



How can luxury companies integrate augmented reality throughout the value chain?

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Summary

Title: How can luxury companies integrate augmented reality throughout the value chain?

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Due to the non-predictable Covid-19 pandemic, the physical stores of luxury brands which were living a three-dimensional and unique dream to all their visitors, had to close their doors and settle for online sales to ensure their survival. However, information online is trapped on two-dimensional sites and screens. This gap between the natural and digital worlds prevents luxury brands from expressing their proper DNA of know-how and heritage. Augmented reality, a technology that overlays our natural environment with virtual 3D images, answers the issue of viewing products directly in the context customers will apply them; augmented reality increases the ability to visualize and purchase them accordingly.

Many luxury brands are already applying augmented reality in entertainment, especially on social media, but this technology is being applied more consistently within organizations. Luxury companies are using it not only for product design, but for manufacturing, logistics, marketing, service, and sales, and they have seen significant improvements in quality and productivity.

Augmented reality will also have a significant impact on the competitiveness of businesses. Therefore, luxury brands implement this tool into their value chain. This research provides readers with answers to the question:

How can luxury companies integrate augmented reality throughout the value chain?

Resumo

Título: Como podem as empresas de luxo integrar a realidade aumentada ao longo da sua cadeia de valor?

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Palavras-chave: *realidade aumentada, negócios de luxo, cadeia de valor, digitalização*

Face à pandemia de Covid-19, as lojas físicas das marcas de luxo, que até então proporcionavam um sonho tridimensional e único para todos os seus visitantes, tiveram de fechar portas e contentar-se com as vendas online de modo a garantir a sua sobrevivência. Porém, no Mundo digital a informação está confinada entre ecrãs bidimensionais. Este fosso entre o Mundo real e o digital dificulta as marcas de luxo a expressarem o seu ADN. A realidade aumentada, uma tecnologia que sobrepõe o nosso ambiente natural com imagens virtuais em 3D, responde à questão da visualização directa dos produtos nos diferentes contextos em que os clientes poderão aplicar; a realidade aumentada aumenta a capacidade de visualização e facilita a compra final.

Várias marcas de luxo já estão a utilizar realidade aumentada relacionando-a com o entretenimento, mas esta tecnologia está a ser aplicada de forma mais consistente dentro das organizações. As empresas de luxo estão a utilizá-la não só para a concepção de produtos, mas também no seu fabrico, logística, marketing, serviço e vendas. Deste modo, as marcas de luxo têm implementado cada vez mais esta ferramenta na sua cadeia de valor. Este trabalho procura dar resposta à seguinte pergunta:

Como podem as empresas de luxo integrar a realidade aumentada ao longo da sua cadeia de valor?

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Table of Contents

Table of Figures.....	VII
Table of Tables	VIII
List of Abbreviation	IX
1 Introduction	1
2 Literature Review.....	3
2.1 Innovation, a major priority for the development of luxury Maisons.....	3
2.1.1 The characteristics and challenges of luxury	3
2.1.2 The adoption of innovations to improve luxury retails	4
2.1.3 Innovation along the entire luxury value chain.....	6
2.2 The augmented reality usage within the luxury brands.....	7
2.2.1 Definition of augmented reality	7
2.2.2 Impact of AR on the value chain.....	8
3 Methodology	10
3.1 The choice of a qualitative approach.....	10
3.2 The data collection	11
3.2.1 The primary data	11
3.2.2 The secondary data.....	12
3.3 The data analysis	12
4 Empirical Setting.....	14
4.1 LVMH.....	14
4.1.1 LVMH presentation.....	14
4.1.2 Digitalization of LVMH.....	15
4.2 Cartier.....	16
4.2.1 Cartier presentation	16
4.2.2 Digitalization of Cartier	17
4.3 L'Oréal Luxe	17
4.3.1 L'Oréal Luxe presentation	18
4.3.2 Digitalization of L'Oréal Luxe.....	19
4.4 Hermès	19
4.4.1 Hermès presentation.....	19
4.4.2 Digitalization Hermès	20
5 Findings.....	21
5.1 Product development.....	21

5.2	Manufacturing	21
5.3	Logistics	22
5.4	Marketing	23
5.5	In-Store Sales	24
5.6	Online Sales.....	25
5.7	Aftersales-Service	26
6.	Discussion.....	28
7.	Conclusion.....	29
	References	31
	Appendices	IX
	Appendix I. The secondary data.....	IX
	Appendix II. The coding tree of primary and secondary data.....	X
	Appendix III. The coding table of the primary and secondary data.....	XIII
	Statutory Declaration.....	XVII

Table of Figures

Figure 1: Value of the online personal luxury goods market worldwide from 2004 to 2021 (in billion euros) 5

Figure 2: The Milgram Continuum 7

Figure 3: Sectors expected to witness the most disruption according to XR/AR/VR/MR industry experts 8

Figure 4: The Gap between the expectations of the commerce online for the customers and what the brands offer..... 15

Figure 5:Brand value of Cartier worldwide from 2016 to 2021 (in million US dollars) 17

Table of Tables

Table 1: Overview of the primary interviewed luxury companies that use AR..... 12

List of Abbreviation

AR	Augmented Reality
LV	Louis Vuitton
LVMH	Louis Vuitton Moët Hennessy
YSL	Yves-Saint-Laurent
3D	Three-Dimensional

1 Introduction

Many large companies are attracted to the virtual world, which is not limited by physical laws but rather by technological boundaries (Farshid et al., 2018). Dematerialized goods and experiences are revolutionizing the way people interact with objects (Faguer, 2022). This trend did not escape the giants of luxury, such as Louis Vuitton (Jung et al., 2021). They embark on the digital adventure, each with its mode of communication and ideas.

Many avant-gardist luxury businesses have adopted augmented reality (AR), a technique that overlays the reality with its digital representation updated in real-time (Feiner et al., 1993), as a new digital communication axis, allowing users to try on a product directly from their smartphone virtually (Poushneh & Vasquez-Parraga, 2017). For instance, Burberry used Google technologies to develop a new augmented reality shopping feature in 2020. The consumers were able to use the AR tool to interact with Burberry items integrated into the world around them, improving their online search and buying experience. From then on, consumers see an AR representation of the product compared to other real things on a human scale (Carmigniani et al., 2011).

With the trend of social media filters, augmented reality has matured, is ready to be democratized, and its applications have broadened (Alamäki et al., 2021). The major players in the luxury market, such as Chanel and Louis Vuitton, have fully embraced this trend (Javornik et al., 2021). It is both a customer acquisition tool and a direct sales lever (Yim et al., 2017). The technology evolved and is configurable on most e-commerce sites. The use of augmented reality in the e-commerce sector helps cover the absence of direct experience linked to the five senses that customers typically only find in stores (Verhagen et al., 2014).

The Covid-19 pandemic significantly boosted the digital transformation: internationally, the luxury retail industry has experienced a sharp decline (Donzé et al., 2022). With this loss of sales, they had to rely on the rapid implementation of a more digitalized strategy. Augmented reality has proven to be a useful tool to improve online sales and customer experience (Morillo et al., 2019), while respecting the deeply rooted values of luxury brands (Javornik et al., 2021). However, no research has shown how AR can provide a competitive advantage within the value chain of luxury companies. The following research answer the question:

How can luxury companies integrate augmented reality throughout the value chain?

To answer this research question, I adopted a qualitative approach. I conducted interviews among four different cases, Louis Vuitton Moët Hennessy (LVMH), Cartier, L'Oréal Luxe and Hermès. The results show and justify the uses of augmented reality from the supply of raw materials up to the sale in luxury stores.

This thesis is divided into five parts. In the first chapter, the literature review resumed the different papers written on related topics. The following methodology chapter of this research justified the data collection and analysis in detail. Then, the empirical chapter followed to contextualize the different case studies, which lead afterwards to the fourth part with the findings and interpretations of the various interviews conducted during the four case-study. A discussion finally nuanced some statements and highlight this research's limits.

2 Literature Review

The literature review shows that despite the previous great delay of luxury brands to establish themselves online and their doubts about innovation (Baker et al., 2018), the Covid-19 crisis and the current trends have led luxury Maisons to adopt a strategy of digitalization, and even avant-gardism towards technological advances (D'Arpizio et al., 2020). Due to the recent emergence of augmented reality in e-commerce (Yim et al., 2017), researchers have studied the consumer's point of view towards this technology and the marketing strategies of luxury companies (Rauschnabel et al., 2022). However, there has been no analysis conducted to examine the use of AR for the overall value chain of a luxury brand.

This chapter displays the academic characteristics of the luxury industry and research conducted concerning its behavior towards innovation and technology over time. Moreover, the second part exposes the papers about AR technologies and their usage in the value chain.

2.1 Innovation, a major priority for the development of luxury Maisons

Nowadays luxury brands aim to be on top of innovation (Vecchi & Buckley, 2016). Nevertheless, it has been a long journey for the luxury industry to establish a strong position online and adopt new technologies (Okonkwo, 2009), as it has long perceived innovation as contradicting its core values and asserting its identity (Kapferer, 2014).

In this section, the notion of luxury will be defined through the previous written papers, as well as its growing relationship with innovation and technology, such as its activities online, but also its internal processes.

2.1.1 The characteristics and challenges of luxury

The definition of luxury can be entirely subjective (Kauppinen-Räsänen et al., 2019). Nevertheless, all luxury brands have a crucial set of six qualities in common:

- a very high-quality hedonistic experience,
- sold at a price far higher than the functional value,
- linked to heritage, unique know-how, and culture,
- available in limited and controlled distribution,
- accompanied by personalized services, and
- representing a social marker where the purchaser feels unique and privileged (Kapferer & Bastien, 2011).

For most of the consumers, luxury is first and foremost rare and unique know-how that brings a high price and is synonymous with quality. Indeed, luxury uses criteria such as rarity, price, sensuality, creation, sense of detail, founding gesture, age, quality, and imagination (Hoffmann & Hoffmann, 2012).

Since the 1990s, the luxury sector has become increasingly concentrated. Leader multi-brand groups now control luxury goods (Ijaouane & Kapferer, 2012), for instance, in France, LVMH, which includes Louis Vuitton and Dior, or Richemont, which includes Cartier. These leaders on the market have the resource to invest in a more digitalized business model while keeping their unique signature (Colella & Amatulli, 2021).

2.1.2 The adoption of innovations to improve luxury retails

The acquisition of innovation within the luxury sector has been slow because brands have been skeptical about innovation to protect their core values, such as their concept of heritage (Kapferer & Bastien, 2011). In 2019, Chanel still refused to sell online (Y. Zhang et al., 2020). While an image of rarity and selectivity characterizes luxury, the internet embraces the principle of diffusion and accessibility. Faced with this opposition (Dall'Olmo Riley & Lacroix, 2003), luxury brands have long been doubtful about creating a website where they could inform, communicate, and even sell. Because of its scope and anchorage, the internet has nevertheless constituted an opportunity for development and dynamism for the luxury sector (Geerts & Veg-Sala, 2014). As figure 1 shows, the value of online luxury products has grown exponentially and reached sixty-two billion euros in 2021 (Sabanoglu, 2022).

