Chain Structure

The concept of Supply Chain has been defined as the alignment of firms that bring products of services to the market. (Lambert. Douglas. Stock. Ellram 1998). The supply chain includes all those activities that contribute to source, schedule, manufacture, distribute and sell a product. Managing a supply chain is, hence, very complicated since there are many individuals included in each step, many SKUs to be managed, costs to be controlled and a market demand which must be always satisfied. For these reasons, a profitable and efficient supply chain consists of a trade off between increasing the service level and keeping as low as possible the inventories at the same time with costs.

The Luxottica's Supply Chain is an integrated and complex and huge process that goes from the raw material sourcing, the production and manufacturing of lenses and frames up to the stock and inventory, logistics and distribution to end up on the fancy shelves of the company's shops. There is a Supply Chain department for each of the major production areas which are Italy, China and USA, although the Italian one is the most important since it manages the 40% of the overall glasses production. Numbers will give a better idea of the reason why it has to be efficient and detailed because with a year production of 104,7 million frames, of which 63,8 require sun lenses that results in a 70,3 million pairs of sun lenses that have to be produced, it is very easy to make mistakes and to waste money, energies, time and, above everything, the customer's trust. The worldwide EssilorLuxottica's distribution and labs system is shown in image 2.1.1. (EssilorLuxottica 2022).

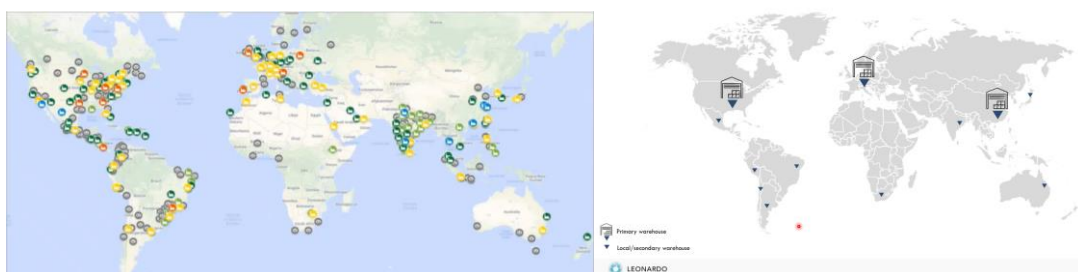


Image 2.1.1 – EssilorLuxottica's Supply Chain presentation (2022). "Worldwide stock points and labs presence". Leonardo, Science for a new Vision

The structure of the department reflects the flow of activities have to be done in order to hit the prefixed targets and to guarantee the service. Luxottica’s supply chain is aiming to meet and exceed customers’ expectations. To be more specific there are 5 main activities performed by 5 different types of teams and every type of team is split again into 4 main categories to deal specifically with the supply chain of sun and crystal lenses, metal, injected plastic, and acetate frames. The 5 activities follow the logical flow of information and the process steps and are called: *demand planning, SIOP, industrial planning, production, and logistics & distribution, diagram 2.1.1.*

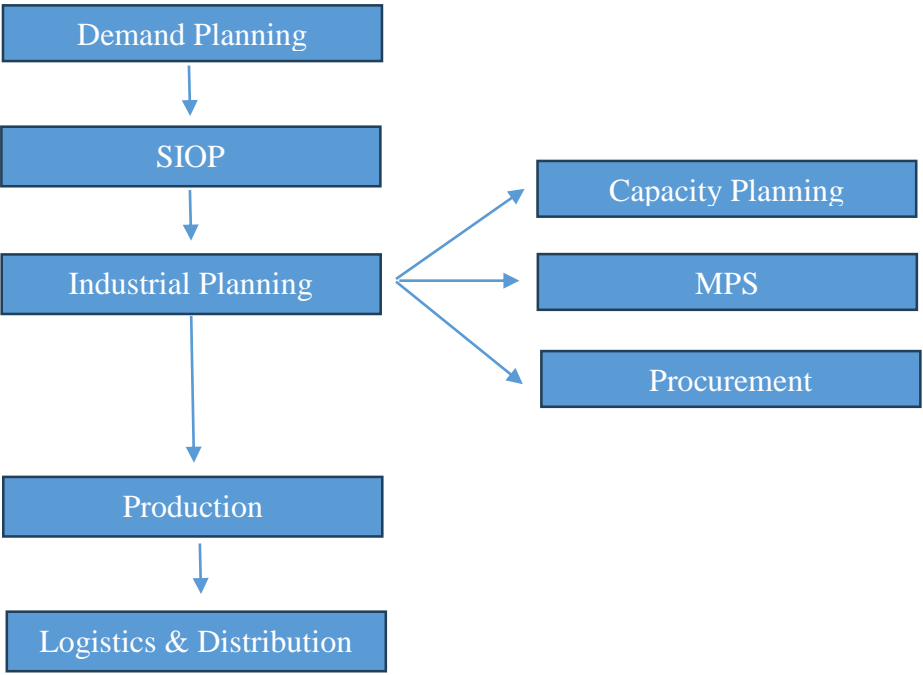


diagram 2.1.1 – Luxottica’s Supply Chain Information Flow

The *demand planning* teams have important activities to do since from their forecasts the whole Supply Chain will schedule each process, raw materials will be bought, workers will be employed, production plants will try to free space in their inventories to be able to stock new products and many other plant activities will be done according to the forecast budgets. These teams will generate an output in terms of forecasted production volumes that will have to be delivered by a certain day in a specific place within the Luxottica’s intercompany plants and distribution centers. By definition, forecasts are wrong and not precise, hence the demand planning teams’ tasks are very complicated and the only sure thing they can rely on are the external clients’ orders that are placed and paid; those, of course, have a high

priority since they mean money that are coming in for sure and contribute to the company's reputation within the industry. All the forecasts have to be well defined and split between every production cluster of frames and lenses since every team further down in the information stream will base his analysis and activities on those specific numbers.

The SIOP, which stands for Sales, Inventory & Operations Planning, team is responsible for interpreting the demand planning and marketing teams' forecasts, allocating the lenses and frames production specifying where and when a forecasted type of lens should be manufactured making an essential decision making activity and deciding the trade-off between in house manufacturing or outsourcing to external suppliers. It takes into consideration labor costs, lead times, quality of production output and other geographical factors in order to maximize the efficiencies of the supply chain trying to meet every stakeholder's expectations starting from the controlling department who always wants to control and cut costs to the plants' managers who try to keep up with their KPIs requiring a certain level of saturation of the production lines and of the workforce employed who cannot be paid and left without nothing to do. Moreover, the SIOP team has to take care of other two fundamental activities, more at a higher company level, that have to be performed twice a year and are the *five years plan* and the *annual production allocation budget* completed with the contribution of the demand and controlling team. The SIOP activities' output is a monthly industrial plan and a Gantt chart of the production activities released every month the first week of the month, this document contains all the demand planning output split and carefully allocated to the most suitable production plant that has to manufacture those lenses or frames with the lowest cost possible and the highest quality standards maximizing, at the same time, the stock, distribution and transportation efficiency guaranteeing on time deliveries. On the other side the five years plan is a long term industrial plan that covers the future production lenses and frames allocation in the various production plants spread among the world; it is an extremely difficult activity that requires many weeks of work which aims to help the management to understand long term trends from the supply chain point of view and to decide where to invest, in which geographical area and in which type of production line, for example. The other second essential activity is the annual budget that is released in November and has to forecast and give an idea to all Supply Chain teams of the volumes that will have to be produced in the following year. This activity will give an output in terms of production volumes numbers and money

budgets that have to be allocated but are useful to give a pre-view to all the plants to help them to organize on time with personnel and general production issues.

The *industrial planning* covers a bigger area in the Supply Chain flow which is split among many teams that practically perform the core activities of scheduling by physically planning and communicating with the production plants, hence they pass the information flow from the office to the plant. The first team that works on the SIOP team's output is the *capacity planning* one. This team takes care of verifying if the proposed schedule from SIOP team is feasible in each specific plant. It is checked if the capacity constraints of the production lines might somehow limit the production targets or if personnel is sufficient to keep up with the forecasted production volumes, they have to constantly check the inventory health in order to monitor the available space in stock analyzing which products are difficult to sell hence occupying space for longer than needed time. Part of their job is to monitor one by one every production resource to be able to tell which is the load of a specific labor process relatively to its capacity, moreover they have to suggest and highlight to the SIOP team if any of their production forecast cannot be met due to production capacity constraints, also called bottlenecks. Hence, as it is easily understandable the SIOP and capacity planning teams work closely, both use a common Supply Chain software called SCP (Supply Chain Planner) useful to automatically plan in a determined plant on the specific production resources all the needed production load, taking in consideration all the constraints and everything starting from the demand loads; the output of these activities is displayed as well in dashboards useful to monitor some critical production clusters and to have a quick and detailed overview of the whole production resources on one paper. To sum up, the main goal of the SIOP and capacity planning teams is to look forward in the following months and try to optimize the installed capacity and balancing the load of the plant in advance aiming to avoid bottlenecks.

All the outputs of the capacity planning teams are analyzed by two teams at the same time: the MPS and the procurement. The *MPS team*, also called "Master Production Schedules" is the one responsible for transforming the orders from paper to WIP, work in progress, with the production plant outlining which product need to be manufactured, in which quantity, when and on which resources. They process the proposed and checked industrial plan sending real orders to the various plants giving specific info about production lots, all the treatments that will have to be performed and the numbers for all the raw materials required for the desired produced quantities considering the production wastes as well.

They have to deal with the inventory trying to maximize the efficiency aiming to avoid overstocking; hence, to reuse available resources stocked in order to meet one of their KPIs: decreasing as much as possible the monetary value of the inventory but, at the same time, avoiding shortages. They enable the calculation of the amount of workforce needed, hence the number of employees who need to be hired or fired and in which shifts they have to work. The MPS teams deal with all the delays of production and make sure that the late production lots are started in order not to miss the delivery deadlines.

On the other side the *procurement* teams take care of placing orders to suppliers to make sure each plant will have all the production materials and services in the right quantities and on time, in the most possible efficient way and taking into account the Luxottica's ethical standards. They have to manage the purchasing requests (PR) and accept and validate the incoming goods. They talk to suppliers that produce plastic, sand, salt, particular colors powders and all the ones who produce essential raw materials needed for the glasses production but, at the same time, they take care of placing orders for all the items needed to make the production process happen, starting from oil for the machines, sand papers for the finishing of frames and every single purchase request made from the plant to make the routine activities happen. Moreover, another task they have to accomplish is to place orders to external finished products suppliers when the SIOP and capacity planning teams decide that some part of the frames or some lenses must be purchased from an external supplier mainly due to capacity constraints. While doing these activities they manage to make the suppliers work with a decoupled planning method which basically is forcing the third party to produce in advance compared to Luxottica's needs and stock the goods in its inventories until the trucks go to pick up what the plants need; this is possible thanks to Luxottica's huge contractual power that allow the company to make suppliers use their own stocking space just to avoid any waiting time in case of production delays of the supplier. These teams are valued on different KPIs such as punctuality of deliveries of the ordered material to the plants and WOP which is basically the time that has occurred since the purchase orders have expired and the ordered goods are not delivered yet. A smaller but essential team that work closely with the procurement team is the *sourcing* one. They take care of looking for new suppliers, contact them and contract prices, logistics, terms and constraints to get the best possible deals. This team is unique for all the supply chain and has a tighter control process since money are involved, hence managers want to check the activities done by the team. The process to insert a new supplier is long and detailed since

many requirements must be satisfied and all the terms concerning payments, prices and money in general need to be approved by higher management who cannot afford to loosen control on these activities.

