Sustainability Implementation in the Luxury Fashion Industry:
Assessing Annual Sustainability Reports

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Abstract

The luxury fashion industry shows a healthy growth of 7% by exceeding €225 billion in 2014. Nonetheless, the luxury fashion industry has a significant environmental footprint. Sustainability reporting receives a prominence. Nevertheless, despite the proliferation of these reports, there is a lack of consensus because of unsuitable definition of performance indicators, and lack of transparency in communication. Therefore, this study makes an original contribution by assessing the comprehensiveness of sustainability reports, and categorizing 'NOT addressed' indicators in terms of aspects. Linkage among practices, environmental impact, and carbon intensity of the industry allows this study to propose suggestions to enhance sustainability.

Keywords: Sustainability reporting, Luxury fashion industry, Environmental intensity

1. Introduction

Sustainability aims at respecting people, preserving the planet while generating profit without endangering societal and environmental rights of future generations. Lately, in many consumer goods industries, sustainability has become an essential managerial issue, and both researchers and practitioners paid a significant attention to sustainability in connection to supply chain management (SCM). As shown in public eye, the fashion industry emerged as one of the most noteworthy industries with a significant environmental footprint (Caniato et al. 2012). Big fashion companies are often held responsible for their SCs (Perry et al. 2014).

The worldwide fashion market has been experiencing a period of exceptional growth in recent years. The global fashion industry had a value of €1,173 billion in 2013, and it is expected to account for €1,512 billion by 2018 (MarketLine 2014). Within the fashion market, one of the fastest growing parts is luxury segment (Silverstein & Fiske

2003). Bain & Company (2014) indeed showed that the market for luxury fashion goods exceeded €225 billion in 2014, showing a healthy growth of 7% overall (Arpizio et al. 2014). Nonetheless, the luxury fashion industry encounters sustainability related problems. Thus, undoubtedly, the luxury fashion industry needs a multi-tiered action plan for sustainability.

Sustainability reporting, on the other hand, is receiving a prominence among global fashion companies. Over the last several years, there is an increase in numbers of companies sharing details on their sustainability initiatives in publicly available reports. Providing accurate and fully transparent information on topics such as governance, intangible assets, non-financial issues, and sustainability performance is vital, since this information is publicly available. Nevertheless, despite the proliferation of these sustainability reports, a general consensus could not be reached on what these reports should encompass, what aspects should be covered, and how they should be structured (Roca & Searcy 2012).

Academic debate on sustainability reporting is growing while concerns and doubts exist regarding the accuracy and accountability of these reports (Roca & Searcy 2012). One possible explanation causing this issue could be the high degree of qualitative information disclosed in reports. Despite the acknowledgement of such relevance (Ageron et al. 2012; Bray et al. 2010; Caniato et al. 2012; Azevedo et al. 2012), very few contributions dealing with the luxury fashion industry (Achabou & Dekhili 2013; Joy et al. 2012; Caniato et al. 2011; Nagurney & Yu 2012) touched the issues of key performance indicators (KPIs) to convey quantitative information, and further explain companies' actual environmental impact. An accurate knowledge is still missing to understand the level of commitment, disclosure, and sustainability performance of companies (Skouloudis et al. 2010). Additionally, sustainability has widely been considered a part of CSR (Ageron et al. 2012), and the implementation and communication of sustainability across SC operations has been so far neglected.

There is a lack of consensus due unsuitable definition of variables, and lack of transparency in corporate communication. The inconclusive results and diversity requires a clarification in the relationship between sustainability reporting, environmental performance and intensity of the market. Therefore, this study aims at making an original contribution to the industry-level analyses of sustainability reporting and environmental footprint by assessing the comprehensiveness of sustainability reports published by fashion companies operating in the luxury fashion industry. Another contribution is categorizing sustainability indicators in terms of aspects to identify the main sustainability practices implemented by luxury fashion companies. Linkage between practices and companies' actual environmental impact led this study to propose further suggestions to enhance sustainability.