Indeed, luxury strategies have changed by finding tomorrow's trend (Seo & Buchanan-Oliver, 2015), e.g. the new product or service that perfectly meets the consumer's needs, even if the consumers didn't know they needed it. Innovation is therefore now at the heart of luxury (Chandon et al., 2016).

Brands have seized the opportunity given to them to improve their image and increase their notoriety by taking an innovative ecological turn, through a production approach based on sustainable development (Kapferer, 2010). For instance, through biotechnology, luxury brands can use new, healthier and more sustainable ingredients (Popescu et al., 2019). They can use engineering methods to make ingredients more effective at meeting specific requirements such as moisture levels for beauty products. Biotechnology also allows brands

to create all-plant and natural products, which represent key customer expectations (Athwal et al., 2019). With this in mind, the luxury goods business LVMH recently created a new research facility in France with a staff of 1,300, of which 240 are research pharmacists and chemical or biological engineers (Yacoub & Laperche, 2013).

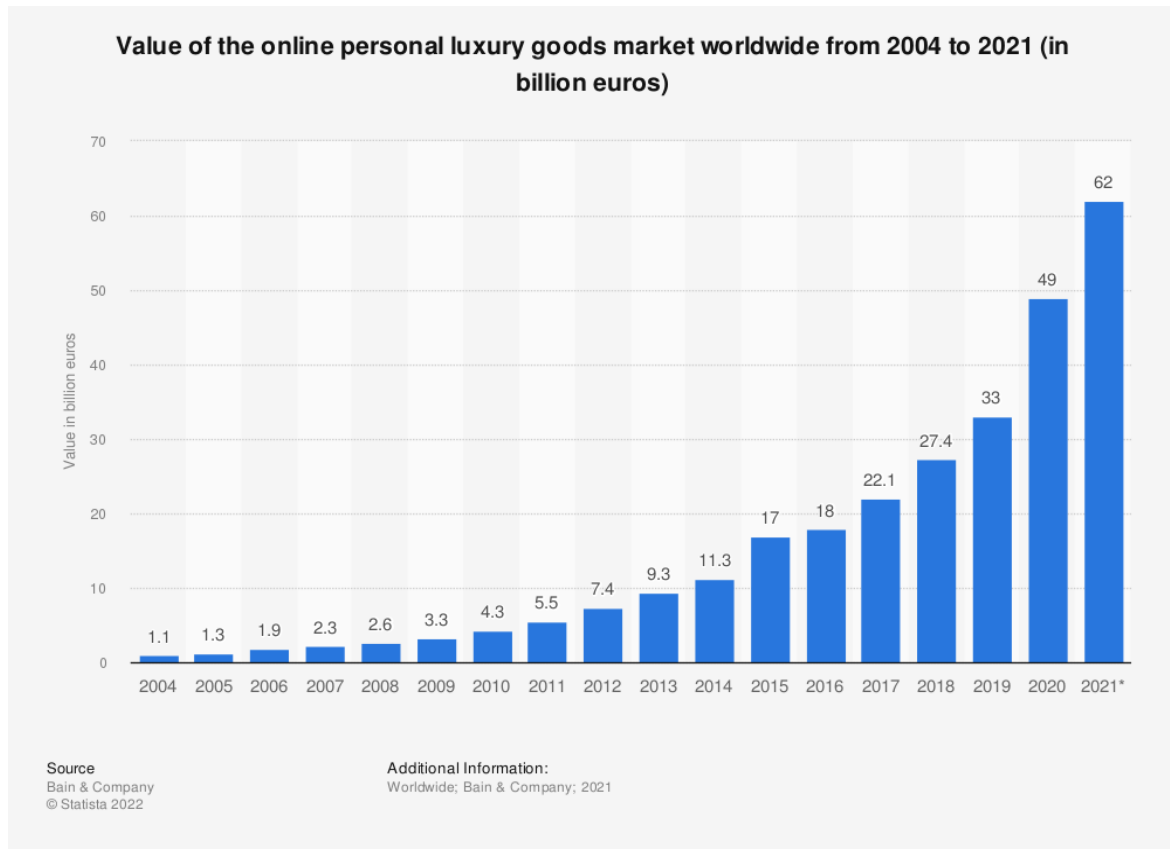


Figure 1: Value of the online personal luxury goods market worldwide from 2004 to 2021 (in billion euros)

In different circumstances, the pandemic has led luxury brands to look for new ways to interact with their customers remotely (Achille & Zipser, 2020). Brands can now create virtual stores to showcase products in 3D (Altarteer et al., 2017). Combined with augmented reality, these online stores allow to virtually try on products from home (Papagiannis, 2020). AR reflects the unique characteristics of luxury innovatively: excellence, sophistication, rarity, exclusivity, desire, noble, status, privilege, sensorial, creative, inaccessible, expensive, artistic, crafty, human, and iconic (Javornik et al., 2021). As many papers showed, luxury brands have invested in time to innovate their sales methods and better respond to customer expectations, however, innovation does not start in retail, on the contrary, it is important for luxury brands to adopt these innovations, upstream, throughout the value chain.

2.1.3 Innovation along the entire luxury value chain

Regarding what technology offers, digital transformation and technological innovations represent real optimization opportunities (Duma et al., 2020) for luxury brands at every step in the product value chain (Fu, 2020). From creation to customer experience, innovation remains a unique and competitive source of creativity.

Luxury brands, for example, have a lot to gain by using blockchain to fight counterfeiting (de Boissieu et al., 2021). Blockchain allows also for recording transactions, tracking assets, and ensuring transparency. This technology guarantees consumers to access the full history of a product, whether it is new or used. They can also contribute to this verifiable history by scanning product labels or including proof-of-purchase information that is then integrated into the blockchain (Nofer et al., 2017). Various luxury brands have already taken steps to integrate blockchain as a solution to improve the value chain. In 2019, LVMH Group partnered with Microsoft and ConsenSys to develop AURA, a blockchain-based platform to authenticate luxury goods (Treiblmaier, 2021). Blockchain is a real asset throughout the processes as it gives logistics managers visibility into products as well as inventory and price changes, updated in real-time (Queiroz et al., 2019).

Researchers are not fully aware of the major impact of AR applications inside the value chain. The literature identifies its consequence on customers' high levels of satisfaction and as a result, an increased propensity to purchase a product or service, as AR boosts hedonic values by combining virtual and actual data (Poushneh & Vasquez-Parraga, 2017). AR uses hedonic values to produce a sensation of joy and playfulness by making the product experience engaging. As a result, the virtual shopping experience becomes an enhanced memory (Ghazwani & Smith, 2020).

In this way, digital tools such as product lifecycle analysis enable time savings and harmonization of the value chain thanks to the blockchain (Nikolakis et al., 2018). However, there is no research showing that augmented reality adds value beyond the unique experience of the luxury product in-store or online.

2.2 The augmented reality usage within the luxury brands

AR software solutions are useful in multiple fields such as education, logistics, industry, commerce, construction, real estate and marketing (Mekni & Lemieux, 2014). Companies such as car manufacturers, use AR for development and production (Fründ et al., 2005). The benefits of AR are evident in the value chain. Areas that require visualization and instruction find greater value in integrating AR into their processes.

In this second section, augmented reality is defined in more detail based on academic research and then its benefits for the corporate value chain are developed.

2.2.1 Definition of augmented reality

Since the release of the mobile game Pokémon Go in 2016, the public's awareness of augmented reality has grown (Liberati, 2018). Indeed, augmented reality technology enhances communication by establishing a more significant level of satisfaction and reaction (Buchner et al., 2022) between the client and the product, resulting in a more favorable setting and making the purchase less complicated than with traditional media (Watson et al., 2018). For the interpretation of augmented reality, it is important to understand the balance between reality and virtuality. This can be scaled with the help of the so-called Milgram continuum represented in figure 2 (Milgram et al., 1995).

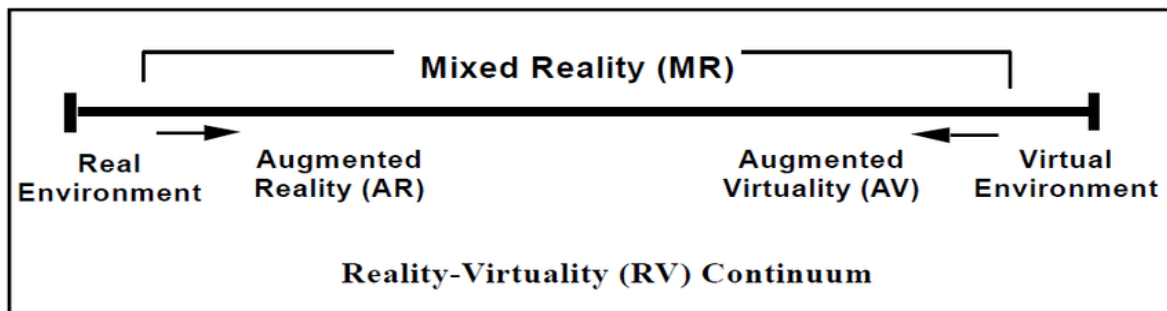


Figure 2: The Milgram Continuum

The model outlines the following concepts: reality, augmented reality, augmented virtuality, virtuality, and mixed reality. Augmented reality is a technology that allows the integration of virtual elements in 3D in real-time within a natural environment (Mekni & Lemieux, 2014). The principle is to combine the virtual with the real and provide the user with the illusion of perfect integration, which is different from augmented virtuality where the environment is a computerized simulation of spaces. This dissertation exclusively analyses the use of augmented reality in the value chain of the luxury sector.

2.2.2 Impact of AR on the value chain

The use of augmented reality is becoming more common in different areas (Mekni & Lemieux, 2014) and influences various steps of the value chain, especially in production, manufacturing and marketing as figure 3 displays (Alsop, 2021). It is changing the way customers make decisions and also affects how organizations design, create, and market products, improving customer experience and adding value to their brands (Hammerschmid, 2017). Furthermore, information technologies are altering how we compete in the marketplace (McFarlan, 1987). As a result, to maintain a strong position in the marketplace and develop sustainably, luxury firms must adapt quickly.