The *production* stage processes all the information given by the upstream teams and takes care of transforming them in actual production output. Every plant gets and process its information, they do not take care of planning activities, hence it is not their responsibility to make the schedule work. Every plant is just informed about the arrival date of raw materials and the supposed shipping date, all the other supply chain teams have to make sure that the plants constraint are respected and not exceeded. By definition, a production manager has to worry about production problems since his KPIs take into account the efficiency, the average process lead time, the personnel management, the inventory health and the production lines saturation. His duties are to make the plant work and respect the required output to guarantee the service level and to not blow up the complex machine which is the Luxottica's supply chain. Every plant talks with its respective capacity planning teams to deal with the health of the inventory since at some point they might run out of space due to obsolete items stuck due to lack of demand. Moreover, a plant planner has to talk to the procurement team who has to buy for the plant all the material required to do the everyday activities from paper to oil, baskets and wheels.

The *logistic & distribution* department has to deal with the stock and shipments of both semifinished and finishes, kitted, products to connect the plants' output with the market demand, contributing to the profitability of the group's supply chain by optimizing stocks, costs, service and distribution. The main distinction consists of who is the "final client" for the production plant such as Luxottica, intercompany shipments, or third-party clients. In the first case, the distribution connects Luxottica's production plants with other production plants or with logistics hub. In general, the intercompany shipments take place when part of the sunglasses are required at the kitting centers in order to be assembled or to be treated with a particular process not available in the original parent plant. The majority of these intercompany shipment are managed by an automatic software that daily places orders from one plant to the other; it is part of the duties of the procurement teams to take care of these shipments, in particular of the ones between plants located in different countries where the air shipment must be planned. On the other side the kitted finished product can be shipped to the logistic warehouses, one in Sedico (BE) and one close to Bologna for the Italian

production, where the goods are stocked and then shipped to all the proprietary shops and wholesalers when they place the orders. In the second case if the final clients are external companies, the goods might be shipped straight from the production plant to the end client since they mostly process the kitting stage on their own. The distribution part is a crucial one, as all the others, since with a low efficiency, it might happen to incur in high transportation costs, in delays and in many expensive mistakes. Millions of SKUs are managed at the same time and it is complicated to deliver the right product at the right location, on time and at the right date, at the right quantity and quality. Moreover, is essential to meet the required service level and requirements, along with controlling the overall supply chain costs and deliver the goods in a sustainable way for planet and people trying to limit inventories to useful goods and trips to reduce emissions. The first step that has to be processed is called the *visual replenishment*, which is an activity performed by the teams who give an overall view to the logistic stock to see if there are any critical needs in terms of inventory that might compromise the service level in case of lack or products or in case of exceeding stocks that “steal” space from the other SKUs. Secondly, a *reorder activity*, also called “Min/Max”, is performed when some SKUs reach the minimum preset level a reorder must be done to preserve the strategic minimum quantity at stock to prevent any drastic change in the demand that might affect the service level. The following activity that has to be done is called *stock rebalancing* and it consist in checking the planned arrivals to be sure to have enough space to stock the goods which are coming next and to anticipate some changes in the demand; all the changes are pointed out by the demand planning teams who try to detect anomalies from the market and each change goes through above mentioned information flow of the supply chain, hence it takes time before hitting the logistics and distribution teams can be prepared. Hence, outcome of some well done distribution and logistics activities would be to be able to deliver the goods within a few days from the order placement while to produce it, in a MTO (Make to Order) logic, few weeks would be required. Clearly the outcome of these activities is impacted by the supplier and transportation availabilities that must be taken into account, as much as the forecast accuracy that might lead to shortage or excess stock risk.

E-commerce platforms and stores are the final internal “clients” of the company’s supply chain output, the ones that make orders and sell the products to end costumers. They represent the way the company stays in touch with the market, hence they gather data, opinions and try to understand new emerging trends analyzing, along with, the demand

teams, sales. The teams responsible of managing these last mile supply chain steps are assessed on their % of out of stock since they have to make sure to always be covered and never be in the situation of having to say no to a client, moreover, as all the others on the accuracy of their forecasts.

2.2 What the Supply Chain manages: New Product Introduction and other product categories

The commercial year for the company, since it belongs to the fashion industry, spins around two main events that are the launches of the new eyewear collections. These events are called new product introductions or, more commonly, people refer to them as New Product Introduction or NPI. With this term every employee refers to the main activity that gives birth to the company's competitiveness and helps to keep up with the fast-changing trends of the eyewear fashion industry. The eyewear maker launches around 2.500 new models every year split between 2 releases, the first one around February and March and the second between July and August. The releases can be of two types: "New model" or "Added Variant", meaning that the new collection has a completely new style and shapes, in the first case, and that has only some changes like some new colors or accessories in the second one. (EssilorLuxottica 2023).

Launching a new product requires many complicated steps with tight time schedules and no chance to make mistakes. The supply chain overview of this complicated process might be segmented in development and engineering of the new models and some incremental production steps to bring the product to the market. All the development and engineering steps are followed by the CSP (Commercial Sales Presentation) where all the brands new prototypes, connected to the two main yearly launches also called N1 and N2, are presented to the clients. The following milestone is tight to capsule collections and to the fashion weeks that do not involve all the brands, a small amount of samples of the new collections is produced and those manufactured sunglasses are sent to be shown on the red carpets. The SRB (Samples in Representative Bags) is the moment when all the samples are presented to the sales representatives, explained and left to the agents who have to go around to visit clients and show them all the news. Right after, there is the AP (Avant Premiere) step that consists in the First Shipment date aiming to ship the products to the first level distribution center. The FSD (First Shipping Date) is the following step and is related to the moment when all the new models are displayed and distributed to the physical shops for the first

time. This distribution is performed following priority criteria since the new products should be provided to clients in order of importance. Missing these important deadlines would result in huge reputation and sales damages contributing to waste all the important investments that were made before and on the NPIs.

The final and real release date are called FQ1, which includes all the quantities that are manufactured within a month after the go to market day where are served the priority customers, e-commerce and owned shops; and FQ2 which represents the quantity needed to meet the sales of the second month after the go to market date. The NPIs contribute to enrich the company's portfolio and to keep the company's main business going on.

Hence, Luxottica's Supply Chain mainly focuses on glasses, sunglasses and lenses but there are many other items that are not considered part of the ordinary production core business that have to be processed and distributed such as customized products, spare parts, AFA, contact lenses and GNFR. All these products belong to the B and C classes of the Pareto diagram but are still an important side of the business that requires many teams to deal with it.

The *spare parts* are all the single pieces belonging to sunglasses that are sold separately to clients in case of broken parts. When an SKU is codified in the system, all the components written into the bill of materials (BOM) are considered spare parts even though the accessories fit every tailored need, since the client has the same fit for red lenses, for example, as for white lenses. For this reason in the BOM cannot be found, for example, red lenses codified as spare parts for that SKU, they will be just codified as an accessory free from any BOM. Spare parts are sold through every channel.

The *customized products* have a dedicated management system due to their intrinsic nature, the main brands that offer this kind of services are Oakley custom products (OCP) and Ray-Ban with its dedicated line "Ray-Ban REMIX". All the customized products are sold through e-commerce, on smart shoppers and in stores with customization option on site. The production of these items is performed in dedicated custom labs, separately from the mass production: one in Atlanta for Rayban Remix, one in Footil Ranch for Oakley, one in Sedico for both brands and there is an on-going project in Asia aimed at implementing a new custom lab able to satisfy all the custom needs of the Asian market.

With *GNFR* the company refers to all those products that are not made to be resold to customers but are useful for the regular production activities. They consist in staff

equipment, optical materials, production and sales equipment; they are all codified and managed in two different ways: massive centralized items are managed centrally with forecasting activities, 12 months in advance, and then distributed to sources while particular ones are directly requested by the teams to the procurement ones. The GNFR product category includes products like sunglasses displayers, shopper bags, related materials useful for selling such as gadgets and branded items, staff equipment such as uniforms, badges and lab equipment like optical tables, lenses.

The *contact lenses* segment has recently been acquired with the acquisition of the market leader of the industry “Gran Vision”, *image 2.2.1*.



Image 2.2.1 – EssilorLuxottica’s Supply Chain presentation (2022). “Grand Vision logo”.

Leonardo, Science for a new Vision

This segment is now generating \$2 billion in revenues with the main market located in EMEA and in North America which represent the biggest part of the business (90%). The forecast of this growing market is about 7% per year resulting in the sales of 16 million units worldwide, up to 90-95% of the forecasted orders are stored in the Sedico warehouse to be able to guarantee an high service level. The production of contact lenses is outsourced and performed by the Big 4 pharmaceutical companies: Cooper Vision, Johnson&Johnson, Bausch + Lomb and Alcon.; they are all not reusable products differentiated in spheric lenses for everyday use, Toric shape for astigmatic people, multifocal and colored lenses for parties and special occasions.

The *Apparel Foot and Accessories* (AFA) is a new business segment which sells everything that is not related to eyewear and under the name of three main brands such as Oakley, Costa and Bliz. AFA is still not big in terms of revenues for the group but it has a lot of offer by contributing to diversify the EssiLux product offer. Oakley produces products for high end costumers and the brand mainly focuses on mountain sports such as snow and cycling, both off and on road but also into golf and military equipment. Costa is a North

American brand, as well, mainly focused to address fishermen needs or for all those people who love being by the sea, hence it produces lifestyle goods to perfectly match with Costa's sunglasses. Lastly, Bliz is a new sport eyewear brand positioned under Oakley, pricewise, it is mainly focused on the EMEA market which is more centered on technical products sold at a lower cost. All these products such as clothes, gloves, helmets and shoes are mainly sold in brick and mortar shops since people like better try them on before purchasing, hence the e-commerce is not the best selling channel. (Leonardo, Science for a New Vision 2024).

2.3 Capacity Planning Team: close up of the activities

By the books the output of *capacity planning activities* should enable managers to make informed decisions about production schedules, assessing if there are sufficient available resources to do what has to be produced while satisfying the required service level. It is useful to ensure that all the teams along the supply chain can work effectively, fast, without incurring in dead periods and within the budget. There are five main and principal advantages for companies with an efficient capacity planning team which can be summed up as: *resources availabilities and management* since the main goal of capacity planners is to make sure that all the production constraints are respected and all the activities are scheduled in advance to maximize the production output with the available resources, both human and automatic. Secondly, to *monitor and control the health and the value of the inventory* guaranteeing a high inventory turnover ratio minimizing the goods at stock and the value of the inventory. In third place, for *cost saving purposes*. The capacity planning activities have to be *performed on a daily basis* and regularly, with a constant monitoring of data coming from the upstream and the downstream part of the supply chain information flow and with weekly meetings with the surrounding teams to constantly assess the situation and to communicate to the plants any change that might affect the scheduled or the future scheduling activities and to prepare them and every individual working in the value chain. Moreover, the company can rely on a precise *production schedule* that allocates the demand needs and spread them over time and on the correct resources, resulting in a detailed and timed production plan able to coordinate the core business of a manufacturing company. Lastly, the huge advantage of having a capacity planning team incorporated into the supply chain flow is that they can give insights to plant planner and to managers on *how the market is evolving in the long term*, hence where to allocate future investments and where to focus

from buying new specific tools, to new production lines, to where to built new production sites, in which geographical area to better satisfy new emerging markets demand or reinforce existing ones.

It is clear that, before planning production volumes, and doing all the other activities, on existing resources, the capacity team has to have a clear and updated view of the available resources. The *mapping* part consists in building files holding fundamental information about the nominal capacity and load capability of each resource, getting information such as on how a production resource works, how many items is able to process in a working shift or how many workers are required to make it work. Moreover, the human resources must be mapped as well with the estimated worker efficiency, average absenteeism rate and number of working shifts opened. Once all the resources are mapped in a dashboard file, the following step is to get forecasted data from the demand planning team analyze it to see how it changed from the previous forecasts. Those data should fill the resources loading files to see which one is not able to bear the forecasted load and requires precautions actions to avoid possible bottlenecks. Moreover, analyzing capacity issues help to understand on how and on which plants to distribute the production volumes and how to rebalance the load to minimize useless investments, outsourcing and to maximize the effectiveness by respecting the deadlines. Finally, the output of these activities helps to manage the personnel and the work shifts.