Particularly, this study considers the concept of environmental sustainability and defines the carbon intensity of luxury fashion companies. The central questions to guide this research were; (i) 'which are the indicators currently being disclosed in sustainability reports of fashion companies? – Accordingly, which indicators are not touched in these reports – ' (ii) 'Which are the most distinctive environmental practices deployed by fashion companies?' (iii) 'How do luxury fashion companies perform in terms of their environmental impact and carbon intensity? (iv) 'What could be done to improve sustainability within the luxury fashion industry?' The paper is organised as follows: A literature review is presented in Section 2, Section 3 introduces the research framework, objectives, and methodology model while Section 4 addresses the findings the research methodology. In Section 5, the discussion is delivered.

2. Theoretical Background

2.1. Sustainability

The world is constantly changing, and over the last decade concerns regarding natural resource depletion, climate change, and sweatshops grew across numerous industries (Vachon & Mao 2008). The importance of sustainability has surged due to the increasing pressure on companies from regulators, customers and investors. Transparency is driving a multitude of stakeholders that require a disclosure of positive or negative environmental and social impacts of companies (Martínez-Ferrero & Frías-Aceituno 2013). Hence, the concepts of sustainability, corporate social responsibility (CSR), and socially responsible investment (SRI) are becoming globalized concepts (Kim 2013) to provide a signal to market (Branco & Rodrigues 2007).

United Nations defined sustainability as the development not to endanger future generations' rights while meeting todays' needs (United Nations 1987). The principle of sustainability relies on a connection among economical, social, and environmental dynamics (Caniëls et al. 2013; Schoenherr 2012). Given these strong links, environmental, social and governance factors are becoming central to companies' ability to license to operate successfully (Karaosman et al. 2015). Therefore, an integration between short and long term business goals and sustainability is required, because business as usual is no longer an option in the era of climate change, and resource scarcity (Werther & Chandler 2005; Achabou & Dekhili 2013).

Legitimation theory, suggested by Campbell et al. (2009), suggests that consumers and investors show a positive attitude toward companies involving in responsible business activities. Accordingly, stakeholder theory and corporate governance literature support this argument by stating that sustainability could improve stakeholder management - even though cannot assist as a form of regulation - (Maignan & Ferrell 1997; Kim 2013). Nevertheless, there are many complexities in sustainability implementation. From this point of view, examining the link among key performance indicators (KPIs), fundamental sustainability aspects, and corporate practices is needed to justify how sustainability could be implemented and enhanced along value chains.

2.2. Supply Chain Management in the Luxury Fashion Industry

Fashion and luxury refer to a cross-sector concept in which various industries, such as apparel, footwear, jewellery, perfumes, and cosmetics are encompassed (Brun & Castelli 2008; Macchion et al. 2015). Luxury influences intangible features of products (Oelze et al. 2014), and business models within the fashion industry provide end-consumers with an exquisite lifestyle through these products. Nevertheless, in recent years, the constant changes in global marketplace such as competition, globalisation, and increasingly changing customer demands made fashion business systems more complicated. Such phenomena resulted in increasing complexity in global supply chain management, which requires a greater coordination among different actors (Oelze et al. 2014). Companies operating in luxury fashion industry aim at aligning their product portfolio with growing customer demand in order to compete in demand-pull era. Thus, they put a set of competitive priorities along their supply chain (Caniato et al. 2012), and seek to reduce process lead times by introducing quick response dynamic planning processes (Caro & Martinez de Albéniz 2014). Due to short product life cycles, low predictability of product demand, and high volatility, fashion companies need an identification of market changes to adjust their operational and managerial structures.

Indeed, Macchion et al. (2014) stressed that industry growth could not be sustained only by marketing practices; rather, it is necessary to align supply chain processes according to a market-driven perspective.

From an operational perspective, supply networks are complex systems (Choi et al. 2014). Typically, fashion supply chains begin with fibre producers, moves to the textile mills, then to the manufacturers and finally to the retailers (Fulton & Lee 2014). Numerous fashion companies develop offshore manufacturing sites located in emerging countries to gain cost savings (Tokatli 2007). From sourcing (resource extraction), production and manufacturing (energy use) to transportation (greenhouse gas emissions) and end-of-life use (waste or recycling), each stage of a product life cycle generates environmental and social impact (Fiorino & Bhan 2014). Hence, the need to incorporate sustainability into supply chain management has become significant (Oelze et al. 2014). Nevertheless, many organizations struggle to expand the boundaries of environmental and social responsibilities to their supply chains.