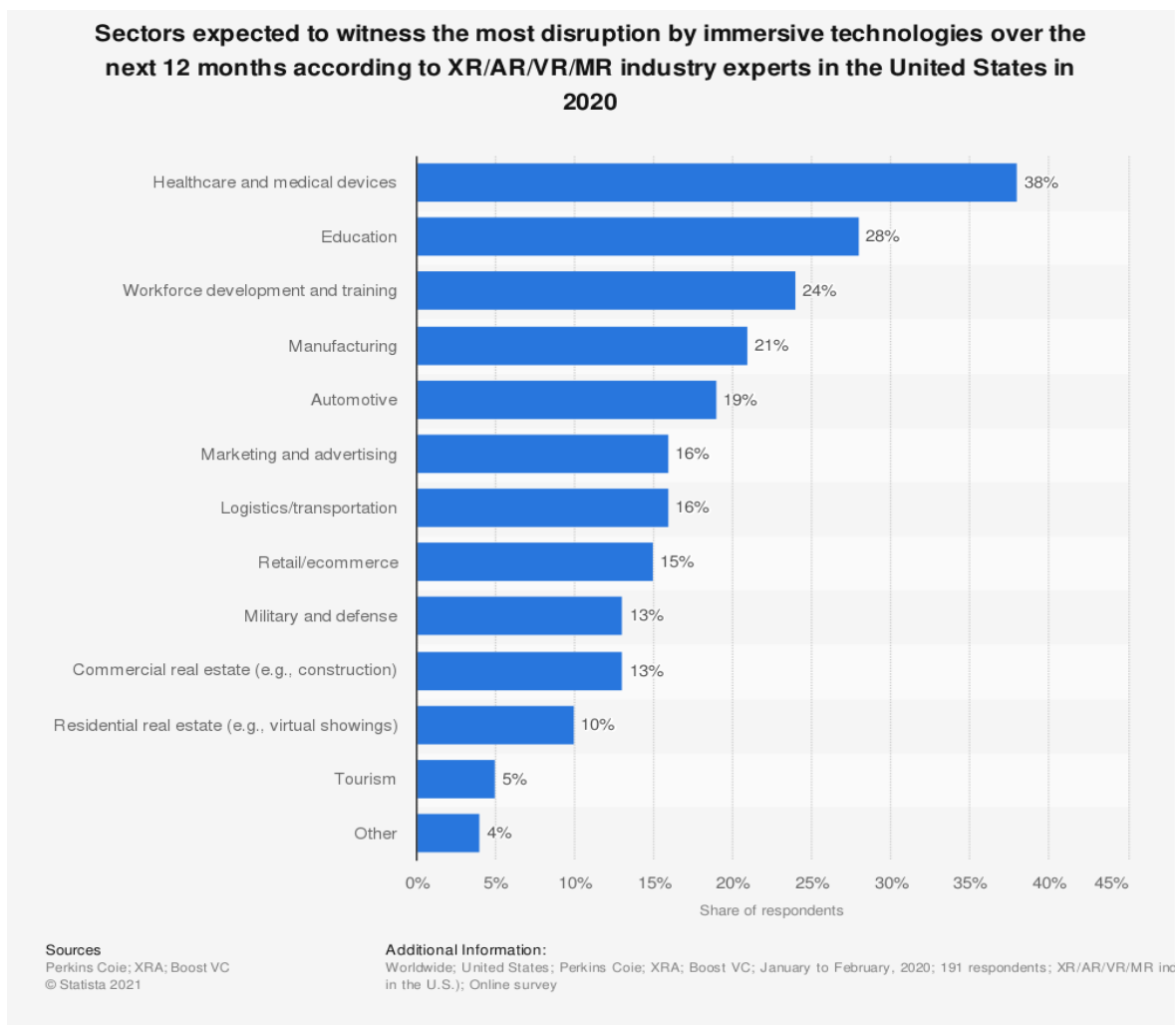


Figure 3: Sectors expected to witness the most disruption according to XR/AR/VR/MR industry experts

There are breaks in the digital value chain between the industrial information systems that manage product life cycles and the operators who carry them out daily in the field. Augmented reality can then become a strong synergy between digital spaces and human

operational spaces (Ageron et al., 2020). The manufacturing quality of products can for instance be verified by superimposing the real model on its augmented reality model (Etonam et al., 2019). The comparison between the plan and the real object is no longer done between a 2D support and a 3D support but now between two 3D visualizations. This means that the data can be transferred much more quickly.

Augmented reality also speeds up the logistics workflow, guiding employees directly to the right aisles and shelves so that they can find the product quickly (Cirulis & Ginters, 2013). The consequences for DHL for using AR in logistics report (Heuts, 2017):

- Less time spent picking orders,
- Near zero error rate,
- New employees are 15% faster than older employees trained in traditional methods.

Augmented reality has allowed a considerable advance in the field of sales. For example, e-commerce, allows to see products in 3D before buying them, which increases the rate of customer engagement and reduces the number of contact points before the purchase (Yim et al., 2017).

After-sales service is an area in which augmented reality also allows a revolutionary growth peak (Porter & Heppelmann, 2017). It indicates to a technician which part of a product is not functional anymore. The data comes directly from the device and returns to an augmented reality interface that clearly transmits instructions on how to change parts on the customer's device. The change of a part on the customer's device is then done much faster and qualitatively.

While the prior studies have shown that AR has a beneficial influence on luxury customer's attitudes and behaviors (Watson et al., 2018), and is becoming increasingly important in creating a superior customer experience (Ostrom et al., 2015). Luxury businesses can rebuild their supply chain with AR to reduce inventory, improve retail, and facility space and, most importantly, reach new geographic markets (A. Zhang, 2017). From an academic point of view, no research has been conducted on the relevance of the usage of augmented reality on the entire value chain of a luxury company. The usage of AR is not limited to improve the customer experience but emerge within the product life cycle of luxury companies, which reshape their strategies consequently. The research aims to answer the following question:

How can luxury companies integrate augmented reality throughout the value chain?

3 Methodology

The methodology chapter details the chosen research method and explains why a qualitative research strategy is suitable for addressing the research question. It will also discuss the qualitative data collection process from luxury experts and the data analysis to answer the research question.

3.1 The choice of a qualitative approach

The main goal of this dissertation is to understand how the implementation of augmented reality impacts the luxury value chain. To answer the research question, I chose to follow a qualitative research strategy that aims to understand and explain the phenomenon of augmented reality adoption among luxury brands. It is a research approach that focused on interpretations, experiences, and meaning from the luxury interviewed experts (Birkinshaw et al., 2011). The interviews were semi-structured, a type of interview in which the researcher guides the interviewee to share numerous, comprehensive and quality information on topics relevant to the research, with limited influence to ensure an unbiased response (Rynes & Gephart, 2004). Each conversation started by an open-ended question about the use of augmented reality. New questions emerged when the interviewee brought up an unknown aspect, such as a new process in the value chain of the luxury company studied.

I decided to conduct four different case studies with four companies: LVMH, Cartier, L'Oréal Luxe and Hermès, to evaluate the different practices related to augmented reality. The four companies are very active in the luxury market and are significantly improving their level of innovation. By interviewing LVMH employees, I was able to incorporate valuable data from the leading company in the global luxury market into my analysis. Although the study examined the entire LVMH portfolio, additional attention was given to Louis Vuitton and Dior, as two interviews were conducted with their direct AR providers and one with a Dior employee. Cartier is also a brand of the Richemont conglomerate, a large and successful group that is in direct competition with LVMH. Cartier is a very prestigious brand, known worldwide for its luxury watches and jewelry. Cartier is a good example of the studied industry that considers innovation as part of its know-how. L'Oréal Luxe, a branch of L'Oréal, the world leader in cosmetics, also invests massively in innovation, especially in new technologies. Finally, Hermès, which caters to a rich international elite clientele, is dedicated to traditional craftsmanship while pursuing

innovation. The four companies had an appropriate profile to provide data on the question under investigation.

Each respondent was selected based on their knowledge of the brand's use of AR technology. I also chose to interview high-level employees to obtain accurate data on AR practices across the corporate value chain.

3.2 The data collection

Primary and secondary data have been identified as relevant sources to answer the study research question.

3.2.1 The primary data

Expert interviews have been used as primary data to provide a solid foundation to justify the findings.

For each company, I had to find interviewees who were aware of the different uses of AR technology within the company under study and who were partially or globally aware of its impact on the value chain. The LVMH study allowed me to contact the provider of the AR technology, a company called Threkit. N. Masserano, the Project Management Officer, was responsible for the implementation of AR technology at Louis Vuitton and Dior. Another interview was conducted with P. Arnera, the 3D, AR and configuration specialist responsible for LVMH's brands. In addition, T. Lassaigne, a business analyst, answered the semi-structured interview questions about Dior. As for Cartier, the primary data are quotes from W. de Varax, the International Marketing Services Manager at Cartier, and one of his superiors, who wishes to remain completely anonymous. Furthermore, during the interview with L'Oréal Luxe, M. de Varax, the Sales and Operation Manager, provided insights into the logistical and production challenges of the brand, similarly to O. Finaz, a Luxury Materials Supplier in the case of Hermès. Finally, L. Finet, a reseller of Hermès products, shared his perspective on the use of AR in sales and customer service.

Each of the eight interviews happened via a video conference to take notes and read the body language of each interviewee.

Cases	Contact	Interviewed	Position	Product line	Date of the interview	Length of the interview
Cartier	LinkedIn	Wladimir de Varax	International Marketing Services Manager	Watches, jewelry, accessories	25/03/2022	50min
	Email	Anonym	Anonym	Watches, jewelry, accessories	28/04/2022	45min
L'Oréal Luxe	LinkedIn	Melchior de Varax	Sales & Operation Manager	Beauty products	28/03/2022	1h
LVMH	Email	Nicolo Masserano	External consultant as Project Manager Officer	Augmented Reality provider	24/03/2022	40min
	Email	Patrice Amera	3D, AR & configuration specialist	Augmented Reality provider	07/04/2022	45min
	LinkedIn	Théo Lassaign	Business Analysts	Beauty products	10/04/2022	35min
Hermès	Phone call	Olivier Finaz	Luxury materials provider	Packaging	05/04/2022	50min
	Phone call	Ludivic Finet	Luxury products reseller	Watches, jewelry, accessories	22/04/2022	40min

Table 1: Overview of the primary interviewed luxury companies that use AR

3.2.2 The secondary data

The secondary data collection (see Appendix I) represented the preparation for each interview and the understanding of each brand's status concerning AR. In addition, the secondary data provided precious data to dig with the interviewee into the topics mentioned during the call and justify their experiences. As the phenomenon of adopting AR is relatively new and proliferating, online interviews, newspapers, company's financial reports, and the market and consumer data platform, "Statista", have been used to bring key elements to answer the research question (Graebner et al., 2012).

3.3 The data analysis

On the first hand, the relevant codes emerging from the research question identified the topics of innovation, augmented reality, value chain and luxury businesses. On the other hand, the primary data generated codes, visible in the colorful tracking of the coding tables (see Appendix III). For example, the following quote *"The 3D product is used in AR to put the object in its environment. This allows the object to be more tangible and contextualize it, for example via the virtual try-on, we realize the size of a watch"* results in two codes, contextualization, which is a significant step of luxury retail online and offline, and virtual try-on that reflects the technology used either for the product design or the sale processes. Each code can be gathered in topics, represented in the second columns of the coding tree (see Appendix II). The three coding trees engenders three main themes of this dissertation,

the characteristics of the luxury industry, followed by the specificity of its supply chain and lastly, the capabilities of the AR and its strategies.

The demand for confidentiality of my interviews had structured my case study findings differently from one company after another, I deliberately chose to develop the evolution of AR use within the value chains' processes. The cases are analyzed together because AR has impacted operations and the product lifecycle of the four companies.

4 Empirical Setting

The next part of the thesis defines the case studies conducted in the research. The introduction of LVMH, Cartier, L'Oréal Luxe, and Hermès participates in the qualitative study, analyzing the history of the different brands and their aspiration to become more digitalized.

4.1 LVMH

This chapter focuses on the general presentation of LVMH followed by the digitalized improvements within the group.