Furthermore, proceeding by carrying out these above mentioned tasks, helps achieving bigger company goals, creating boundaries between colleagues and enhancing communications between them avoiding any surprise in terms of unseen events. Working and processing information as a single entity is positive for every team since each team member is informed and know how he is positioned in the supply chain in term of production volumes weight and priority. Starting from this awareness, *the actual capacity is analyzed and assessed to understand if it will be possible to meet present and future requirements, to test hypothetical scenarios and, even more important, to be able to anticipate changes.* Anticipating possible situations is a valuable activity that each capacity planning team tries to accomplish with success in order to reduce dangerous production inefficiencies that would result in a waste of money. This might be pursued by doing resource rebalancing activities or smart stock managing. Hence, capacity planning is a frequently changing activity that has to adapt and follow all the possible market variations, although it always mainly follow three main production strategies:

1. Make To Order (MTO): this is one of the most know strategies where the capacity planning teams releases orders only when the demand planning ones communicate that clients made a real order with an amount in terms of volume, economic value and required shipping date. It is a just in time logic.
2. Make To Stock (MTS): this strategy is the opposite of make to stock since here all the production is based on historical forecasts, the inventories are filled depending on future orders hypothesis. It is the best approach for mass production, especially for products like eyewear with a lifecycle longer than 18 months.
3. Correspondence: this is a hybrid strategy between the first two since consists in a massive in advance production with smaller production lots orders released in case of some orders placed by clients. (Tashakori 2015. Ghalekhondabi. Suer 2018).

The most useful instruments used by a capacity planning team are the ones useful to reflect the chronological order of scheduled production lots such as Gantt diagrams to monitor the chronological order of production series, Kanban dashboards useful to spot and highlight the number of activities of each team, the critical path chart to assess possible critical steps in the production of each item. Moreover, many types of dashboards are frequently downloaded to have a tailored view of some data based on the specific needs of the team. Under the software point of view the most common ones are SAP, SCP, Power BI, Power Query, Excel, BOXI, JDI and SQL databases all fundamental to perform queries and extract useful information and analysis from datasets. (SmartSheet 2024).

There are many common errors in which a capacity planning team could incur, these are all related to the data base source from where they start doing their analysis. For example, there might occur mistakes during the database updates or during the manual uploading of a data or, much more frequent, some logic mistakes in complicated formulas. A chronological data series might be missing or making decisions considering different priorities criteria than the one recommended by managers depending on more economic, financial or production and inventory logics and, as a direct consequence, the not correct definition of production timings or budget. (Hasanuzzaman. Hamammed. Nahar 2022. Lucchetta 2016).

3. Sun lenses process overview

The Italian production of Sun Lenses is split between two important production plants: the first one in the northern part of the country in Lauriano (TO) and the second one in the center in Castel Sant' Angelo (PE) which respectively manufacture plastic and crystal sun lenses. The production of sun lenses is planned starting from the frame's requirement, they have to be produced in advance to be ready when the relative frame is finished so they can be kitted together in other plants and then shipped to the logistics centers.

On every pair of lenses can be applied many different treatments in order to make a unique product with particular properties completely depending from the collection that it belongs to. For both plastic and crystal lenses there is a huge distinction since the very beginning of the production between normal lenses, also called standard, and polar lenses that have properties linked to light shading. Going on with the macro production flow the huge differentiation between every pair is made in the coating branch where the lenses are treated in many different ways starting from being colored, being layered with anti-reflex properties or mirroring treatments and many other options. They might go through some other treatments useful, for example, for branding the product.

3.1 Plastic Sun Lenses Production in Lauriano

The Italian Plastic Sun Lenses Production is manufactured, as mentioned before, in the Luxottica production center of Lauriano (TO), *image 1.3.1*.



Image 1.3.1 - EssilorLuxottica's Supply Chain presentation (2022). "Luxottica's Lauriano (TO) plant". Leonardo, Science for a new Vision

This production center was acquired by Mister Leonardo Del Vecchio in 1995 from a famous sunglasses maker from Turin owner of the Persol brand. Lauriano used to manufacture both frames and crystal lenses for Persol but now has been transformed into a huge plastic lenses production site since majority of the Italian crystal lenses production has now been moved to the Barberini plant and the frame production to other plants mainly located in Veneto. The Lauriano plant is able to generate an output of around 60.000 pairs of lenses each day of which only around 10% are polar and 33% are treated. The main clients of this plant can be defined into two categories which are: other Luxottica sunglasses kitted in other plants or external clients' sunglasses.

The production workflow of a plastic lens can be summed up in 8 main stages that are pooled and performed in three different branches of Lauriano plant: Injection, Coating and Special lenses department. The stages are displayed in *diagram 1.3.1*.

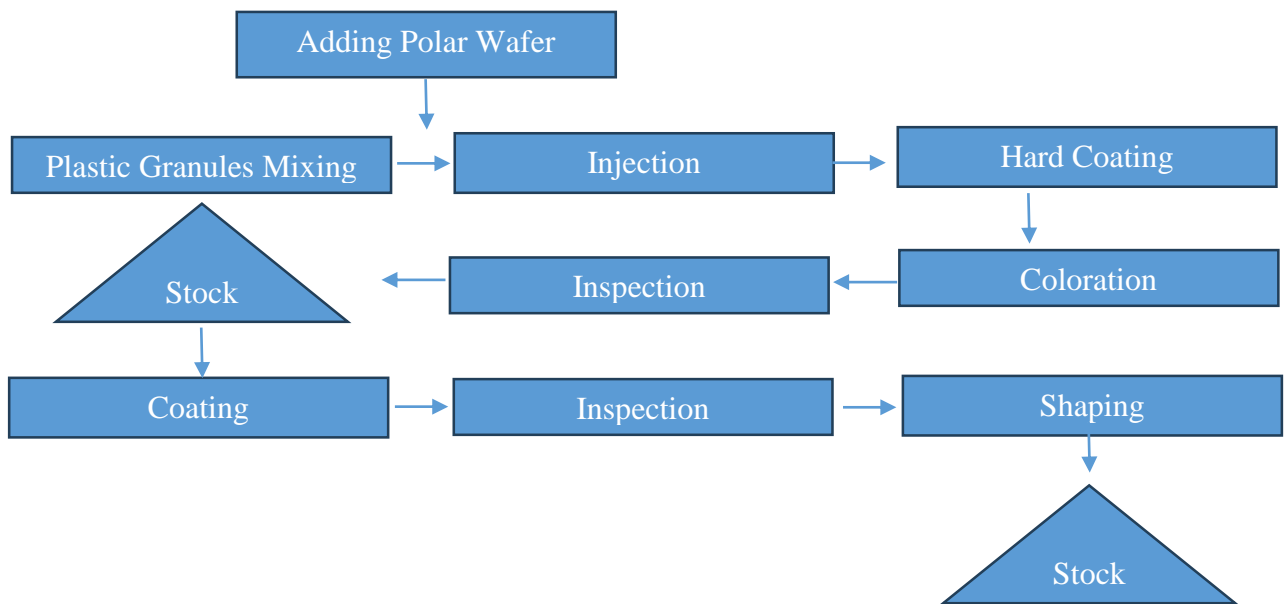


Diagram 1.3.1 - Plastic Lenses production phases

The production flow is basically the same for all the lenses in the first stage while the second and the third ones are made for tailoring and differentiating the lenses adding properties and a shape to obtain the final product. (EssilorLuxottica 2023).

The most used plastic granules to print plastic lenses are made of PolyAmide (PA), PolyCarbonate (PC) and PolyUrethane (PU) three types of synthetic polymers made by the linkage of, respectively, an amino, a carbonate and a urethane group of one molecule to a carboxylic acid group of another.

- PA is a transparent material that when is wisely mixed with additives it guarantees really good UV protection, it can be produced with the classic method such as derived from petrol and it can be manufactured in a BIO version as well. It is a hard polymer and it is used for luxury brands collections, *image 1.3.2*.



*Image 1.3.2 - Luxottica's Plastic Lenses production presentation (2022). "Polyamide granules".
Leonardo, Science for a new Vision*

- PC is a transparent material that already has UV shielding properties, but it requires a dehumidification treatment before being used in the production. It is more flexible and can be better adapted for sport products.
- PU used only for the casting production method that has to be added to specific plastic pigments to obtain further properties.

These polymers have to be mixed with other colored plastic pigments, studied and produced in the American EssilorLuxottica's lab of Columbus (Ohio), to obtain the base color of the lens and to give it some optical properties. They are bought in 20 or 40kgs bags and these measures will determine the size of the production lot, hence each one will give an output of 20 or 40kgs of finished product which is equal to around 1600 lenses. Both plastic granules and pigments are put in a cylinder where they are mixed in the correct proportions as stated in the recipe. When the desired mixture is obtained the material is taken and prepared for the injection in the molding machines.

There are two macro families of lenses that can be distinguished into *standard* and *polar lenses* and they are originated at this stage since the prepared mixture is split into two groups; the first one will be molded as it is while the second one will be added to a *polarizing wafer* that is already placed in the molding cavity where the plastic polymers will be injected. Hence the granules are heated up and injected into the molding holes where they will obtain the desired shape thanks to the high pressure in that cavity. These semi-finished lenses are commonly called “meniscuses”, *image 1.3.3*.



*Image 1.3.3 – Luxottica’s Plastic Lenses production presentation (2022). “Injected Meniscuses”.
Leonardo, Science for a new Vision*

All the *molded lenses* produced by 11 molding machines working simultaneously are taken and quickly inspected to see if there are any major defects such as air bubbles or scratches. If they pass this first rough and *informal inspection*, they are loaded on automatic runners that bring them to the third step, otherwise they are thrown away and prepared for being recycled.

The third step consists in a process called *Hard Coating*, a useful treatment to prevent the lens from scratches, everyday shocks, for esthetic purposes to make the lenses smoother and shining and to better preserve the polarizing wafer in the case of polar lenses. Lauriano has three big machines called FISA1, FISA2 and Kuntec which are basically three long basins that contain 9 smaller basins each. Each machine holds both liquid mixtures of basic and acid pH soaps able to produce the expected results. In FISA1 and FISA2 can be *dipped* all the standard lenses while in the Kuntec machine only the polar ones. Right after the hard coating processes the lenses have to go through an oven to dry the surface and the hard coating polymerizes giving the lens the correct degree of superficial hardness.

The *coloration* is performed in the hard coating basins, to be precise between the first and the second polymerization, and it can basically be distinguished between *solid* and *gradient* coloration. The solid coloration gives the lenses a monochrome color while the gradient one sprays the color to give a nuance effect on the surface. Depending on which color the lens has to get, it has to go through different hard coating procedures that are going to make it more or less permeable for the color. For solid lenses the hard coating process will be less permeable while for gradient ones it will allow the lens to be colored with a different intensity since it will not be permeable in the same way on all the surface. All the items are dipped in the color basins following a scheduled timing depending on the required color intensity and nuances, *image 1.3.4*.



Image 1.3.4 - Luxottica's Plastic Lenses production presentation (2022). "Gradient lenses on Rayban model". Leonardo, Science for a new Vision

The fifth step consists in the first *inspection* that precedes the first stock activity. This process is completely automatic and is very strict since Luxottica's quality standards are set to be higher than the average. Imperfections, scratches and stains are not allowed. If minor imperfections are detected by the automatic machines, also called "Gevis", the lenses are reintroduced in the production process where the superficial layers are removed and they go through the hard coating again.

In the following stage of the production flow all the lenses are stocked and become part of the inventory. Here the items might be withdrawn and shipped to other plants or directly to external clients that both will have to shape the meniscuses since plastic lenses are recommended not to be shipped with the final shape since, due to physical limits of those polymers, it is easier that they might be deformed during the transportation for temperature or pressure issues. On the other hand, most of the meniscuses are withdrawn to be sent in the second half of the production line where they will be treated shaped and tailored for each collection of each brand.