Seuring and Miller (2008) proposed a conceptual framework to incorporate sustainability into supply chain operations. Ageron et al. (2012) further suggested a supply chain reconfiguration by introducing barriers, drivers, and governance structures. Nonetheless, compared to other producer-driven supply networks, fashion and luxury have not been widely investigated from an operations point of view (Caniato et al. 2012; Brun & Castelli 2013). Particularly, it is important to understand how implementation scenarios could be improved within the luxury fashion industry.

Managing fashion operations in a responsible manner is no longer nice-to-have, rather a business imperative. Fashion companies, regardless of their segment, face increased costs in materials, energy, and compliance. Many companies have already started taking important steps toward sustainable supply chain management by ensuring their growth is sustainable (Fulton & Lee 2014). Nevertheless, fashion companies are expected to increase their transparency on environmental, social, and governance indicators across all levels of operations. Therefore, companies must integrate sustainability considerations into design and development, engage suppliers on sustainability issues, actively monitor labour practices, and communicate their results of sustainability performance by stating *what have been* and *what have not been* achieved.

2.3. Sustainable Supply Chain Management
Vertical disintegration of supply chains and globalization made fashion industry become a focal point for sustainability debate due to the heavy impact on environment. Thus, fashion companies operate in a system where corporate responsibility is a strategic element (Martínez-Ferrero & Frías-Aceituno 2013). In this vein, sustainable supply chain management (SSCM) could be defined as socially and environmentally responsible supply chain practices to enhance capabilities (Seuring & Müller 2008). A successful SSCM require an organisational culture, risk management, and transparency (Alexander et al. 2014; Fernie & Sparks 2014). Nevertheless, following the emergence of SSCM, companies face the challenge of integrating environmental and ethical standpoints in their supply chains (Caniëls et al. 2013). The difficulty of embarking triple bottom line – people, planet, profit – in fashion supply chains is to ensure each individual component is ethically and environmentally secured and accounted for (Beard 2008). Hence, the holistic view of sustainable development is strategically important, and collaborative approach is highly needed to achieve a good level of sustainability implementation through relational interactions.

Many studies defined the impact of SSCM on company performance, in particular on financial return (Martínez-Ferrero & Frías-Aceituno 2013; Timmons 2011). However,

results are still inconclusive and cannot demonstrate strong correlations between SSCM and performance. There are studies supporting the positive impact of sustainability on companies' financial performance. In accordance with social impact theory and theory of good management, Martinez-Ferrero and Frias-Aceituno (2013) argue that sustainability derives stakeholder satisfaction that leads to a greater business reputation then to a better company performance. John Peloza, (2009) similarly demonstrated the positive influence of philanthropic activities on sales growth. The results of Ferrero et al. (2013) correspondingly enable us to acquire empirical evidence of a positive relationship by demonstrating the existence of a synergetic circle.

Despite studies suggesting a win-win situation fostered by sustainability implementation, there are also some studies highlighting the opposite. Lopez et al. (2007) addressed a negative impact on company performance. In their study, Moon et al. (2013) supported this argument by emphasizing a win-lose perspective. These arguments suggest that environmental protection causes additional costs to companies; therefore it hinders economic productivity by undercutting competitiveness. Furthermore, it was noted that failure to manage SSCM responsibly could affect companies' financial and non-financial performance (Oelze et al. 2014). When companies cannot manage to broaden their responsible actions and communicate them – due to various reasons such as lack of training knowledge regulations, and commitment at the managerial level – operational and reputational risks could emerge (Hughes 2012).

2.4. Sustainability Reporting
Sustainability reporting is receiving a prominence among companies around the world. Over the last several years, there is an increase in numbers of companies sharing details on their sustainability initiatives in publicly available reports. There is no universally agreed definition of a sustainability report, however there are many definitions available in the literature. The World Business Council for Sustainable Development states that sustainability reports are public reports to provide external as well as internal stakeholders with a depiction of corporate position and activities on environment, society, and economy. Providing accurate and fully transparent information on topics such as governance, intangible assets, non-financial issues, and sustainability performance is vital, as this information is publicly available. Nevertheless, despite the proliferation of these sustainability reports, a general consensus could not be reached on what these reports should encompass, and how they should be structured (Roca & Searcy 2012). The global reporting initiative (GRI) is the best known and the most frequently used framework for voluntary reporting with the overall purpose of standardizing various reporting systems implemented simultaneously (GRI 2013). Being launched in 1997 by the United Nations Environment Program (UNEP), GRI highlights that companies that want to commit to business sustainability must report on the social, environmental, and economic aspects of the firms.