4.1.1 LVMH presentation

Louis Vuitton Moët Hennessy is a major French group and a world leader in luxury goods. Employees must first be creative and innovative, and these qualities have enabled the group's various companies to prosper and become world leaders in their respective sectors. The group embodies luxury craftsmanship and must pay meticulous attention to every detail. On the third of June 1987, the CEOs of Moët and Louis Vuitton announced the merger of the two companies to form the LVMH group.

LVMH is mainly known for its fashion and leather goods brands, such as Louis Vuitton, Dior, Givenchy, Kenzo, Fendi, Berluti, and Marc Jacobs. In addition to these brands, LVMH produces perfume, cosmetic and jewelry brands (Guerlain, Benefit Cosmetics, Acqua Di Parma, Tiffany & Co., Bulgari, Chaumet,...). Moreover, LVMH is the world's leading luxury goods company in other areas such as the wine and spirits sector (Moët & Chandon, Château d'Yquem, Veuve Clicquot, Krug, Hennessy, Dom Pérignon, Maison Ruinart,...), in retailing (Le Bon Marché and Séphora) and in luxury hotels (Cheval Blanc in Courchevel and the Maldives). The LVMH network includes more than seventy-five prestigious brands whose products are available in nearly 5,000 stores worldwide.

The group is very proud to say that 73% of its workforce is female. It is also very dynamic and constantly expanding in 2019, its global revenue reached 53.7 billion euros, compared to 35.6 billion in 2015.

4.1.2 Digitalization of LVMH

The group has maintained the spirit of a startup, where entrepreneurial difficulties lead to innovation and a never-ending pursuit of excellence. LVMH has been a founding partner of VivaTech, and it continues to demonstrate its commitment to innovation by balancing legacy with innovation. VivaTech is a productive yearly gathering for the group and its brands, which are active in the startup ecosystem, such as Threekit, through their business acceleration program. Threekit was the finalist of the 2021 LVMH Innovation Award in the category omnichannel and customer experience. Threekit is a startup that uses 3D and augmented reality to enhance the e-commerce landscape and provide a better customer experience for shoppers and businesses worldwide.

The Threekit platform allows customers to easily view products, which is the initial thing that catches customer interest. Visualization empowers buyers who want to explore the details and complexities of the product thanks to 3D. Lastly, AR provides ultimate reassurance by letting the customer place the product in a physical space. Threekit aims to fill the visual experience gap shown in Figure 4.

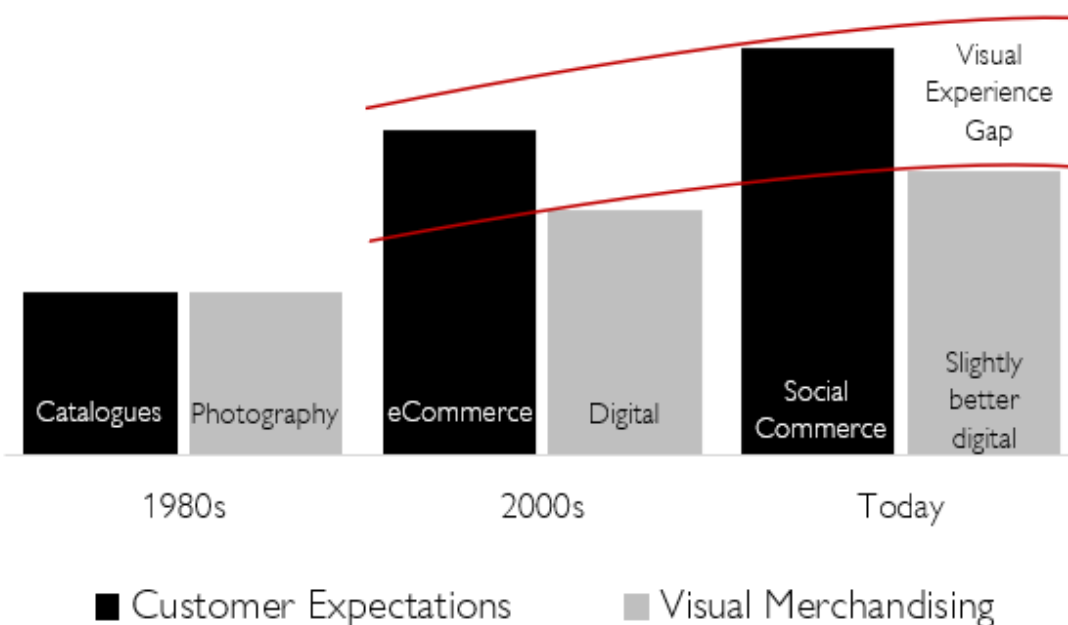


Figure 4: The Gap between the expectations of the commerce online for the customers and what the brands offer

4.2 Cartier

This part defines on the company Cartier and the adoption of new technology within the brands.

4.2.1 Cartier presentation

Cartier is one of those iconic French brands with an international aura. This original jeweler has succeeded in establishing itself as a reference in luxury by offering a wide range of products, including watches, perfumes, and leather goods. Today, Cartier is a completely owned of the Geneva-based company, Richemont.

From the beginning, in 1847, the watchmaker Louis-François Cartier supplied the most elite. With business flourishing, Cartier opened a Parisian boutique in the prestigious Rue de la Paix in 1899. It quickly became the Cartier headquarters and the place from which Louis François Cartier's three grandsons planned their expansion. In 1904, Brazilian aviation pioneer Alberto Santos-Dumont contacted his friend Louis Cartier about his difficulties using pocket watches during his flights, which inspired Louis Cartier to create a timepiece that his friend could wear on his wrist. Cartier designed a flat wristwatch with a square case and bezel inspired by the only pocket watches of the time.

Given the success of its wristwatch, Cartier began to develop other models. The brand created several timepieces, all of which became iconic. Cartier offers jewelry and accessories products as well, like bags, glasses, and perfumes.

The success of Cartier watches has never decreased. All timepieces in the Cartier-Tank-Collection remain symbols of pure luxury. Of course, the 1970s and 1980s brought their share of upheaval to the watch industry, especially with the quartz crisis. Cartier focused on selling quartz versions of its most famous models during this period.

Cartier has been selling jewels to nobility for more than a century. Cartier has almost 300 stores worldwide that sell the brand's high-end jewelry and timepieces. Richemont, the brand's parent company suffered a lot from the Covid-19 crisis as the figure 5 indicates (Smith, 2021). A considerable part of the sales is made in stores, as the luxury brands deeply value the experiences in boutiques for their customers.

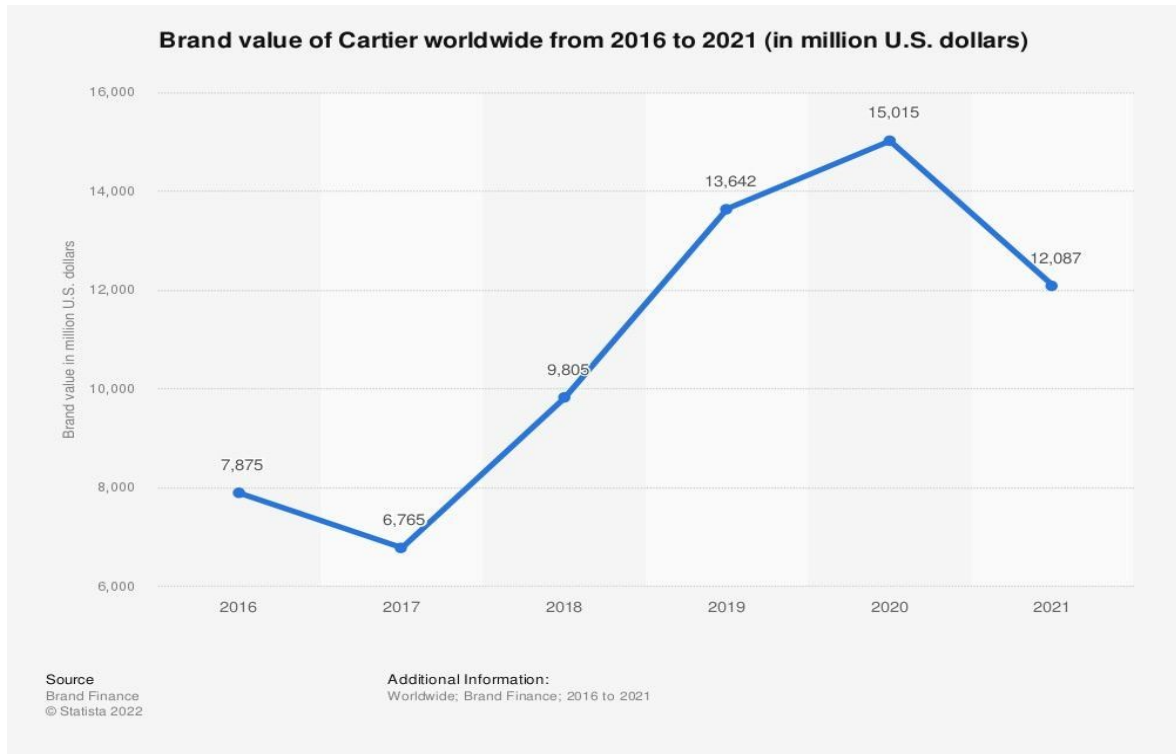


Figure 5: Brand value of Cartier worldwide from 2016 to 2021 (in million US dollars)

4.2.2 Digitalization of Cartier

Due to the crisis, Cartier was not able to present its products on site, Cartier had to adapt and implement digital solutions. The marketing company Mazarine Asia Pacific introduced the customer to augmented reality via their event “Cartier through you”. AR allowed the customers to remotely experience Cartier’s history and culture.

From the beginning of 2020, Cartier has strengthened its digital ambitions. The priority is the Chinese market, where the brand enjoys an excellent reputation among luxury customers. The jewelry house increased its presence on the Chinese web, a strategic market, by opening an online store. More than a year later, the results were excellent. Cartier is one of the best-performing luxury brands on the platform. Cartier was the first jewelry house to offer personalization services (engraving, gift wrapping, delivery) to web customers.

4.3 L’Oréal Luxe

The following studied case is L’Oréal Luxe, for which an introduction of the group’s history and its behavior towards technology is necessary to continue the empirical setting.

4.3.1 L'Oréal Luxe presentation

L'Oréal group was founded in 1909 when the young chemist Eugène Schueller offered Parisian hairdressers a hair dye, which he had created himself. The name of the dye was Aureale. Thus, the French company took a very distinctive path from the very beginning. Since then, it has adopted the slogan: *"using research and innovation to create beauty"*. L'Oréal Luxe includes 26 brands, with a portfolio of major aspirational and multi-expert brands such as Lancôme, Yves Saint Laurent (YSL) Beauté, and Giorgio Armani Beauty.

Luxury brands joined the L'Oréal group, starting with Lancôme in 1964, a perfume, skincare, and make-up brand that already embodies luxury in many countries. This acquisition, which laid the foundation for a future luxury empire, enabled L'Oréal to position itself in the market for high-end cosmetics and perfumes. In 2008, L'Oréal bought YSL Beauté for 1.15 billion euros whereas Armani Beauty has a license renewal agreement with L'Oréal until 2050. Their partnership is successful because L'Oréal has been developing since 1988, via its L'Oréal Luxe Division, very high-end fragrance, skincare, and make-up lines benefiting from the inspiration and vision of Mr. Armani. These lines show one of the most robust growth rates in the beauty sector as it exceeded €1 billion in sales in 2017.