The *coating* step is where all the treatments are performed. It can be done in two places depending on the accuracy required for the treatment. The first is a room called the “*white room*”, an hermetically sealed environment, where all the lenses have to be cleaned and dried before going in to prevent dust from being around and to lay on the lenses surfaces while treated creating aesthetic imperfections; moreover, all the workers, who have to treat lenses in there, have to wear a total body suit, gloves and shoes covers. In this room all the treatments can be performed. Secondly, some coating processes can be done in a not sealed environment within the production plant. As mentioned before all the meniscuses are collected from the stock and are pooled in small baskets that contain up to 50 pairs of lenses.

All the pairs that have to be treated in the room are washed and dried before being entered in the room. Here a variety of treatments can be performed such as the anti-reflection, the mirroring and hydrophobics treatments that guarantee to the lenses easy to clean properties really appreciated from the end customers. Another automatic machine called VC sector pull out all the meniscuses from the boxes and load them on the machines.

The anti-reflection coating treatment is performed on the internal side of the lens, it has to be done on machines called Leybold or Satis that can be located in the white room only. Every lens is loaded on a specific spheric part of the machine called “the dome” where the target surface is exposed to the treatment, *image 1.3.5*.



*Image 1.3.5 – Luxottica’s Plastic Lenses production presentation (2022). “Satis machine”.
Leonardo, Science for a new Vision*

The mirroring activity is performed only on Satis machines but the biggest difference with the previous treatment is that it is performed on the external surface. The mirroring can be both uniform on the surface or gradient, hence, nuanced. In case of nuanced mirroring the Satis machines are not sufficiently advanced to give the expected result, hence these are performed on others called FET and OPTOTECH, *image 1.3.6*.



Image 1.3.6 - Luxottica's Plastic Lenses production presentation (2022). "Solid Mirroring coating on plastic meniscuses". Leonardo, Science for a new Vision

The third big treatment is the hydrophobic one, or commonly called easy to clean, is performed on both sides of the lens and on a machine called Cotec. The peculiarity of this treatment is that it has to be done as the very last one since, after that, the lenses are so smooth that is not possible to apply any other films or coating process, not even to hold it tight since it is so slippery.

After the white room the lenses are transferred to the *special lenses department*, the last one in Lauriano, where they are branded, serigraphed or shaped according to the required frame shape and collection they belong to. In this last branch of the plant can be performed the other easy to clean treatments on a machine called Antifinger where all the pairs are dipped in the hydrophobic solution; here are treated all the lenses that do not require other treatments, hence do not have to go into the white room only for the easy to clean that can be performed outside it as well, hence the washing and drying processes are skipped. As mentioned before the shaping, if required, is performed as the last step of the production line.

All the manufactured pairs go back to the *inspection* machines to be controlled again and, if all pass the quality standards, are packed and shipped to the clients. (Leonardo, Science for a New Vision 2024).

3.2 Crystal Sun Lenses Production Castel Sant' Angelo (Barberini)

The Italian Crystal Sun Lenses Production is manufactured, as mentioned before, in the Luxottica production center of Castel Sant' Angelo (PE), *image 1.3.1*.



Image 1.3.7 - Barberini plant (PE) Luxottica's Supply Chain presentation (2022). "Barberini plant (PE)". Leonardo, Science for a new Vision

This plant has been acquired in 2018 with a 140million euros deals with the crystal lenses maker company Barberini spa. Barberini has more than a century of history since it has been founded by Pietro Barberini in 1963 who created a 440 employees and 80 million euros revenues company in the heart of Abruzzo. With this acquisition Mister Del Vecchio acquired the Barberini's Germany plant, as well, in charge of making the glass from the sand and ship it to the Italian plant to be treated and labored. This kind of operation completely reflects the Luxottica's mindset and vision of business planning, always aiming to vertical integrating the whole supply chain. Over the years Barberini developed patents to innovate the crystal eyewear production and to improve the efficiency and the quality of the glass that is a useful material for its high scratches and mechanical stress resistance, adapt to guarantee a long-term sustainability and gives the possibility of being shaped to obtain different geometries while maintaining crystalline purity for high quality vision.

Today the Castel Sant' Angelo plant produces 50.000 lenses a day and ship shaped lenses to worldwide "clients" both Luxottica's plants, such as USA and Brazil, and external clients.

The whole production of a pair of premium crystal lenses starts in Germany, to be specific in the Gruenenplan area. The silicium and the other materials are extracted from the sand pit, transported to the plant, stored and mixed together. The proportioned sand mix is then melted together in 4 high temperatures ovens that heat up the materials up to 1200 Celsius. The melted outcome is poured into steel molds where it is pressed to obtain the initial form

of a lens. All the lenses output goes on a long cooling belt where it is transported for a few meters to cool down. At the end of the process all the lenses are inspected and packed ready to be shipped to Italy.

The Italian production flow can be summed up in 11 main steps, *diagram 1.3.1*.

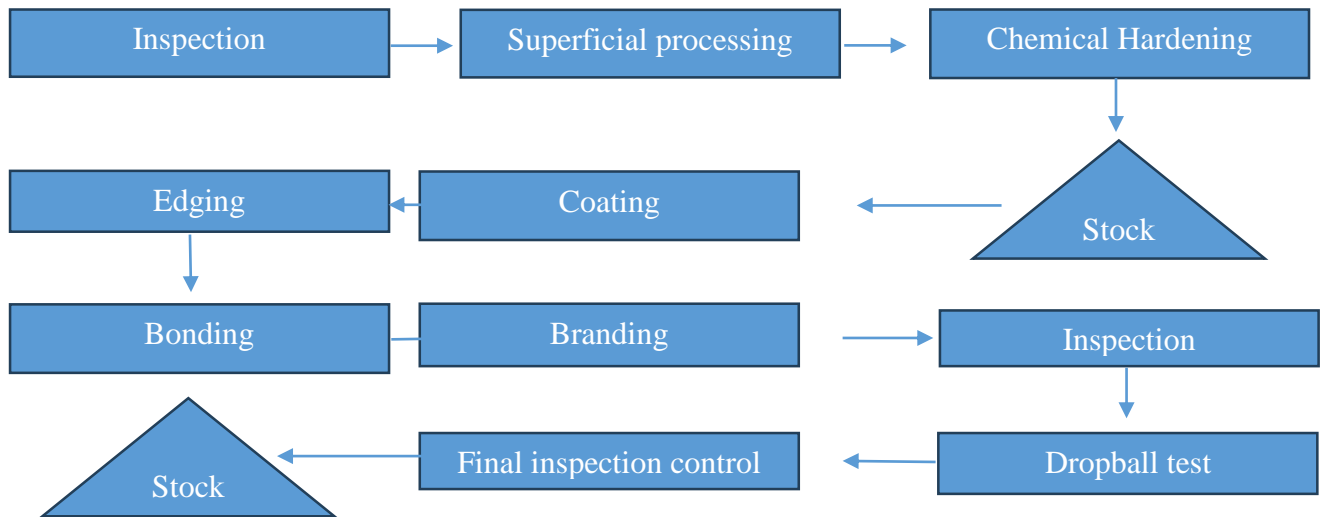


Diagram 1.3.2 - Crystal Lenses production phases

When the lenses arrive in Italy are unpacked and stocked. The first step of the production flow is the *inspection* to check if all the items meet the minimum quality requirements, *image 1.3.8*.



Image 1.3.2 - Luxottica's Crystal Lenses production presentation (2022). "Raw lenses shipped from Germany". Leonardo, Science for a new Vision

The second stage is one of the most adding value steps in this production chain since are performed two important *superficial processes* that remodel completely the raw lens shipped from Germany: *lapping* and *polishing*. These procedures consist in removing the majority of glass from the raw lens to make it thinner, more lucid and transparent; they are performed by to highly precision machines, that's why all the items must be washed before being processed. These processes generate a lot of glass dust that has to be washed away from the lenses and gathered to be sent again in Germany to be melted and recycled.

The third step consists in the *chemical hardening* where all the lenses are dipped in some studied hot salty solutions to acquire special resistance properties. Compared to the thermal hardening it offers a bigger mechanical resistance a minimal surface deformation. This process consists in dipping the lenses in a 400 °C hot solution where a superficial ions exchange occurs which put pressure on the exposed surface creating a compact layer that prevents the glass from breaking under strong impact forces.

The following production activity is the *edging* since the crystal lenses can be sharpened before the shipping and distribution given that they are more resistant to external shocks. It is an extremely precise phase with a tolerance of tenths of millimeters.

The fifth step in this production process takes place in the *coating* branch of the plant where all the lenses are treated with the goal of improving the optical and the color properties. On some lenses can be applied up to 16 thin layers that give tailored properties depending from the collection or the requirements of the clients. Among the most important treatments there are the nuanced or gradient coloration, the mirroring, hydrophobic and anti-reflection treatments. For the first mentioned type of treatment the color is vaporized on the surface while a part of it is shaded to prevent it from being reached by the color while the mirroring is performed with the same method but with special “paints” that are able to reflect up to half of the light that hits the lens, *image 1.3.9*.

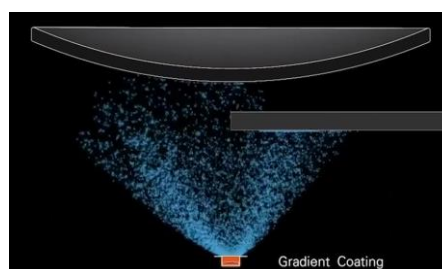


Image 1.3.9 - Luxottica's Crystal Lenses production presentation (2022). "Nuanced mirroring".

Leonardo, Science for a new Vision

The anti-reflection and hydrophobic treatment are performed and give the same results as for the plastic lenses treatments. At this point these semi-finished items are stocked in the inventory, ready to be withdrawn and proceed with the following steps.

As sixth stage the lenses are *bonded* together with another lens, usually both from an external supplier, which is, actually, the part that gives the color or the polar properties to the final lens formed by the Luxottica's transparent lens bonded together with another one.

As one of the last processes the lenses are *branded* and serigraphed by hand or with laser. After that they are immediately sent to the last inspection control that is extremely strict since Luxottica's standards are higher than the market average.

The ultimate quality control is to statistically test each production lot with the drop ball test, a qualitative method that tests the crystal resistance to impacts and their tendency to give off splitters. A 16 grams iron ball is dropped from a 1,27 meters on the lens to test its hardness. (Leonardo, Science for a New Vision 2024).

4. *Teams benchmarking activity*

4.1 *Internal Benchmarking activities*

Internal team benchmarking is a strategic research aimed at assessing the performance, processes, and practices of various teams that are involved in similar activities or tasks. This strategic process aims to identify best practices, areas for improvement, and opportunities for optimization by leveraging insights gained from comparisons with other teams performing similar tasks or activities. Team benchmarking enhances collaboration, knowledge sharing, and continuous improvement within the organization, ultimately increasing performance and competitiveness. By comparing the performance metrics, methodologies, and outcomes of different teams, organizations can gain valuable insights into their own operations. These insights can highlight areas of strength, uncover weaknesses, and identify opportunities for improving.

The process of internal benchmarking typically involves several key steps. These include defining the objectives and scope of the benchmarking initiative, identifying relevant performance indicators and metrics, collecting data from participating teams, analyzing the findings, and disseminating the insights gained to facilitate informed decision-making.

The benchmarking activity object of this theses project research was achieved by interviewing the four capacity planning teams to understand which practices they are used to regularly do every week in order to enhance an effective decision making process and to be able to show useful data and think of helpful insights to tell to plant planners to achieve and maximize the production, reducing the stock, meet the demand and the required service level without missing the tight and important delivery dates. (Leibfried, McNair 1992. Zairi, Youssef 2009. Coding 2009).

The activity has been split into three main steps: interviews and data collections, cleaning of collected data and assessing sessions with the various teams' members and, finally, the creation of the White Space Analysis.