L'Oréal Luxe offers a plethora of assets to enable it to reach all customer groups, with the diversity of brands. Couture labels like Yves Saint Laurent, Giorgio Armani, and Valentino, with whom L'Oréal struck a license arrangement in 2018, are particularly popular among millennials. Lip makeup is also a popular choice among young people, particularly Asia.

L'Oréal is the world's leading cosmetics group, present in 150 countries with a portfolio of 34 complimentary brands, from luxury products to consumer ranges. The L'Oréal group launches around 8,500 new products and sells more than 7 billion in skincare, haircare, perfumes, and make-up each year.

In 2021, sales increased dramatically, reaching an all-time high of around 32.29 billion euros. The various brands of L'Oréal focus on beauty consumption and distribution methods. Consumers are increasingly interested in high-end cosmetic brands like Lancôme and Yves Saint Laurent, especially in Asia-Pacific. As a result, future sales numbers are likely to rise due to the high product demand.

4.3.2 Digitalization of L'Oréal Luxe

L'Oréal's ambition to become the champion of Beauty Tech is rooted in a deep conviction of gathering science and technology to shape the future of beauty and keep the company strong on the marketplace.

The company has taken the digital turn through the growth of its e-commerce sales, online exchanges with its consumers, and the positioning of its brands as "love brands" present and engaging on social networks. V erane de Marffy, Senior Vice-President at Yves Saint Laurent Beaut e of the United States insisted on *"offering exceptional personalized experiences, like pop-up shops, both in-store and online while never losing sight of our level of luxury or our heritage"*.

Nicolas Hieronimus, President of Selective Divisions, emphasizes that L'Or al adapted to the luxury shoppers more focused on new interactive spaces. *"To personalize our services, we work hard to get to know our customers better and to strengthen our direct contact with them, whether through focused marketing efforts or dedicated stores, especially online"*. Esthe e Lauder or Sephora are, for example, the two main competitors on the marketplace.

4.4 Herm es

The fourth case of Herm es, defined through a presentation and the digital status completes the empirical setting chapter.

4.4.1 Herm es presentation

Herm es is a French company that designs, manufactures, and distributes numerous luxury products in fields as diverse as leather goods, ready-to-wear, perfumes, watches, and art of living. The company was founded by Thierry Herm es in Paris in 1837. At that time, the company specialized in equestrian equipment and was not in the luxury market.

At the beginning of the 20th century, in the 1920s, with modernity and the advent of the automobile replacing the horse in daily life, the company decided to vary its activities and invested in the design of clothing, watches, jewelry, interior decoration, and sports accessories. In 1929, stylist Lola Prusace created the famous silk squared scarfs so emblematic of the brand. A few years later, she also developed the leather goods business by creating bags and luggage. In 1947, Herm es invested in perfumery and launched another of its emblematic products Eau d'Herm es.

In 1967, the brand offered the first ready-to-wear collection, and later in the 1980s, it developed a cosmetic range. In 2001, it created its e-commerce site. In 2009, the House of Hermès, wishing to regain its leadership position in the equestrian world, where it comes from, created the Saut Hermès, an international competition based on show jumping.

The Hermès brand targets an upscale clientele with a very affluent lifestyle. The main target group is women aged between 30 and 50 years. However, Hermès, like any world-renowned luxury brand, remains in contact with those who may not be able to afford certain products and turn to accessories, to give them the impression of being part of a privileged population.

4.4.2 Digitalization Hermès

Hermès wants to convey strong, timeless and unchanging values while proving to be rare in order to be even more desirable. It is important to understand that when a product becomes too popular, the brand takes it off the market for a short period of time. It intends to frustrate its consumers and be even more desirable. After all, the brand sells its products almost exclusively in its boutiques, which contributes to its exceptional image. These characteristics, especially for luxury brands, go hand in hand with a digital strategy that is not very well developed.

Faced with the rise of the Chinese market and e-commerce for luxury goods, Hermès could not have prolonged its online absence for too long. Especially since the renovation of its virtual boutique has yielded encouraging results. Hermès was able to win over a new clientele, and this digital flagship has become "the fourth store in the world in terms of sales," as Axel Dumas, the group's managing director, recently confided. Moreover, the Web has become the key to conquering the Chinese middle class. Outside the megacities of Shanghai, Beijing, Guangzhou, and Shenzhen, where the brands have stores, it is only via the internet that the brand will reach potential customers in the rest of the world.

5 Findings

The customer's buying journey has evolved; consumers do not buy like they used to. Luxury brands must grasp the new digital codes and tame the new ultra-connected generations to stay competitive, especially after the Covid-19 pandemic has hustled the traditional habits of luxury boutiques. The findings expose the different uses of augmented reality of the four brands studied for the improvement of their sales but more importantly, upstream, throughout their value chain. Through the analysis of different interviews conducted for the four cases, LVMH, Cartier, L'Oréal luxe, and Hermès, this study answers the following question:

How can luxury companies integrate augmented reality throughout the value chain?

The results show that the integration of AR adds value by enhancing performance across the several operations of luxury brands, which shows the benefits of augmented reality at every step of the value chain — in product development, production, marketing, service, and especially sales. An interviewee confirmed that *"3D is already widely used, for rendering, zooming and personalization. Besides, AR is used from creation to sale, AR can be used in all stages of the digital chain"* (interview of an anonym employee of Cartier).

5.1 Product development

Visualization is a central activity in the design process, and augmented reality helps bring products to life. AR provides a realistic visual experience of a design by transcending the scales and perspectives of flat 2D planned image reproduction. For example, at Cartier, *"Augmented reality is an area that Cartier is exploring. When designers develop a watch, they study the perception of the product, its comfort, if it has the right weight, and its integration with the bracelet thanks to AR. It is becoming instrumental in designing and creating new products for rendering"* (interview of the International Marketing Services Manager of Cartier at Cartier). AR allows 3D models to be projected as holograms on the physical world, improving engineer's capacity to analyze and develop designs. AR brings products to life, increases the engineer's confidence, and facilitates manufacturing.

5.2 Manufacturing

With augmented reality, the operations to be performed are precisely calculated and explained.

The case of Hermès confirmed that AR reversed the manufacturing operations flows. According to one of the brand's providers, *"AR is more and more frequent; at Hermès, it is used today only internally. There are shows called Podium, organized by the head office to present the new products to the managers of the Hermès stores in the world, who come to choose the products they want to have in store. Before the Covid-19 pandemic, the podiums were physical and represented three times the surface of a soccer field and were set up twice a year. Before the marketing department of the head office set a production number for each creation, they had to allocate them to the different stores. Now, these podiums have become virtual showrooms with products presented in AR. This has caused a lot of evolution, especially because now it's the store managers who choose how much they want the headquarters to produce for their boutique"* (interview of the luxury material provider of Hermès). Here, augmented reality transformed the production flow; the virtuality allows the boutique's manager to command a certain number of products' manufacture. Before the pandemic, the headquarters designated the number. Now, the boutiques earned bargaining power toward the manufacturing process.

Connected stores are implementing the concept of *"see now, buy now"* which allows buying directly the clothes proposed during a fashion show by connecting the AR visualization to the website for example. This is a fundamental change as the usual time between the shows and the manufacturing of collections is exceptionally long. AR can create a high-quality remote event for the brands to show the new collection to everyone worldwide. *"Today, a fashion brand will be able to put together a few fashion shows, 2, 3, 4 a year, whatever, those shows are incredibly unique, they're incredibly polished, but every potential client or existing client sees the exact same show. We can imagine that the future will bring a bit more flexibility and personalization. You can easily imagine options where models, for example, will change depending on the country, depending even, why not, on the client"* (interview of the Chief Omnichannel Officer of LVMH). Thanks to the data collected during the orders of an augmented reality fashion show, luxury brands have the opportunity to optimize the production flow and decrease the manufacturing time.

5.3 Logistics

Virtual reality enhances the customer experience and reduces returns, making it easier to manage logistics. Visualization helps consumers to get to know a product better. Augmented

reality can ease shipping operations by preventing brands from having a high undesirable product return rate because *"the customers can visualize the real size and render of the product"* (interview of 3D, AR, and configuration expert of LVMH). AR allows the customer to see how it looks and fits in their natural environment, ensuring the bought item's consistency. Augmented reality is the ultimate reassurance that a product is right for a prospective buyer's space: it brings 3D models to life with vivid, life-like animations and sound effects.

Augmented reality can boost order picking, as operators are able to see immediately where the item they need to pick up or the location where they need to put a product. My Armani To Go Cushion and Yves Saint Laurent's customized lipstick Rouge Pur Couture have been huge bestsellers throughout Asia, *"especially in the Chinese markets, AR has a huge impact. Having the right product quickly is essential in this very active online market"* (interview of the Sales & Operation Manager of L'Oréal Luxe

5.4 Marketing

Augmented reality technology allows for never-before-seen experiences, and above all to manipulate the product without possessing it. Thus, AR creates a different user experience and leads to purchase, as the consumer is no longer just a spectator but an actor in advertising. For instance, at Dior, *"the release of the new lipsticks coincided with the end of the mandatory wearing of sanitary masks, so the stores have transmitted QR codes, to offer the possibility to try in AR virtual try-on the different colors"* (interview of the business analyst of Dior). Augmented reality is highly used for advertising a new release and offers fantastic visualization to potential customers.

Additionally, *"augmented reality was becoming a key thing, not just a trend, in a way people and consumers were discovering our brands, obviously experimenting our brands and also buying our brands. So, we thought that it would be building a key competitive advantage by in sourcing that expertise and that talent"* (interview of the chief digital officer of L'Oréal Luxe). If luxury brands incorporate and performed in house augmented reality during their processes, it will significantly impact how they compete.

Storytelling fits well with luxury brands, as they generally base their communication on emotions and brand values. Buying online breaks the ritual of buying in a store, and the magic does not work the same way. *"For LV, we absolutely need to develop these kinds of*

experiences because they will enable us to enrich the whole selling ceremony and the whole experience around almost exclusive and historical services that are personalization and special order where the client is in the very center of the design process" (interview of the Art of Travel Collection Manager at Louis Vuitton). The interviewee added that creating AR visuals will highlight the brand's identity. It is a format that's exploding and very suitable for telling a brand's story, transmitting emotions, and making people dream.

5.5 In-Store Sales

Augmented reality helps to increase the sales rate of a luxury boutique. Indeed, it is effective in convincing a prospect, as it tends to reduce uncertainty. AR is a particularly beneficial marketing tool when products may be modified with numerous features and options, making them difficult and pricey to stock in stores. *"One of the challenges for luxury boutiques is the scarcity and low stock, often even more limited [for watches] than in jewelry. There is, therefore, pressure for the salesman linked to the limited stock, a tension between visibility and scarcity of products,"* (interview of the International Marketing Services Manager of Cartier). In each store, the sellers do not have all the options available to show the potential render of a product. There is always a tension between visibility and rarity. Augmented reality solves this issue, making the item *"as tangible as possible,"* (interview of an anonymous employee of Cartier), allowing the consumer to visualize any options the product offers.

In addition, the transmission of the brand DNA is essential in the boutique's experience. AR extends and improves the universe through AR animations, *"the concept we wanted to do for this experience [Dioriviera AR capsule] is to create something really playful and immersive. So, we use the Dior Toile de Jouy motif, which is one of our iconic products. It adorned the founding boutique at 30 Avenue Montaigne, when Monsieur Dior created his first boutique, so it is very iconic for us. It is also at the heart of our Dioriviera pop-ups worldwide so we really wanted to emphasize this particular motif for this experience. So when people scan the Toile de Jouy, they are immersed in a 360 environment which is animated in augmented reality [...]. When you try it on the selfie side, you can try on two different models of the Dior Club visor, you can play with it, tap to change"* (interview of the social media and e-Reputation Strategic Planner of Dior Couture). The importance of

stores' experiences comes mainly from the fear that customers stay a couple of minutes, as is often the case for fast-fashion retail.

Entering a luxury boutique is scary and time-consuming, especially for young people, so technology is also a way to attract these young people. In addition, *"people used to think the only true luxury experience had to be in a store, and there's of course some truth to it, but not necessarily always the case. [...] It's the client's place to decide what luxury means to them, we have very different client profiles, and we have a lot of clients, for example, who are cash-rich, but time-poor. Their set of expectations is radically different, their definition of luxury is different. So, our challenge is to adapt and provide the same level of excellence to all these client profiles"* (interview of the Chief Omnichannel Officer of LVMH). Customizable and limited editions, impulse purchases, and objects of want have been a massive hit with millennials. Augmented reality reaches those customers' expectations, facilitating the product visualization and modernizing the luxury boutique's experiences.

AR answers these challenging features of creating a whole universe for store visitors offline and online, as mentioned *"technology will allow us more and more to create an online experience close to the one we have in our exceptional store today"* (interview of the CIO of LVMH).

5.6 Online Sales

Due to the Covid-19 pandemic two years ago, there has been an explosion in sales online. At the same time, the attachment to the store's experience stayed significant. AR was adopted to recreate the offline environment to enable online shoppers to download product holograms. The experience alleviates buyers' doubts about their options and shortens the sales cycle. AR is shaping the future of e-commerce: according to the project manager officer of Threekit for LVMH, 70% of customers prefer to use AR capabilities, and 22% are less likely to visit a traditional retail store if an AR experience is available online. With this solution, shoppers can see how a product looks in their space with remarkable detail and accuracy. AR projects the same emotional and sensory experience from luxury shops online. It is sometimes so successful that *"a brand had to stop the AR configurator on their website because they were completely sold out,"* (interview of the 3D, AR & configuration specialist of LVMH).

LVMH needed to develop the first-mover advantage during the Covid-19 crisis. *"3D & AR is a trend that goes very deep. As you know, in the luxury industry, people really need to see and feel the product before they buy it. It's a very emotional and sensory experience. With the pandemic, we have seen an acceleration of such experiences being offered online. Customers are getting accustomed to it, they are demanding it. Everybody is investing in 3D and AR and it's only natural that Louis Vuitton, the number one brand in the world, should lead this space"* (interview of the Regional Vice President at Threekit). The Covid-19 pandemic has drastically accelerated the digital transition strategies of luxury brands by pushing them to extend the luxury values online to answer the new market expectations.

Online luxury retail does not harm the brand equity; on the contrary, well-implemented digitalization can respond to the brand's DNA, *"since day one, Monsieur Dior really pushed boundaries and really established himself as being one of the most creative haute couture brands. And, as part of the Digital team, we're really looking to continue this testament and to be super innovative and creative"* (interview of the social media and the e-reputation responsible of Christian Dior Couture).

There is still a considerable commitment for customers who buy online, mainly because the price and a couple of pictures are hard not to persuade them. The goal at L'Oréal Luxe with AR is to make the luxury brands *"as aspirational as ever and we are working on improving our speed to market speaking to consumers in the most relevant way and offering exceptional, personalized experiences like pop-up shops, both in-store and online whilst never losing sight of our level of luxury or our heritage"* (interview of the Vice President of Marketing at Yves-Saint-Laurent Beauty). AR technology improves the luxury selling processes, mainly because the physical constraints are no longer an obstacle, which positively also impacts the after-sales department.

5.7 Aftersales-Service

AR helps technicians in the same manner that it helps factory workers: by displaying predictive analytics data generated by the product, visually guiding them through repairs in real-time, and linking them with remote specialists who can help optimize procedures.

AR can expose internal characteristics that might be impossible to observe, such as Cartier watches functionalities or Louis Vuitton trunk. *"Immersive, three-dimensional experience enables the client to discover the product and dive into it, [...] discover the trunk,*

open it, open each of the drawers, understand what kind of jewelry you can fit in all the different departments, play with the different functionalities, the bust, the mirror, the small suitcase. The second feature is to customize the materials and the colors" (interview of the Art of Travel Collection Manager at Louis Vuitton). AR does not stop to only visual rendering but shows different options and technical elements inside the product, giving visibility beyond the naked eye. The LV trunk is a massive and emblematic product, it is not easy to transport it. Augmented reality allows the specialists to investigate properly the client's issue, without having to geographically moving.

6. Discussion

The general approach of this chapter is to compare the literature results with the knowledge and interpretations of the professionals consulted.

The findings indicate that the benefits of augmented reality are driving the development of the luxury industry in immeasurable ways. It enables significant gains in areas as diverse as fashion, beauty, jewelry, and watches thanks to its application across the value chain. In line with the paper of Hammerschmid, (2017), AR adds business value by improving performance along the entire value chain product development, manufacturing, marketing, service and in sales by redefining the concept of product presentation and transforming the customer experience. While previous research has focus on the impact of AR in e-commerce (Yim et al., 2017) and marketing (Rauschnabel et al., 2022), these results demonstrate that augmented reality is used by luxury brands at every step of the value chain.

Secondly, the previous research has shown that applying blockchain throughout the luxury value chain is a major source of competitiveness (Queiroz et al., 2019). Likewise, the thesis supports the theory that AR technology improves efficiency and productivity at every stage of the value chain.

The generalizability of the results is limited by the analysis of the four companies. It is beyond the scope of this study to define the practices of AR technology for the entire luxury industry. Many smaller luxury companies with less emblematic skills such as ceramics, gilding, cutlery, architecture, design, do not have the financial power to adopt augmented reality.

7. Conclusion

Throughout the study, the cases answered a question that no academic research have yet raised:

How can luxury companies integrate augmented reality throughout the value chain?

The case studies confirm the statements of the literature review by validating the avant-garde behavior towards innovation in luxury companies today and the large-scale use of augmented reality in online and in-store sales. Several papers have investigated the impact of augmented reality on luxury retails, but AR technology has proven to be a strong competitive advantage of its application among the different processes of the value chain of businesses. The analysis demonstrates that thanks to AR technology, luxury brands have created premium, luxurious, exclusive, high-touch interactions to optimize every step of the product lifecycle. As previously stated, it has the potential to improve processes and reduce the cost of training drastically, service, assembly, design, sale and other aspects of the value chain. It can also significantly upgrade the production by eliminating the need for physical interfaces, which drastically increases visibility worldwide.

This thesis does not consider that many luxury brands use outsourcing for their production. It is difficult to know the percentage of the value chain that is subcontracted because it is a subject that tarnishes their character of exclusivity and craftsmanship. But entrusting part of the production to third parties allows them to increase the profitability of their products. The use of augmented reality with subcontractors can be tricky because AR is a great source of information that could harm the confidentiality of luxury production. In addition, luxury brands have a pledge of quality to their customers, and if the AR rendering is not of high quality or if it is not fluid, the experience can be a source of disappointment for the user. Indeed, some materials, such as precious stones, are technically difficult to represent in AR, which could be a source of error in production, marketing, or sales. The luxury experience for customers should combine all the senses, while AR deprives the touch, which represents a limit to its use, especially for luxury online sales.

Future research should investigate the impact of different kind of virtuality on luxury value chain. Through metaverse, NFTs or gamification technologies, the dematerialization of the luxury experience is more and more coveted by big brands. With increasingly realistic

avatars and ever stronger storytelling on the metaverse, it is sometimes difficult to distinguish the real from the fake in this new narrative space, not always entirely controlled by marketing. If customers' desire for proximity is fulfilled through a unique relationship, the question of authenticity arises. The value chain of luxury companies faces the challenge of finding the right balance between digital and physical worlds while keeping a vision focused on innovations and new digital tools.

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Appendices

Appendix I. The secondary data

Cases	Link	Author/Interviewed	Position	Product line	Date of the interview
Cartier	https://www.essay48.com/value-chain-analysis/13742-Cartier-Value-Chain-Analysis	Taylor Byrne	Researcher	Watches, jewelry, accessories	2018
	https://www.statista.com/search/?q=Cartier&Search=&qKat=search&newSearch=true	P. Smith	Researcher specializing in retail	Watches, jewelry, accessories	2021
L'Oréal Luxe	https://www.loreal-finance.com/en/annual-report-2016/loreal-luxe-speech	Nicolas Hieronimus	CEO of L'Oréal	Beauty products	2016
	Behind the scenes of Beauty: the French touch in the U.S #11 EN - YouTube	Véronique de Maffey	Senior Vice-President, YSL	Beauty products	2018
	L'Oréal's augmented reality acquisition helps with online brand experience Marketing Media Money - YouTube	Parham Arabi	CEO of Modiface	Virtual try-on	2021
	L'Oréal's augmented reality acquisition helps with online brand experience Marketing Media Money - YouTube	Jennifer Tidy		Virtual try-on	2021
LVMH	VivaTech 2021 #11 Louis Vuitton: 3D personalization & LV virtual assistant - YouTube	Sophie Campion	Art of Travel Collection Manager at LV	Fashion, Furniture, accessories	2021
	VivaTech 2021 #11 Louis Vuitton: 3D personalization & LV virtual assistant - YouTube	Franck Deveaux	Regional Vice President at Threakit	AR provider	2021
	VivaTech 2021 #10 Christian Dior presenting virtual try-on sneakers and Dioriviera AR experience - YouTube	Lina Djoudi	Social Media and e-Reputation Strategic Planner at Dior Couture	Fashion, accessories	2021
	VivaTech 2021 #10 Christian Dior presenting virtual try-on sneakers and Dioriviera AR experience - YouTube	Gary Pinagot	Directeur Médias Sociaux et e-Reputation at Dior Couture	Fashion, accessories	2021
	VivaTech 2021 #1 LVMH's digital transformation during and after the pandemic - YouTube	Franck le Moal	CIO LVMH	Parent company	2021
	VivaTech 2021 #1 LVMH's digital transformation during and after the pandemic - YouTube	Michael David	Chief Omnichannel Officer LVMH	Parent company	2021
Hermès	<i>Vertical integration in the luxury industry: analysis of Hermès' strategy and evaluation of the impact of internalisation on leather goods small manufacturers</i>	Camilla Costantino	Student	Watches, jewelry, accessories	2019