1) Interviews and data collection: with this research, five Luxottica's capacity planners have been interviewed, they are all based in the operations head quarter office of the company located in Agordo, Italy. Their teams take care of the Italian production of the company that cover the needs of 40% of the worldwide demand. The interviewed people are listed here in chronological order:

- an intern of the *capacity planning metal frames team*

- the head of the *capacity planning acetate frames team*
- the head of the *capacity planning injected frames team*
- the head of the *capacity planning metal frames team*
- a *capacity planning sun lenses team* member

All the interviews have been scheduled in presence and where structured in the same way: two main questions aimed at letting the interviewee talk as much as he or she could while explaining the routine activities. There was, then, a moment for the interviewer to ask the questions he came up with while listening to the interviewee. The two main questions that have been asked to everybody were:

A - *“Which are the main routine activities that, on a weekly basis, your team has to accomplish? How do you organize the team’s weekly schedule?”*

B - *“How do you technically provide the data and result you are required to, which tools do you use, which is the architecture of your decision making process?”*

The average length of each interview has been of 30 minutes. The collected data have been taken on a digital note book used to write chapter 4.

- 2) Cleaning of collected data and assessing sessions: as mentioned before the goal of this benchmarking activity was to find out which activities every team does and how they do it in order to assess possible gaps between the activities of each team and how they accomplish them. All the gathered data have been cleaned, for example repetitive information have been deleted, incorrect data have been verified and possible overlapping information have been sorted. Secondly, each team interview’s result has been showed to the interviewed of each team who had to confirm and correct, if needed, the information.
- 3) White Space Analysis: with the gathered data collected during the interviews a white space analysis table, or also called GAP analysis table, has been filled displaying on the rows all the mentioned activities and, on the columns, the name of each team, marking every activity that everyone does. This type of graph is very useful to immediately visualize the white spaces, hence the activities that some teams don’t do compared to the others, chapter 5.1 *“White Space Analysis and Preliminary Findings”*, page 59. The result and outcome of each interview will be discussed in each of the following

paragraphs; the theoretical capacity planning duties have been already anticipated in chapter 2.3, “*Capacity Planning Team: close up of the activities*”, page 30.

What could have been found was that the week of every capacity planning team is organized to gather and analyze data of the past weeks, to forecast the incoming production volumes and to approve the proposed SIOP production planning activity, already explained in *chapter 2.1 page 23*, that weekly allocate the production of frames and lenses in each production site. Each team has two main weekly meetings with their plant planners at the end of the week, where they have to give them directions of what to do, when to do it and gather feedbacks of how the production activity is really going in order to adjust data to reality. Moreover, there are other two monthly activities that have to be prepared week by week, hence a smaller amount of time has to be dedicated to these duties each week. The four, before mentioned, meetings are:

- *The Pre-Capacity and Capacity Planning meeting*: these are the most important meetings of the week since are the moment when each team communicate with the respective plant planners to display the new production schedule, to answer perplexities, doubts that might arise from the plant’s side to check if the actual schedule is being respected and to detect possible production capacity issues that might impact the future output of the plant. It is based on the analysis and the delivery of some documents like the *industrial plan* and the *resource management* dashboards, which are the most important ones.
- *The Inventory meeting* is generally held every Thursday morning or afternoon and has the aim of assessing with the MPS teams of each plant the current situation of the stock for each production cluster, giving insights about how obsolete and exceeding lenses are stocked, hence the health of the inventory; it is valuable for accountability purposes as well.
- *The Long Term meeting* should technically take place once every three months and it does in some teams while others tend to make it happen more often and it is useful to managers to assess the ongoing trends and anticipate possible problems that might arise in the future in terms of production needs. In this meeting every team expose its concerns, about possible production lines capacity constraints, supported by data and gives directions on what the company should do to keep up with the fast-paced fashion market.
- Pre-SIOP and SIOP meetings are two essential moments, that happen once a month, where the capacity and SIOP teams talk to assess possible issues that might come up in the future in terms of allocation of production, geographically wise and resources management by analyzing the trends. In these meetings the production of some SKUs might be moved from

one plant to another in a different region basing the decision on parameters like cost, taxation policy, quality of labor, logistic effectiveness and distribution chain.

4.2 Capacity Planning Metal frames Team

Two members of the team have been interviewed, respectively, the team leader and an intern. They both had to reply to the same questions and they mostly covered the same topics, clearly giving a different point of view due to the different roles covered. The two interviews were conducted separately.

As a result of both the interviews it can be stated that the main Metal Frames Team's activities are the *analysis and modification of the Industrial Plan*, along with the most important and complementary activities which are the *resource and inventory management*; both the activities are performed on a weekly base. Moreover, there is a *long term activity* that is performed on a monthly basis but has to be modified week by week, as the SIOP activities.

This team manages one of the most important company's production clusters, in terms of revenues and of historical value since metal frames have been the first products to be part of Luxottica's portfolio and a large number of the most iconic sunglasses is made with metal frames. The team has to plan the capacity of three different production sites which are the Agordo, Cencenighe and Rovereto plants. Each one of these plants has its dedicated industrial plan that has to highlight to the three plants planners what to produce in the current and following weeks, which production resources will be loaded, how and with which production cluster. It is essential to run the production plant since everything starts from that. The data analysis to be able to give useful directions to the plant planners is performed every week in the first two days. On Monday a Metal Frames capacity planner waits for the new Supply Chain Planning software, or also called SCP, unconstrained production suggested schedule for the following 10 weeks, to update the industrial plan file that will show all the refreshed data computed by the software over the weekend.

The Supply Chain Planning software has the duty to automatically plan and spread the production demand, uploaded on the system, scheduling it over the following weeks thanks to few easy rules and priority criteria. It is part of the capacity planner job to modify the industrial plan each Tuesday morning basing the modifications on new information about delays, capacity constraints, different priorities and every circumstance that might arise and

influence the production output. The industrial plan numbers should represent the best fit between the technical requirements to fulfill the machines capacities, to meet the market demand on time, to respect the production constraints and the general plant capabilities. For how the metal frames production is organized, the Agordo and Cencenighe plant produce single components of frames such as the temples, the temples tips, the front frame, the nose pads, the rivets and the screws. Hence, these plants do activities such as molding and shaping of the components from raw metal and these are labeled as level 1 tasks, of which output is required by the activities of level 2 such as some of the treatments that take place in other parts of the same two plants. While the Rovereto plant is more dedicated to the frames finishing, kitting and some final treatments, hence finishing activities considered of level 3, needed for colored or particular frames. Each step of the production needs the output from the previous one that, in the metal frames case, is often accomplished in different plants. Every level category is technically treated as a cluster of activities and allocated to different production resources in terms of machines and geographical location under a scheduling point of view.

For each plant a tailored industrial plan is needed to fit the different productions processes and to adapt to the different machines resources. What they have to do is to create a detailed table that will be shown to the respective plant planners with an indication of the expected production output for the coming weeks and with the production forecasts for each cluster with its production volume and that takes into account all the possible variations and their impacts that might occur; the analysis starts from adjusting the number of the week before, from the inventory and resources management activities and from a deep and frequent communication between the different teams and the plants. Moreover, the industrial plan will have to show the requirements for all the materials needed to manufacture the metal frames and all the relative bill of materials components. Attached to this main table further information should be displayed to help the plant planners to visualize the single load of every machine resource.

The industrial plan is shown every Thursday morning to each of the plant planners in three different meetings that last around 30 minutes to one hour each. In these meetings the three resources capacity dashboards are commented as well to better understand how each machine resource should be working and to give an idea and get a feedback from the plant planners for how the resources are really performing, to avoid gaps between the theoretical planning and the real production.

The *capacity dashboards* are three different pdfs, one for each plant, that are used to monitor and manage the machine resources from which the industrial plan is created and to plan eventual new investments or new hiring rounds for new personnel in case of more labor intensive resources. The three dashboards are made to clearly show the capacity, the load and the utilization of each resource, with the utilization computed as the ratio between the load and the nominal capacity. The utilization for every resource is mapped for as many weeks as the industrial plan aims to forecast, hence a capacity planner is able to see if future production volumes will be manufactured without exceeding the production capacity. A resource is both the real mean through which the production is made and the relative informatic entity that maps what the resource can do and is used for planning purposes. Each resource can be set as constrained or unconstrained on SCP for scheduling purposes. If a resource is constrained it means that it's production capacity might represent a possible bottleneck; for this reason the automatic planner has to spread the production volumes over more or less days, taking into account the possibly critical resources. Moreover, every resource is measured with the most appropriate measuring system for that kind of production; the two most common ones are unit/hours and hours/unit and the difference stays in measuring how many units can be manufactured in one hour and how many hours are required to manufacture a determined amount of units. The metal frames production resources are mostly measured in hours/unit, allowing the scheduler to plan with more flexibility thanks to the easier way to allocate workload and the possibility to distinguish between different items with different cycle times, hence to better balance the machines load.

The important activity that this team does is to analyze the result of these dashboards every Wednesday morning and to adjust, eventually, the industrial plan if there is any alert that might give concerns about the future production capacity. During the Thursday capacity meeting the feedbacks from each plant planner are very important to better understand how the dashboard model fits the reality and to realize how realistic and feasible is the current production schedule proposal.

Another complementary activity, that is actually performed by the inter of the team, is the weekly monitoring of the production output that is stocked in the inventory. It is the first activity of the week on Monday morning and is useful to analyze the results of the previous week. These data is the first that can ring a bell in terms of bottlenecks or mapping mistakes because an abnormal output might be the first sign of some issues, on the plant level, and

must be tackled immediately or at least mapped to schedule the future weeks knowing the new constraint. The production output is split into three different production stages, recalling the level number explained before, called: raw, treatments, finished products used to better focus on each part of the frames creation.

Following this activity, every Tuesday the *inventory* of each plant is analyzed and monitored to spot trends and to see which frames are becoming obsoletes. The inventory is mainly measure in euros since it is very important for all the controlling teams that, every trimester and at the end of the year, will have to publish the inventory level that has an important weight for investors in terms of the EssilorLuxottica's stock price. As it is easily understandable, the priority is to ship and sell the most expensive items since, in this case, the monetary value is worth more than the units quantity. This activity and analysis is performed with the metal MPS team who has to better understand what SKUs is planning and to adjust the production mix in order to slow down some frames output or speed up others. The technical name of that last mentioned activity is called off-setting production volumes.

Another essential activity performed by this team is called the "*Long Term*". It should be done once every three months but has recently been changed with a frequency of three weeks. Since it is a strategically important task it has to be done with accuracy and regularly to avoid lack of data. The aim of the long term is to help managers to decide about future investments basing their assessment on the considerations of technical data concerning the capacity production of single machines; hence the aimed output is to underline eventual new machines, new software or new more modern or with larger capacity tools that have to be bought to avoid constraints. That's why this task has to be done step by step every week, to be able to gather every data, especially from the dashboards, and analyze trends that might suggest a direction of the market and the shift towards different costumer preferences of style or use. The fashion side of this industry has a huge impact on these kinds of decisions, since it is not easy to allocate budgets to build something that will produce goods that might not be sold anymore in a matter of years, just for fashion trends, while the company invest money with potential returns on investments within a decade. The capacity planner's task consists of simulating new collections loads and new trends that might require to use the resources that already have an utilization around 80/90% or trying to forecast the future trend for a time span of about a year. In order to make the finals decisions, every plant planner is always asked for his opinion and recommended to share

suggestions from a different point of view. The result of these meetings is shared and discussed again with managers.