Appendix II. The coding tree of primary and secondary data

Luxury Values	Excellence	Features of a luxury good
Quality		
Excellence level		
Effectiveness		
Lost of quality		
Expensive	Pricing	
High price		
Authenticity	Heritage	
universe		
Universe		
Events		
Contextualization		
Luxury values		
Selling ceremony		
know-how		
Brand heritage		
DNA		
Icon		
Luxury definition		
expertise & talent		
Own creation	Personalization	
Options		
Customization		
Emotional & sensorial experience		
Personalized experiences		
Exclusivity	Privileged rank	
uniqueness		
Social marker		
scarcity		
Exclusive & historical services		
Aspiration		
unique		
Luxury experience	Emotional experience	
Need of experiment		
Satisfaction		
Commitment		
Live experience		
Cusomer experience		
Discover		
New experiences		
immersive experience		
fashion show		
Experimenting		
Innovation	Digitalisation	
Digital chain		
Digital team		
Experience junkie		
Digitalization		
Chief Digital Officer		
New technology		
360 technology		
Technology		

Design	Product development	Value Chain of a luxury business
No timing constraints		
On-demand	Manufacturing	
Functionalities		
Features	Logistics	
Sold out		
Internal organisation		
Speed		
Processes	Marketing	
Campaign		
Launch		
Communication		
Social media		
Ads	In Store	
Stress for seller		
Boutique		
Sales		
Showroom		
Exceptional store	Online	
Accessibility		
Store closed		
E-commerce		
Remote		
No physical constraints	After-sales services	
Return rate decreases		
Capabilities		

Visualization	Virtuality	
Virtual try-on		
Rendering		
Preview		
Tangible		
Metaverse		
Projection		
3D experience		
Virtual testing		
Pops-up		
Attraction		
Creativity		
Playful & immersive		
Connection with clients		
Mobile apps		
Direct		
Play & try		
AI	Data Management	
Forecasts		
Power of data		
Trend	First mover advantage	Augmented Reality capabilities & strategies
Add-on		
Covid		
Shift of the market		
Desindustrialisation of processes		
Pandemic		
Success		
Records		
Conversions		
Avaibility	Client	
Direct-2-Customers		
Consumers		
Clienteling		
One-to-one commerce		
Variety of clients		
Worldwide	New market	
Future client		
Gen Z		
New generation		
America		
China		
Global expansion	Product differentiation	
Competitive advantage		
Investment	Cost reduction	
Cost savings		
Lost of prestige	Limits	
Lack of touch		
Technical limits		
Challenge omnichannel		
Challenge seamless		

Appendix III. The coding table of the primary and secondary data

Quote from direct interviews	Code I	Code II	Code III	Code IV
"One takeaway from my experience is that AR is first a trend, luxury leaders want to be the first movers, especially because they have the financial power to invest." (Nicolo Masserano)	Trend	Investment	First-movers	
"These brands sell very expensive products, and there is no possibility to have them in store, because the production is on demand, very long and pricey. AR allows the reseller to show before hands the products to the customers." (Nicolo Masserano)	Expensive	On-demand	Visualization	
"AR stays a tool nice-to-have, it is not a necessity to sell." (Patrice Arnera)	Add-on			
"Personalization is also a key takeaway. AR allows customers to personalise the product while having a real-time and realistic visualization of their own creation." (Nicolo Masserano)	Personalization	Visualization	Own creation	
"The technology of virtual try-on is AR but without a plan, instead AR has to follow movement, it is very used by brands, especially via filters on social media, it is used as innovative curiosity for the IT department and for medium-term marketing purposes (Patrice Arnera)	Marketing	Innovation	Social media	Virtual try on
"Luxury furniture visualized in your own bedroom can lose their luxury values and become comparable to other brands (Patrice Arnera)	Luxury Values	Lost of prestige	Authenticity	
"Thanks to AR, luxury brands can protect themselves from unwanted returns. If the customers can visualize the real size and render of the product, the rate of dissatisfaction is decreasing". (Patrice Arnera)	Return rate decreases	Visualization	Satisfaction	
"We witnessed a brand, that had to stop the AR configurator on their website because they were completely sold out" (Patrice Arnera)	Success	Online	Sold out	
"AR allows brands to convince a new market segment to buy luxury products." (Patrice Arnera)	New market			
"We are talking about very expensive products, AR is not enough, the customers want to see the real product, they need to touch the materials, experiment with their hand" (Nicolo Masserano)	Expensive	Lack of touch	Need of experiment	
"The rendering of some materials are not good, which prevent some luxury companies to invest in AR. In addition, AR doesn't remove the existing item of one's environment, which can create superposition of real and virtual objects." (Patrice Arnera)	Lost of quality	Technical limits		
"One of the challenges for luxury boutiques is the scarcity and low stock, often even more limited than in jewelry. There is therefore a pressure for the salesman linked to the limited stock, a tension between visibility and scarcity of products" (Wladimir de Varax)	scarcity	Stress for seller	Visualization	
"The average price of our products is quite high, so it is complicated to belly online, the customer engages with a great prior reflection." (Wladimir de Varax)	High price	online	Commitment	
"Luxury brands want to focus on the customer experience, to avoid at all costs that customers stay 30 seconds and leave the store. The creation of a universe via the stores is emblematic of the luxury experience." (Wladimir de Varax)	Customer experience	universe	Luxury experience	Boutique
"The AR allows to answer some problems, especially in a given store where it does not have all the options available, the creation of a concept in the stores with an AR visualization of the rendering offers all the options that a customer could have. The AR answers the stress of the salesman of not having the right pieces at the right time in the right place." (Wladimir de Varax)	scarcity	Stress for seller	Options	Rendering
"Secondly, there is the personalization, the AR gives the customer to choose his options (stones, colors...) and gives a preview of the customer's own creation. If you want to offer a large number of options for a product, AR answers the problem of visualization." (Wladimir de Varax)	Personalization	Options	Preview	Own creation
"Two years ago, the proportion of online sales was very low, it was one of the worst events to have to close the stores for Cartier. But today, online sales are exploding. However, it is still a huge commitment for customers to buy online and it is difficult to project. Cartier is thinking about sending a paper bracelet with a QR code to view the watch in AR on a smartphone." (Wladimir de Varax)	online	Covid	Commitment	
"Augmented reality is an area that Cartier is exploring. When designers develop a watch, they study the perception of the product, its comfort, if it has the right weight, its integration with the bracelet. AR is also becoming very useful in the design and creation of new products for rendering." (Wladimir de Varax)	Design	Visualization		
"The AR is not available in all Cartier stores, and it is still a perfectible tool." (Wladimir de Varax)	Technical limits			
"Personalization is very important for us, so AR allows us to visualize things that are not available at the moment." (Wladimir de Varax)	Personalization	Visualization	Availability	
"AR does not jeopardize the brand's exclusivity because users do not own anything, they can simply see." (Wladimir de Varax)	Exclusivity			
"Entering a Cartier store is scary, it is impressive especially for young people, so technology can help attract these young people to live a luxury experience." (Wladimir de Varax)	Universe	New market	attraction	
"Augmented reality can allow us to create remote events" (Wladimir de Varax)	Remote	Events		
"On the AR application under development, not only will the customer be able to have visual rendering, choose options, but he will also have visibility on technical elements of the operation of the watch inside, it will give AR visibility beyond the naked eye." (Wladimir de Varax)	Visualization	New experience	Options	
"For our brand, there are two use cases for augmented reality: for internal use and for customers." (Anonym)	Internal organisation	Customer experience		
"A main theme concerning AR is to make a product that is not present in the store, as tangible as possible." (Anonym)	tangible	scarcity	in store	
"3D is already widely used, for rendering, zooming and personalization. On the other hand, AR is used from creation to sale, AR can be used in all stages of the digital chain." (Anonym)	Personalization	internal organisation	Digital chain	

"The 3D product is used in AR to put the object in its environment. This allows the object to be more tangible and contextualize it, for example via the virtual try-on, we realize the size of a watch." (Anonym)	Contextualization	Virtual try-on	
"We know that the market is moving in this direction, even without a marker (i.e. without a paper wristband with QR code), without a dedicated application and especially any device." (Anonym)	Shift of the market	Innovation	
"There must be a trade off between quality and accessibility, but so far the AR tests have been conclusive. We are therefore looking to desindustrialize the processes that apply AR"(Anonym)	Quality	Accessibility	desindustrialisation of processes
"For luxury beauty, and even beauty in general, the current trend is personalization. There are for Lancome alone, 80 shades of lipstick available, where the AR, combined with the AI will match the outfit, the tastes of the customers." (Melchior de Varax)	Personalization	AI	Trend
"At YSL, there is a custom lipstick, connected to the application, which will come according to the skin tone and clothing, create a custom color." (Melchior de Varax)	Customization		
"Personalization benefits e-commerce, but also the store, where AR is widely used." (Melchior de Varax)	Personalization uniqueness	In store	e-commerce
"L'Oréal Luxe offers a unique luxury experience" (Melchior de Varax)			
"Especially in the Chinese markets, AR has a huge impact. Having the right product quickly is essential in this very active online market." (Melchior de Varax)	Social market	Online	China
"During the lipstick campaign, with actress Anya Taylor-Joy, famous for the Netflix series, The Queen's Gambit, the goal was of course to attract a younger generation to our clientele" (Théo Lassaigne)	New market	Campaign	
"The release of the new lipsticks coincided with the end of the mandatory wearing of sanitary masks, so the stores have transmitted QR codes, to offer the possibility to try in AR virtual try-on". (Théo Lassaigne)	Campaign	Marketing	Virtual try-on
"The AR is more and more frequent, at Hermès, it is used today only internally. There are shows, called Podiums, organized by the head office to present the new products to the managers of the Hermès stores in the world, who come to choose the products they want to have in store. Before covid, the podiums were physical and represented three times the surface of a soccer field, and were set up twice a year. Before, the marketing department of the head office set a production number for each creation and they had to allocate them to the different stores. Now, these podiums have become virtual showrooms with products presented in AR. This has caused a lot of evolution, especially because now it's the store managers who choose how much they want the headquarters to produce for their boutique." (Olivier Finaz)	Internal organisation	Innovation	Manufacture
"With this link to technology, the desire to attract young people, the memory of the covid and the limitation of travel, Hermès will go more and more towards its virtual techniques." (Olivier Finaz)	New market	Innovation	Covid
"On the other hand, the AR is still far in the quality of visualization than 3D." (Olivier Finaz)	Visualization	Technical limits	
"The AR is more of an internal tool to allow the luxury house to sell to their own network and push sales. It allows to make forecasts, to avoid mistakes, to subdivide the market and to better manage the stocks, which of course leads to important cost savings." (Olivier Finaz)	Internal organisation	Cost savings	Forecasts
"On the other hand, there are concerns about the new generations who want to shop more playfully in other worlds than the real one. AR remains a small step towards the metaverse, but it is a dangerous environment because it is difficult to keep control over brand representations and usage. Is Gucci still luxury if you can buy a pair of shoes for 50€ in a virtual world?" (Olivier Finaz)	Metaverse	Luxury values	
"The AR allows the optimization of internal flows, which is often difficult for luxury brands, due to the scarcity of the materials used." (Olivier Finaz)	Internal organisation	scarcity	
"The problem with luxury jewelry is that a jewel does not look very good in 3D and even less in AR, especially for stones, it is extremely difficult to photograph a diamond or a ruby for example, you need a camera and a very sharp expertise. AR does not allow to visualize gems properly. We prefer that the customer does not have this option." (Ludovic Finet)	Technical limits	Visualization	Lack of quality
Quote from online interviews	Code I	Code II	Code III
"The [LV] trunk is mainly available on order, they are difficult to find in the stores, it started from the need to provide a live experience of the product." (Sophie Campton)	On demand	Live experience	Code VI
"It's an advanced personalization for 'made to order' pieces. It is like the ultimate personalization experiences it will allow you to see this beautiful trunk as if you were standing in front of it. See how you would like to personalize it and project it in augmented reality in your space, to see how it fits." (Franck Deveaux)	personalization	projection	
"Immersive, three-dimensional experience to enable the client to discover the product and dive into it, [...] discover the trunk, open it, open each of the drawers, understand what kind of jewelry you can fit in all the different departments, play with the different functionalities, the bust, the mirror, the small suitcase. The second feature is to customize the materials and the colours." (Sophie Campton)	3D experience	Discover	functionalities Customization