The last important two activities are the *Pre-Siop* and the *Siop meeting* where the capacity planners meet the respective area supply chain managers to discuss about how to allocate resources in order to meet the future demand of finished products, hence they talk more about workforce, procurement, inventory, wider plants issues and timing, about new production plants and in which geographical area. Every scheduling activity starts from considerations about the required quantity of finished products since all the components have to adapt and be ready to satisfy the demand. Personnel is one of the most delicate topics for a plant since it is a very expensive resource, often not much efficient that cannot be left without workload but, at the same time, must be planned to be sufficient to guarantee the service level, with the expected quality and on time. That topic is the main one in each metal frames SIOP meeting. In each monthly meeting, the focus is on analyzing the workload of the next 3 rolling months where the aim is to compute the expected standard hours of work required to satisfy the forecasted production. This task has multiple advantages and it is useful for both the plant planners and the controlling teams. As a matter of facts, these analyses are conducted through the same resources used by controllers: to compute the standard hours and the relative workforce cost and management. The standard hours are computed by gathering data from the dashboards and the industrial plan analysis as well, the current load and the average absenteeism, given by the HR department, is used to compute the number of people needed. At the SIOP meeting these numbers are discussed with managers that treat the data from an economic point of view and check the calculations, making tradeoffs between costs and service level. Always giving priority to the second one.

4.3 Capacity Planning Acetate Frames Team

The team's leader of the Acetate Frames Team has been the only interviewed member, she had to answer to the same two question explaining some added value activities peculiar of this technology scheduling practices. The weekly routine of this team spins around the creation of the industrial plan, the NPI tracking activity, the inventory and resources management, the SIOP and Long Term weekly meetings.

The week starts with the activity of *setting the constraints of the resources* on the SCP software to be able to shape the planning criteria and recalculate the production volumes for the week. Every Monday night the software runs the new constrained capacity schedule and displays the new numbers on Tuesday morning allowing the creation and adjustment of the industrial plan. The logic and the scope of this document are similar to the ones mentioned before; the main and only difference consist in the mapped resources since each process has its own. The Acetate production technology has four main production resources, 2 for its production in the Lauriano plant (TO) and 2 for the Sedico plant (BL). The two different industrial plans are scheduled and discussed every Thursday morning; another peculiarity of this team is that they have to create an industrial plan appositively for the Sedico plant that prefers to have a wider vision and a longer forecast on the production volumes planned with five months in advance, compared to all the others which need four.

An important complementary activity done by this team, to better schedule the production, is the *tracking activity and forecast of NPIs*. The reason why it has to be done is that SCP cannot see the production volumes of the finished products planned in four or five months but only for the first 10 weeks. Hence, for this reason it has a strategical importance to track and plan accordingly to what SCP cannot see yet because, by doing that, the production schedule can be adjusted and some production volumes, seen and planned by SCP, can be relaxed or anticipated depending on what is coming in terms of manufacturing load. The goal for a capacity planner is to create a plan as flat as possible to avoid volatility in terms of workload, constrained resources, procurement and human resources. It is clear that is better to constantly work 3 shifts a day for only 5 days a week for the whole period rather than work less during some weeks and open some extra shifts on Saturdays or hire extra employees to keep up with the unseen demand. This activity is technically done by extracting the required data through a query on the Tracker finished products forecasts, the dedicated NPIs planning software, through which all the components' requirements can be computed. Hence, the tracker gives an information of the number of finished SKUs needed for a specific week but, what is interesting for the Acetate capacity planners is to know the components requirements since each frame is made up of more pieces which are all manufactured separately, each one on its dedicated resource. Once the components requirement are computed, what the plants want to know, is the number of items belonging to new collection and not to restyled old ones since the focus on the production of those has to be higher to avoid issues from the moment that all the others, called as "AddVar",

meaning added variant to the old collection, are manufactured in the same way except for a few changes like the color or some small accessories.

Among the other activities, there is the *resource monitoring* through the dashboards that, in this case, are of two types: the automatic and the manual ones. Similarly to the Metal Team, the automatic dashboards work in the same way showing the capacity, the load and the utilization for each resource. This team uses, as well, the manual dashboards to have a closer look at the critical resources, that each plant explicitly asks to monitor aiming to have more data about the type of load they have to bear. The load can be distinguished between Plan and WIP: the first one is referred to all the volumes that are planned to be produced on that resource in the following weeks while the second one, which stays for “Work In Progress”, refers to those units that are being produced now and in the following two or three days. This distinction is fundamental to give an idea of the production timing in order to be prepared for the following working shifts and, above everything, to compute the workforce required to produce the planned quantities, which has to take in account the efficiency and the productivity to be able to transform the amount of output units, into an amount of work hours into an equivalent number of people. Lastly, this team has set up the resources mapping system in order to reflect the lean production, hence to simplify the strategic production planning with less resources and working only with the necessary ones.

As all the other benchmarked teams the *Inventory monitoring and management* is a fundamental activity that is performed in the same way as explained in the previous paragraph, without any substantial changes and with the same exact goals and weekly deadlines.

The last two worth mentioning activities are the *SIOP* and the *Long term* one. As mentioned before, the SIOP is a monthly activity done in collaboration with the SIOP team that has the aim to give an output information about the future of the production scheduling for a plant, to analyze resources in the same way as the Metal team, hence this is an activity more useful under a strategical point of view. What the team has to do on a weekly bases is a small amount of work finalized to show capacity planning data to the SIOP team in the pre-SIOP meetings and to discuss and re-elaborate them before the real monthly SIOP meeting with the managers. As it could come up from the benchmarking activity, this is the only team that does a comparison between the output of the previous 3 months forecasts with

the new one to analyze the prediction delta between what has been forecasted the month before and what really became real to improve the team's forecasting ability.

A strictly connected analysis is the Long Term one performed under a more technical point of view. Exactly as the previous team this activity aims at suggesting, in accordance with managers and plant planners, new investments to restyle and improve the actual work centers and machines capacity. The dedicated assessment process is made of empirical calculations about current cycle times, SAP data extraction and comparison to reach useful conclusions on what to buy and by when. The result of these analysis are displayed in dashboards with special layout shown to the managers at the official meeting, who are able to see the long term capacity issued that might arise on the monitored resources.

4.4 Capacity Planning Injected Frames Team

This team takes care of the injected plastic frames production which is, in terms of demand, the most sold type of frames. As much as the other teams, the main weekly activities are the industrial plan scheduling, resources and inventory management, pre-SIOP and SIOP forecasts and Long Term analysis.

The two managed plants by this team are the Agordo and the Pederobba ones, the two *industrial plans* for these production sites are created and adjusted at the same manner as the others; but in this case a particular attention is driven on the backlogs analysis which are the delta of the equivalent number of working days that would be required to keep up the pace with the production schedule in case of delays or number of days in advance on the production in case of upfront results. These parameters are essential to decide if to increase or decrease the units per week targets. This activity is very interconnected with the production output and *inventory management* which gives signals about the real manufactured units results. Due to preferences of the respective plant planners, these data are displayed through graphics hence the inventory and production outputs are shown and discussed on graphs, while the others team do that mainly through tables. The critical resources output has a special section, that any other team has built, where only their performances are analyzed even though they are in the middle of the process and not the last mile ones. For example, the molding branch output is under tight control: all the injected plastic components are stocked before proceeding in the production process, since that department is often a bottleneck for its intrinsic long time cycle and due to the initial

demand investment to buy new molding machines that take a very long time to be amortized. By stocking the produced units, the company has a double advantage since the treatment department can pick up molded units from the inventory without waiting for production lead times, hence the stock is used as a safety hub. Secondly, the stocking activity allows to monitor, by scanning the units, the real output. The extraction of inventory data is made by the metal frames intern capacity planner every Monday morning for all the frames capacity planning teams. All of these data have to be ready by every Thursday for the two Capacity meetings with the Agordo and Pederobba Injected Frames plant planners for the resources and the industrial plans, while with the MPS for the inventory analysis.

The focus that this team has decided to put on the resources management to improve the adjustment of industrial plans is on the *NPI tracking* since with every new collection the resources load, technologies and stress can change, even more than once a year. They monitor, as well, some cyclical constrained resources in the Pederobba plant giving them a dedicated space on the dashboards where the capacity, load and utilization are monitored for both the current and the past week highlighting the possible delta to have a better sensibility of the weekly changes.

Moreover, what emerged from this interview has been the different approach for the *resources management* since they closely monitor the manual resources due to their longer cycle times than the automatic ones; the injected frames planners are focusing on the percentage of manual treatment and processes that each collection requires to be prepared for future trends and loads. Moreover, to have an estimation about the resource capacity before the beginning of the production activities the engineers try to calculate the cycle time as an average of the manual and machines lead time; it is clear that while the workers keep working on the same repetitive tasks, they rapidly improve the gestures and are able to do them quicker, by significantly decreasing the initial esteemed cycle time. The reason why this is such an important factor is that before scheduling the production a capacity planner has to know the available capacity in terms of machines, workers efficiency and time. Based on these assumptions some estimations are made to set plants goals, hence selling targets, hence budget allocation for the operations department. When the budget and the targets are clear and announced, at the beginning of the year, have to be achieved without any chance of missing the deadlines and the quantities. To have a safety margin, what engineers and planners do is to keep constant the esteemed cycle time over the whole production weeks of the same item even though they could easily track the improvement or to switch some

processes from manual to automatic to save further time. This small but repetitive gain of time, compared to the theoretical one, has a strategical importance for because, on a huge mass production a few saved seconds for each units mean hours. By gaining hours the plants can manage to manufacture all the target numbers facing possible delays that would make it harder to meet the expectations and endanger the sales and the financial results. This safety time, as they called it, is essential to achieve and get the year production bonuses for the team which is, of course, an important goal for each employee and manager.

Their SIOP and pre-SIOP activities are a bit more based on the analysis of the standard hours to understand the trend of production volumes and to forecast how to manage the future clusters production. But, for the rest are similar to what the others do.

Every Friday this team does some informatic actions aimed at cleaning databases, check if new codes introduced have been linked to the correct resource in the right production process, to avoid weird informatic issues that might determine the exclusion of some frames codes from the automatic software planning activities. This happen because SCP needs to know which frames go on which resources to link them to the correct path through the plant and guarantee a correct scheduling plan; in this part of the process the master data team has the important role of linking each code to the correct machines where it will be manufactured. Especially during the NPIs production release weeks, all the new codes are uploaded on the system and the chance of making mistakes is very high, so for this reason, it is interest of the capacity planning team to make sure that each code is informatically linked to its correct characteristic and labor phases to make it go through on the right machines and the correct milestones.

4.5 Capacity Planning Sun lenses:

This team has been the last one interviewed since it is the youngest among all the others. Until one or two years ago the sun lenses capacity planning activities were incorporated in each of the three above mentioned teams. Everyone was planning his quantities of lenses and there was not a proper person dedicated to that, there were clearly many inefficiencies since everybody was communicating his needs to the same plant that had to mix the demand from every team. Lately, the need of unifying this mansion under a single control center became essential and a new capacity planning team dedicated to the sun lenses capacity planning has been created.

The interviewed team member was a capacity planner, who joined the team in the late 2023, with a deep background in master production scheduling and in the capacity planning software. The main weekly activities are the same as the other teams but with a big difference that sits in the intrinsic nature of lenses, they do not have components. This fact makes the planning activities way easier because the team does not have to match the production end dates of different components to make them arrive on time at the kitting branch. As a cons, though, while every other team is planning his units with complete autonomy since the service level they have to guarantee is towards the final clients and the distribution centers; the lenses have to be produced in order to be ready when the relative frames are ready because they are considered a component of the frames.

For this reason, the two industrial plans created by this team, respectively for the Lauriano plant (TO), for plastic sun lenses, and the Castel Sant'Angelo plant (PE), for the crystal lenses, largely depend on the frames industrial plans. Moreover, the quality issue for these components it is the most important one since any imperfection here cannot be allowed. As a matter of facts, the disadvantage for these items is that the industrial plan has to take into account the large waste rate of all those lenses that do not pass the quality controls, that's why there are scheduled way more lenses than the number that is really needed to avoid problems of having a frame ready but without its lenses. That is one of the main KPIs for this team since its service level is measured by the number of frames that stay with their lenses, hence that can immediately be kitted and distributed. The industrial plans are discussed and analyzed every Thursday with the relative plant planners. While, for quality reasons, this team regularly meets with the procurements team since it is the link between the company and the many suppliers needed for the lenses production to have information about quality issues, possible delays due to that and updates on the production schedule.