<p>"3D & AR is a trend that goes very deep. As you know, in the luxury industry, people really need to see and to feel the product before they buy. It's a very emotional and sensory experience. With the pandemic, we have seen an acceleration of such experiences being offered online. Customers are getting accustomed to it, they are demanding it. Everybody is investing in 3D and AR and it's only natural that LV, the number one brand in the world, should lead this space." (Franck Deveaux)</p> <p>"For LV, we absolutely need to develop these kind of experiences because they will enable us to enrich the whole selling ceremony and the whole experience around almost exclusive and historical services that are personalization and special order where the client is in the very center of the design process." (Sophie Campion)</p> <p>The boutique Urban Decay [...] which is an excellent example of our branded boutiques know-how, notably in the rapidly expanding make-up market as well as of our D2D - Direct-to-consumer - strategy. (Nicolas Hieronimus)</p> <p>You can find everything, but especially exclusive products. (Nicolas Hieronimus)</p>	Trend	Emotional & sensasional experience	Pandemic	Online
<p>It is ultra-digitalised with a giant screen [...] and a terminal for virtually testing the 100 Vice Lipstick shades. (Nicolas Hieronimus)</p> <p>We give consumers an enriched customer experience at our branded stores. (Nicolas Hieronimus)</p> <p>Our innovation is visible worldwide (Nicolas Hieronimus)</p> <p>We have learnt to reconcile the long-term aspect of luxury products, quality, brand heritage and sustainability, with the short-term requirement of today's world, speed, flexibility, data management. One of the way to do this is D2D, or Direct-to-consumer (Nicolas Hieronimus)</p> <p>Consumers are positioned at the centre of our actions. (Nicolas Hieronimus)</p> <p>Our brand is as aspirational as ever and we are working on improving our speed to market speaking to consumers in the most relevant way and offering exceptional, personalised experiences like pop-up shops, both in store and online whilst never losing sight of our level of luxury or our heritage (Vérane de Marffy)</p> <p>I think we come from a very creative and innovative background. I think it's part of our DNA. Since day one, Monsieur Dior really pushed boundaries and really established himself as being one of the most creative haute couture brand. And, as part of the Digital team, we're really looking to continue this testament and to be super innovative and creative. (Gary Pinagot)</p> <p>We were watching augmented reality very carefully and we jumped on the technology. We jumped on it as soon as it was available on Instagram. And as soon as Snapchat released their Try-On sneakers availability, we were one of the first brands to try it, and it completely matched the launch of the B27 sneakers designed by Kim Jones. (Gary Pinagot)</p> <p>Since the first launch was such a success and generated such a buzz, we decided to create an updated version of the lens for people to try new colours of the B27 sneakers. We've integrated a new feature on Snapchat, which is the colour-slider, so people can slide to choose the colour on Snapchat. We're also working on other products try-on which are arriving very soon (Lina Djoudi)</p> <p>Also, since we had such an amazing launch with the first version of the B27, we also decided to have a similar launch for women's sneakers, by Maria Chiuri. [...] We really continued being this experience junkie on augmented reality and now we have experiences like this everytime we launch a new product that can fit the technology (Gary Pinagot)</p> <p>If we look at the Gen Z in particular, they're becoming our future clients. In less than 10 years, they will be the biggest luxury segment as a buyer. So, it was very important to stay connected with them, to use the platforms they're using and to offer them experiences that they are willing to try. (Gary Pinagot)</p> <p>Of course, in the context of Covid, it was making a lot of sense because most of our boutiques were closed for a long time, so it was also a way of accessing to product from home (Gary Pinagot)</p> <p>I really think what generated a lot of buzz around this is that this new generation is really into buying online and also trying new experiences. So, I think this is why we were able to reach them with this experience. (Lina Djoudi)</p> <p>We've generated more than 1.5 million plays for this lens and more than 350 articles about this subject which is quite huge. (Lina Djoudi)</p> <p>The concept we wanted to do for this experience [Dioriviera AR capsule] is to create something really playful and immersive. So, we use the Dior Toile de Jouy motif, which is one of our iconic products. It adorned the founding boutique at 30 Avenue Montaigne, when Monsieur Dior created his first boutique, so it's very iconic for us. It's also at the heart of our Dioriviera pop-ups worldwide so we really wanted to emphasize this particular motif for this experience. So when people scan the Toile de Jouy, they are immersed in a 360 environment which is animated in augmented reality [...]. When you try it on the selfie side, you can try on two different models of the Dior Club visor, you can play with it, tap to change, it's really cool. (Lina Djoudi)</p> <p>As a matter of fact, online sales really jumped and broke all-time records for a lot of our Maisons. That was good news for the Group, as it helped offset some of the losses that resulted from the stores being closed (Michael David)</p> <p>Digital technology also allowed us to achieve a decent amount of sales, but also maintain a strong connection with our clients, and that was priceless. (Michael David)</p>	Selling ceremony	Experience	Exclusive & historical services	Personalization
	Boutique exclusive	know-how	D2C	
	Digitalization	Virtual testing		
	Customer experience	worldwide		
	Quality	Brand heritage	Speed	Data management
	Consumers			
	Aspiration	personalized experiences	in store	online
	DNA	Creativity	Digital team	Innovation
	Social media	Try-on	Launch	
	Success	Features	Try-on	
	Success	experience junkie	technology	
	Gen Z	Future client	Experience	
	Covid	Accessibility		
	New generation	New experiences		
	Success			
	Playful & immersive	Icon	boutique	Pops-up
	Store closed	Records	online	
	Digitalization	Sales	Connection with clients	

E-commerce activity has dramatically boomed everywhere, especially in the US. For example, LV and Sephora faced massive increase in their online sales in the Americas and if you take the example of China, it's exactly the same concept. Most of our brands saw a significant increase in China, on their .com, .cn and on their WeChat platform, so it was really impressive in 2020. (Franck le Moal)	E-commerce	online	America, China	Social media
Covid-19 has been the Chief Digital Officer of the group in 2020. (Franck le Moal)	Covid	CDO		
For me, one of the most impressive [approach during Covid] was clienteling and one-to-one commerce. We had an opportunity to develop some great mobile apps, in order to allow our sales advisors to interact with our customers remotely, and by the way, they are still using them. (Franck le Moal)	clienteling	one-to-one commerce	Covid	Mobile apps
I would add that there was also a lot of work done internally in terms of processes and how we handled fashion shows and buying sessions. As that to me was incredibly impressive, because overnight, a group the size of LVMH was able to pivot and switch to full digital, and the entire world got behind it, it just happened so quickly it was really astounding. (Michael David)	Processes	Fashion shows	remote	digitalization
People used to think the only true luxury experience had to be in a store, and there is of course some truth to it, but not necessarily always the case. [...] It's the client's place to decide what luxury means to them, we have very different client profiles, and we have a lot of clients, for example, who are cash rich, but time poor. Their set of expectations is radically different, their definition of luxury is different. So our challenge is to adapt and provide the same level of excellence to all these client profiles. (Michael David)	In store	Luxury definition	Variety of clients	Excellence level
I think tech is boosting more and more creation, showroom and brand communication. [...] When you see that very quickly brands were able to manage a full digital fashion show on various channels [...] with a more and more immersive experience (Franck le Moal)	Technology	showroom	communication	immersive experience
It's a challenge, however, for us to take that [e-commerce] to the next level, which is that seamless, omnichannel experience [...] that is very hard to achieve. (Michael David)	Challenge	omnichannel		
We have with recent LVMH Prize website for young creator, we had the opportunity to use new technology and especially 360 product technology. (Franck le Moal)	new technology	360 technology		
Today, a fashion brand will be able to put together a few fashion shows, 2, 3, 4 a year, whatever, those shows are increasingly unique, they're incredibly polished, but every potential client or existing client sees the exact same show. We can imagine that the future will bring a bit more flexibility and personalization. You can easily imagine options where models, for example, will change depending on the country, depending even, why not, on the client. (Michael David)	fashion show	unique	personalization	Clients
We're going to have to free ourselves from physical constraints and timing constraints (Michael David)	no physical constraints	no timing constraints		
I'm sure that technology will allow us more and more to create an online experience close to the one we have in our exceptional store today (Franck le Moal)	Technology	online	exceptional store	
The power of data that allows us to improve our level of personalization of service (Michael David)	power of data	personalization		
As the technology got better and as we had more deployments, it became clear that it has actually an impact on conversions, we've seen three times increase in sales, which is substantial and the last factor is that, this is something that every retailer and tech companies were interested in. [...] L'Oréal was one of the first companies to realize the impact of this technology and so now, the question isn't 'is it effective?', it is 'how quickly can we deploy it and scale it globally?' (Parham Aarabi)	conversions	technology	global expansion	
We found for example in China, messaging is a major avenue by which people find and buy products so we partnered with WeChat to provide our capabilities directly to customers for L'Oréal brands (Parham Aarabi)	China	Social media	Direct	Capabilities
The most effective ads, are actually not ads, they're services, so when someone comes on the L'Oréal website and instead of telling them, 'here is a lipstick' and it's for everyone the same product, letting them play with different colors and then recommending what might be best for them or what options might match the lipstick they have added to the basket, that is the most effective (Parham Aarabi)	Ads	play & try	effectiveness	
So you go in [shop], you explore the products you can try them on, you can feel like you've gotten a personalized experience, you're happy with the results then you purchase the products and then you leave. (Jennifer Tidy)	Try-on	personalized experiences		
We really realise that augmented reality was becoming a key thing, not just a trend, in a way people and consumers were discovering our brands, obviously experimenting our brands and also buying our brands. So, we thought that it would be building a key competitive advantage by in sourcing that expertise and that talent (Lubomira Rochet)	Trend	Experimenting	competitive advantage	expertise & talent

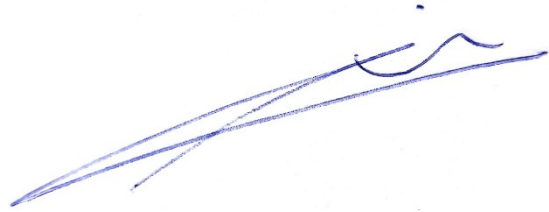
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