The *resource and inventory management* work at the same way of the other three teams with the only simplification that there are less resources due to the lack of lenses components. The only branch that requires a bit more of attention is the lapping and superficial treatment for crystal lenses. The resources dashboards of those processes are singularly mapped not by machine but by lens diameter; even though the same machine can treat different lenses sizes but that requires some setting up changes hence waste of time, that's why these resources are mapped singularly. Furthermore, all the resources are mapped in units/hour which is a less efficient way of measuring the production load on the capacity dashboards, discussed every Thursday, since this measure unit does not allow to

do the differentiation between different lenses with various cycle time and, consequently, unbalances the precise allocation of human resources on the correct machines. This team involves in the inventory and resources dashboards meeting the MPS sun lenses team.

Moreover, an important activity that this team does every Monday is to create a capacity report that maps all the lenses machine resources for the two Italian plants and for the Tristar (China) one. This report displays graphs that highlight how the load of each resource is respecting or not the capacity constraints for each following working week, taking into accounts the working days. The huge advantage of having a large plant in China is that the two respective lenses capacity planning teams can ship to each other lenses to be produced in order to avoid heavy capacity loads or, other times, to help each other to reach the aimed saturation level for the resource when the plant production volumes are lower.

The NPI tracking activity for this team has been implemented when the team has been created but it has been suspended recently due to long updating processes and not precise output. As mentioned before, since a lens is a component, there is a different software to map the lenses demand which is called “Retroplanning” but, at the end, it works in the same way of the Tracker with the same issues and complications.

Another difference between the other teams is that the lenses production is performed not only for Luxottica’s sunglasses but for external clients as well. This cluster has an high priority in the production scheduling for many reasons: the first one is that Luxottica’s lenses are manufactured to be kitted on frames and then are shipped the company’s distributions centers, so nobody is technically assuring that will be sold; while if an order of lenses is placed by an external client, it is paid immediately and the lenses have simply to be shipped to the client’s inventory where he will take care of the kitting and tailoring of the lenses to its frames. Secondly, because the strategic importance of producing lenses for external competitors give more advantages to the company which, in a way controls what its competitors are doing and their sunglasses production. For this reason, each of the above-mentioned activities has a special section dedicated to external clients, from dedicated industrial plans, to inventory, to specific resources.

5. White Space analysis vs real workflow, Consolidation of workflows and best practices in order to keep the “lesson learnt”

5.1 White Space Analysis and Preliminary Findings

The main goal of this internal benchmarking activity was to create a white space analysis table able to display the weekly routine of every capacity planning team, enhancing a useful comparison activity to gain insights about how different people accomplish the same goals, maybe using different methods that might be faster, smarter and more effective or less dynamic, slower and redundant. This kind of analysis has been chosen since it is a powerful tool that enables to identify and capitalize on untapped opportunities within their existing business or operations units. The "white space" refers to the gaps or areas of unmet needs that exist between a company's current activity and broader list of improvements that can be done. The white space is considered as a blank canvas waiting to be filled with new ideas, products, practices or services. It represents the potential for growth and innovation. Conducting a white space analysis involves examining your current offerings, understanding teams needs, and identifying areas where you can expand, improve, or introduce new solutions. (Crist 2000). The following table is the graphical representation of the result of all the interviews, where each team was displayed on the columns and each activity on the rows, *table 5.1.1.*

Activities	Literature	Capacity Lenses	Capacity Frames Metal	Capacity Frames Injection	Capacity Frames Acetate
Production Output monitoring	X - weekly	X	X		
Production output monitoring				X – istograms on dashboards	
Output Performance Review		X – plant planners & MPS			
Production output data			X – shared with controlling team		
Production Output monitoring of spare parts			X		
Update report Capacity PROD & ICAP 2		X	X	X	X

Constrain Production Volumes on ICAP 2		X	X	X	X
Unconstrain Production Volumes on ICAP 2		X	X	X	X
Update File Industrial Plan (custom file)		X			
Update file industrial plan (official report)	X	X	X	X	X
Monitoring NPI collections				X	X – weeks that SCP cannot see
Update Inventory	X	X	X	X	X
Inventory		X – weekly meeting	X	X	X
Update Demand Stability - CO	X	X	X	X	X
Update Dashboard Capacity (DC)	X	X	X	X	X
Update (DC) - custom	X	X	X	X	X
Long term capacity monitoring	X	X	X	X	X – machines capacity
Focus on critical resources		X	X	X – FARO for PED and BILANCELLE	X
OFFSET alignment meeting			X		
Pre-capacity weekly meeting		X			
Capacity weekly meeting	X	X	X	X - Thursday	X – Thursday morning with plant planners LAU e SED
Pre-SIOP monthly	X	X	X	X	X (CT) – out of scope for the role
Consolidating of previous Pre-SIOP monthly					X
Resources Capacity Management	X	X	X	X	X

New phase and resource matching				X – every Friday update resources 1.0 to match with new phases	
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Table 5.1.1 – White Space Analysis result

This table has been filled interview by interview in order to map in the most detailed way possible, the real routine of each team. A total number of 25 different activities is carried out weekly by the four teams, including some specific variants that are specially required to manage certain types of productions. The mapping methodology consisted in filling with an X the white cells if the activity is performed by the team, the cell was left unmarked otherwise. Some notes have been added to some cells in order to help the other capacity planners to better understand the table. The table, as final step of the research, has been analyzed by all the capacity planners who could firstly, have an idea of what each capacity team is specifically doing compared to others and, secondly, gaining insights and hints on activities that might be improved or that should be replicated in other teams since they produce significant advantages to the ones who are doing those.

For didactic purposes, the literature of what a capacity planning should do has been previously added in chapter 2, paragraph 2.3, page 30 and all the official capacity planning activities have been reported in *table 5.1.1*. As a great result achieved by all the teams, it can be easily spotted that each team is doing the main recommended activities for a capacity planning role. Moreover, many other activities have been created and invented to better monitor and analyze the specific needs of the sunglasses, frames and lenses production. A deeper focus has been shifted on those white cells that suggest that a team is not doing an activity, hence it would be necessary to analyze why by talking to the team members and interviewing them to truly understand why they think that the activity is not necessary or is better to do it how they usually do.

As a result of multiple analysis, the two main take aways of this project are two possible best practices that some teams do and others don't and have been detected as the *NPI tracking activity* and a different way of *measuring the production's output* since some teams use the units/hour measure while others in hours/unit, to be more precise, the amount of time needed to manufacture a determined target number of units. The two following paragraphs will list some of the reasons why these best practices should be implemented to gain efficiency in terms of time, cost and planning activities both at a team and a company

level and the main difficulties that each team has to achieve these goals. (Alexander, Chapman 2011).

5.2 NPI tracking and visibility

As clearly displayed in the above attached table, one of the most important but not widely implemented practice is the *NPI tracking and visibility*. The only two teams which has been using this approach to forecast and adjust, accordingly, the industrial plans were the *acetate and injected frames capacity planning* ones. Thanks to this benchmarking activity the other two teams have been able to shift their attention on such a strategic activity that they knew it had to be done but none of them was doing due to excessive complexity and the demanding amount of time and energies required. None of the two teams mentioned the NPI tracking activity among their weekly routines and everybody was very interested in getting to know how the acetate and injected teams are normally doing this activity and how.

Moreover, the incoming release of the N2 collection and production volumes request is a problem that is usually addressed between April and May of every year, hence, this activity happened with the write timing, highlighting a problem that usually causes many inaccuracy mistakes in the Industrial Plan creation.

As mentioned before, the industrial plan is one of the main capacity planning activities and consists in delivering a detailed schedule of the required production output to the production plants. For this reason, a capacity planner has to weekly review it and give estimations, based on data, of how much to produce or how much to change the already forecasted production plan. This activity is possible thanks to many tools, to the experience and to the deep and frequent communication net of the company. Furthermore, the two most important and delicate periods of the year are the months before the N1 and N2 collections releases that have a huge impact on the company image and on the customer's appeal. These two releases have different deadlines that cannot be missed, where different quantities have to be delivered with a fixed amount of time in advance. The production outputs of the NPIs are determined and forecasted by the NPIs teams that place production orders for every week before the release in order to give an idea to capacity planners of what is ahead since they have to consider those volumes in the industrial plan.

As previously explained, the heaviest part of capacity planning is performed by the SCP software that automatically spreads the production volumes over time, counting all the demand planning teams' requirements for the following 10 weeks. The demand distribution logic is very easy: the system sees the quantities that has to produce and allocate the production demand on every possible working day, with respect to the constraints that are set in the system for every machine and production line. Hence, this software has a rolling planning method that, due to technical and accuracy purposes, does not plan and "see" the requirements that are temporally set further than 10 weeks from the starting day and, week by week, it will see every time one week ahead but always no more than 10. For these reasons, since the Tracker systems displays all the NPIs demand from now until the release date, there will be many weeks that SCP cannot see at the beginning, hence it will not be able to plan and schedule event though the industrial plan should already include those quantities since it has to cover the 4 coming months.

The problem arises from the fact that each capacity planner cannot see what it is next, in terms of production volumes, in the weeks 11 and onwards so this gives a certain level of exposure to inefficiency from the moment that SCP, while going on, might start seeing a huge increase or decrease in the production request, resulting in drastic changes to the industrial plans that have to be adjusted with as many weeks as possible in advance due to workforce contracts, since people cannot be fired or employed in a matter of a few days just to follow the market volatility. Given that the tracker quantities can be adjusted and can change week by week, by the NPIs teams, a capacity planner is exposed to possible negative surprises that might complicate the schedules and decrease the efficiency along with the missing of KPIs targets.

What the Acetate and Injected Frames capacity planning teams did was to create a file able to monitor the difference between the quantity seen by the tracker and the one by SCP, week by week, of the thousands of NPIs new models. This activity is allowing the Acetate capacity planner team leader to better adjust the SCP production in order to be less or more busy in the weeks close to the end of what SCP can see. This consists in an incredible strategic advantage able to provide a linear industrial plan, which is the best thing for a production plant.

On the other hand, it is not that easy to compute this apparently simple difference between two quantities since there are some obstacles that arise. The first one is that while the

tracker's quantity cannot be changed for a determined week if timewise close to it, SCP with its rolling view will see a static number for that period resulting in a not precise difference since, when one week enters in the system, another one goes out from the moment that it is in the past and the quantities that are in the past have been produced and stocked in the inventory, hence not counted anymore. For this reason, there is the risk that this delta will result in a bigger and bigger number while the first monitored SCP's week get closer to the Tracker target one, up to the moment when the two weeks will be the same one where the tracker number will still be the same while the SCP planned quantities will be under production or produced, hence resulting in a 0 items to be produced. That's why a system that keeps track of each code, of lenses or frames, which is produced and sent to the inventory has to be matched with the forecasted numbers of Tracker to avoid a wrong delta that would be as useless as not having the instrument.

A second problem that usually arises is placeholder one. To be more specific, every brand decides in advance how many new sunglasses will release for the new collection, to give an idea to Luxottica of how many projects it will have to open. For each new sunglass the company has to do a huge work behind it, starting from the design to the prototyping, engineering and production; hence a detailed project has to be opened. For example, a brand might decide to start 10 projects at the beginning of the new NPI campaign, hence 10 different spot will be recorded by the tracker that has to be prepared to show the future production quantities of each possible new sunglass. It might happen that not all the opened projects go through and end up being successful, that's why only 7 or 8 projects out of 10, for example, might be opened. At this point the tracker shows 10 possible NPI's codes but not all of them will be linked to real production needs in any week of the production time span, hence there must be paid a lot of attention to monitor the right codes of the SKUs that will be launched for real.

A third issue that might arise is if the NPI demand planning team has the need of changing some production targets for some weeks since, as said before, the tracker system displays quantities that don't increase or decrease unless an action is forced by a demand planner. If the action is performed with short advantage the tracker system, due to its informatic structure, does not allow any modifications, hence if the new quantities have to be added they will be only and manually on SCP causing errors for the computing of the delta. To avoid this, there must be a well-established and frequent communication channel with the

NPI demand planning teams that have the obligation to explain and notify the capacity planners.

It has been widely agreed on that this is the most important and urgent best practice that the Acetate and Injected Frames Capacity Planning Teams have to export to the others to enhance better performances for everybody, to speed up decision making processes when the industrial plan has to be created and scheduled. The implementation of this best practice is going to produce many advantages for the teams and the production plants. Starting from:

- 1) More linear production process output, guaranteeing an improved planning capacity to plant planners that will be able to increase their efficiency by keeping the same and skilled personnel avoiding inefficient costs in terms of time and money due to contracts and inductions. Moreover, it is widely known that production plants try to avoid volatility and drastic changes because the settling up of a production line, when a new product has to be produced on it, it requires time, money and increases the production waste for the first hours of work. Increasing the plant efficiency is the goal of everybody, hence, for this reason this is a really useful best practice that has to be implemented.
- 2) It contributes to a more sustainable, timewise, procurement and purchase of raw materials that are bought in advance and the orders are split in equal parts avoiding stress for both the suppliers and the plant which would have to manage a suddenly full stock or an empty one.
- 3) Under the commercial point of view, a better planning of the future production along with a smoother integration of the two systems decreases the chances of missing some distribution dates, hence, to make some clients unhappy and negatively impact revenues.
- 4) As a last advantage it guarantees a quicker and more precise scheduling process for all the capacity planning teams that will be able to manage any kind of not forecasted event and react thanks to the well managed production capacity that is going to suffer less from inefficiencies and wastes.

For these main reasons it is fundamental for the company, and not only for capacity planning teams, to implement as an official procedure the monitoring file of new NPIs collections.

5.3 Measure systems: “hours/unit” vs “units/hour”

Assessing the white space analysis output there is an interesting activity that the Metal Frames Capacity Planning Team does that might be a smarter way to measure the production output of some items. As mentioned in chapter 4.2 through the overview of the relative interview, the Metal Frames team is used to measure the production output of the resources in hours/unit while the Lenses Capacity Planning team, for example, can and is used to measure the production output only with a units/hour measurement system.

Following this benchmarking activity, the lenses capacity planners could realize that the measurement system that might suit them better could be the hours/unit, to be more specific: the number of hours required to produce a determined amount of units, hence having access to resources able to measure the amount of time needed to produce 1 unit. For this reason, a project has been recently opened from the mentioned team that will try to implement the same measurement system for the sun lenses production as well. To understand what is missing to reach that target and why it has not been developed yet a first analysis has been conducted with the master data team and a problem above the others emerged as the most difficult to solve in order to develop that useful measurement system for the lenses production as well. To be specific, in order to measure the production volumes in that way, three data should be available: the machine time cycle, the man time cycle and the overall time cycle, given by the addition of the machine and man’s ones. The machine time cycle is technically the average time that a mechanical process requires to give a determined output including the time when it is active and performing, assembling, molding or any kind of operations carrying out any production-related activity as well; it does not include any scheduled or unscheduled downtime such as maintenance, waiting for material replenishment or machine setup for production changeovers. The man one is computed on the average time spent by a man on a specific task, project or activity and measure the human effort and efficiency required to complete a specific job. It is computed by the number of people required to complete the task multiplied by the average time each individual needs, taking into account the working men efficiency also called OEE as mentioned before in paragraph 4.3, to accomplish the goal. Lastly, the overall time given by the sum of the machine and men time. It happens that due to technical constraint the production of sun lenses is measured only with the overall production time since the dedicated planning software is now unable to split the two different times for how it has been built. For this reason, the Master Data team has been involved and called to action to

change some SAP settings in order to allow this distinctions that will require, as well, an help from the engineering team which will have to measure the different processes part of lenses production.

The process case study is focused on the coating activity of mirroring, as an example. As mentioned in chapter three it is an activity that mainly requires both the mechanical and human contribution to happen. Watching it from an engineeristic point of view, the two different cycle times could be measured since in the first part of the process, the operator receives the cleaned lenses, pick them up from the box and proceeds to display them on the dome, which has the only function to hold them, and that will be put into the mirroring machine that, at that point, will start to spray the chemical products that produces the expected effect. At the end of this process, the worker starts the extraction and final part where he has to put the labored lenses back in the box. This activity could be practically measured and split between the three cycle times, 2 depending on the man and one from the machine. For the moment, the Lenses Capacity Planning Team has only the overall cycle time available while, as proved, even the other two can be provided and recorded. After this internal benchmarking project, the engineering team will have to start this meticulous job of measuring the time needed for each operation, supported by the master data that will have to adapt the already existing resources to the new system in order to give to the planners one instrument more to better adapt their scheduling activities, resulting in more precise industrial plans and human resources management.

The main reason why there is a necessity of measuring the output of some resources in a way and others in another is due to different needs and processes that influence the precision of the scheduling activities. Knowing the required amount of time needed to produce one unit gives the planner some flexibility and precision that is not available otherwise. Knowing how much time is required to produce one unit gives the possibility to easily compute the work load in terms of human power and precision. Machine resources mapped on the manufacturing time needed for one unit give more information about the work load that, a machine resource mapped in total units per hour does not provide. The essential information that the former brings, thanks to its structure, is that it can disclose the right amount of time needed to produce a determined amount of units even though each unit has a different cycle time. For example, we could imagine of having the machine A that can manufacture some types of lenses of different sizes that needs different treatments. If we consider three different types of lenses, each one with particular needs, hence with different

cycle time and we suppose that those times are one the double of the other due to longer treatments. It is clear that depending on the mix that will have to be produced, the amount of time needed to complete the production lot will be different. On the other side, if the machine resource is mapped to be able to only give the number of pieces that it can deliver in one hour it is not clearly giving a detailed information on the specific cycle time of each of the units cluster that will be produced on that machine, starting from different diameters or shapes.

Moreover, this extra information about detailed cycle time gives more awareness to the planner that have to hire and allocate personnel. Knowing that to produce a specific lot of x units: z of type a , k of type b and y of type c all with different cycle times is required a determined amount of hours computed by multiplying the number of each unit cluster by its cycle time and adding all the results along with the average man productivity and efficiency, it will easily give the number of men needed to accomplish the target. This is an extremely valuable advantage a machine resource can give, since the workforce management is an important KPI both for the plant and the capacity planning teams. They have to maximize the personnel efficiency, hence capacity planners decide to hire, at the beginning of the year, a determined number of people and they have to guarantee that each worker is assigned to tasks and how his working shifts are managed in terms of working load. On the other hand, if the machine resource is structured to give only the number of units that have to be manufactured in one hour is more difficult to allocate the blue collars since only an estimation of how many will be required to produce the lot is available due to the missing cycle times of the various units. The consequence of this might be an inefficient allocation of workers that might be assigned in a short or larger quantity to the same machine.

This measuring method, as mentioned before, will need more teams' collaboration since is going to benefit multiple stakeholders of the planning activities even though for managers it does not bring an immediate return in terms of revenues so it might be more difficult to explain the importance of this kind of measuring method and that the real saving will be visible on the long term in terms of money, time, efficiency and quality of service.

6. Conclusions and Reflections

The idea of this project came up from real capacity planning need, it was aimed to help every capacity planner to have a wider, more detailed, clearer and complete view on all the capacity planning activities that every team does and how they do it. The main scope was to test the communication capabilities among the teams and see how they are organically improving and evolving together, assessing possible new procedures invented by some individuals, sharing those possible smarter and more effective practices in order to promote an overall company's supply chain upgrading.

By simply interviewing different members of the various teams it could have been possible to understand how people do think differently even when they have to achieve the same outputs. There are some differences that can arise over time due to the independent cognitive capabilities of single individuals who are always thinking about how to accomplish tasks in an easier and less energy demanding way. These natural processes brought the capacity planning teams to develop different procedures to better adapt to their needs such as different measure units, different focus on some activities, different informatic support.

Two activities have been selected as possible best practices to be implemented: the NPIs tracking activities and the hours/unit resources' measure unit. As widely discussed in the previous chapters they will have important impacts on the planning activities of the teams who are not using them yet and will make it easier to make more informed decisions on the capacity scheduling activities. The first one will help speeding up and adjusting the correctness of the decision making process of the industrial plans that will not have to be adjusted anymore with few weeks in advance; hence it will guarantee smoother operations and cost savings. To implement this best practice each team will have to work closely with the NPIs demand planning team and with the Master Data teams to set the informatic architecture and structure that allows this kind of analysis. While the second one is more an engineering kind of improving, with the right collaboration between more teams can bring a competitive advantage on the long run allowing a more efficient allocation of resources, budget and more consciousness of the real production dynamics by minimizing the gap between theoretical planning and real supply chain. A different measure unit makes the whole difference, switching the approach from the beginning and setting the planning logics on an easier, faster and more precise level. The Supply Chain Department, and the interested

teams, will try to implement these two suggested best practices by the end of the current year.

What has been found by this research has brought a tangible value and a real advantage to all the capacity planning teams that had the chance to quickly visualize and realize what their colleagues were doing and could get some hints on possible improving topics. That white space analysis triggered an interest among all the four capacity planner leaders who started to look for each other and share their vision on some topics to better understand how others were doing something, which difficulties they had experienced and all the advantages brought by those best practices, weighted against the cons.

This benchmarking activity could be easily replicated by other teams of the supply chain since, every branch has a team for each kind of frames and for the lenses. The power of this easy, quick but useful tool can be possibly huge. If applied on a larger scale it could enhance a fast and effective spreading of best practices along the information chain flow, with the chance of not only improving procedures among the teams at the same stage but probably among different teams at different levels of the supply chain. This activity could, initially, be done a few times, as a test, but it could become part of the company's improving philosophy and it might happen regularly every 18 or 24 months to enhance communication and organic growth. Furthermore, there would not be problems in escalating this practice, which can be considered itself a best practice, among all the other functions of the company: from controlling, to marketing, to store management and to sales.

This practice has multiple advantages such as being easy, being quick, not involving complicated informatic software, not preparatory trainings and requiring a small amount of time to gather data. Of course, once the data are available it is required knowledge and critical thinking to analyze and extract useful insights and considerations. As cons this activity might be limited by the people who are conducting it who might not give complete information causing biases that might allow misinterpretation of data and possible need of repeating the interviews; the lack of collaboration makes it harder to get precise and clean data sets. Secondly, there should be a real intent of collaboration from the various team members who have to understand and keep in mind the importance of the possible output. Changing is a demanding process, it requires willingness to improve and evolve but not everybody is willing to leave the comfort zone and collaborate with others, especially if it requires extra time that has to be added to the already full schedules of each employee.

Lastly, in a big company like EssilorLuxottica the competition to get promotions, get bonuses and step up in the career might be intense. There are some individuals who don't want to share their knowledge in order to keep a possible advantage in terms of strategical activities, hence holding higher chances of getting promotions, on the long run, but harming the overall company evolution.

This benchmarking project can be part of a future integrated business development practice, essential for a multinational company that is constantly evolving and growing, especially through acquisitions. The take aways found out in this thesis project can be amplified on a 190,000 thousands employees company and give back, as a result, insights that might have an important improving effect on a global scale. The progress has been made through communication, interactions and knowledge sharing in every business field since these are the fastest and smartest ways of learning, making less mistakes and improve the decision-making process by having a wider range of different scenarios ahead thanks to other people who shared their knowledge and point of view.

In such a difficult and fast changing environment like the fashion industry, a lean set of procedures to enhance progress will reflect the reactivity of each individual and its perceptions on how to approach tasks differently, resulting in development for the business. This activity can become part of a routine that employees should see as a mean through which their life can become easier, with a small extra effort while the company will have a way larger return on the long run.

“Coming together is a beginning, keeping together is progress and working together is success” - Henry Ford. (Beltrami 2017).

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