Academic debate on sustainability reporting is growing while concerns and doubts exist regarding the accuracy and accountability of these reports (Roca & Searcy 2012). One possible explanation causing this issue could be the high degree of qualitative information disclosed in reports. Adams and Frost (2008) highlighted and Roca and Searcy (2012) further indicated the importance of incorporating quantitative information through performance indicators. Yet, only few studies were specifically conducted on KPIs to convey quantitative information. Skouloudis and Evangelinos (2009) stressed that the most commonly disclosed KPIs are related to energy, water consumption, emissions, and energy efficiency.

Similarly, Lozano and Huisingh (2010) clustered environmental indicators in various categories such as operations, land use, biodiversity, accidents, and supply chain. Nonetheless, it is important to know that the level of commitment, dissemination, and performance disclosure varies from industry to industry (Skouloudis et al. 2010).

In spite of the generally accepted definition of sustainability, there is little consensus on how to measure, interpret, operationalize, and communicate (Meckenstock et al. 2015). Therefore, due to inconsistent body of knowledge, further research on KPIs and sustainability practices for specific sectors is needed. The present study is specifically focusing on environmental sustainability indicators featuring aspects such as material sourcing, energy, water, biodiversity, emissions, effluents, and waste, products, compliance, and transport (GRI 2006) in particular for luxury fashion supply chains. We aim at investigating (i) which KPIs are disclosed and which KPIs are not disclosed by luxury fashion companies, furthermore which aspects could be considered significant based on identified KPIs, (ii) which practices could emerge as the most distinguishing ones to preserve the future, (iii) how luxury fashion companies perform and are aligned within the industry according to their environmental impact, and (iv) what should be improved to better sustainability within the luxury fashion supply chains.

3. Research Design

3.1. Research Objectives
A clear agreement on what is needed to communicate, what is needed to implement, and how consistency and efficiency could be secured through sustainability practices is required to develop effective sustainability strategies across supply chains. Sustainability alignment through communication is vital, and misunderstandings among network actors are not affordable considering the immense impact on natural resources. The central questions to guide this research were; (i) 'which are the indicators currently being disclosed in sustainability reports of fashion companies? – Accordingly, which indicators are not touched in these reports – ' (ii) 'Which are the most distinctive environmental practices deployed by fashion companies?' (iii) 'How do luxury fashion companies perform in terms of their environmental impact and carbon intensity? (iv) 'What could be done to improve sustainability within the luxury fashion industry?'

3.2. Background Information on Fashion Companies in the Sample
Sustainability reporting is on a voluntary basis; yet, many fashion companies are actively engaged in corporate sustainability. In order to select fashion companies to include in the sample, the following steps were employed. The global fashion industry was explored and following numbers derived. By the moment, 287 fashion retailers are registered in the United Nations Global Compact (UNGC). The UNGC is a strategic policy initiative for businesses to help corporations ensure that markets, commerce, technology and finance advance in ways that benefit economies and societies everywhere. Furthermore, many of these retailers are also active in sustainability reporting. The numbers of sustainability reports published by the fashion retailers are significantly increasing: 113 reports were published in 2014, 122 in 2013, 108 in 2012, 83 in 2011, and 57 in 2010. This growing trend leaves its mark also on carbon disclosure reporting. Carbon Disclosure Project (CDP) is a global initiative works to transform the way the world does business so as to prevent dangerous climate change and protect natural resources. By 2014, number of fashion retailers that disclose their carbon performance was 18.

However, for us it is important to demonstrate why luxury has a profound drive in sustainability, and why we focus on the luxury industry in this study. Seven companies reported in CDP were luxury brands, and furthermore, only 12 fashion retailers (all luxury) have been indexed in Dow Jones Sustainability Index (DJSI) where corporate sustainability is assessed. Therefore, to address our research questions and provide applicable suggestions, a total of 15 luxury fashion companies were included in sample. Table 1 below stresses the characteristics of sample companies.

Table 1 Sample characteristics

Company Name	Product Typology	Revenue	Country of Origin	Description
Company A	Perfumery, luxury goods , fragrance	€3,755 b	France	Specialized in leather, lifestyle accessories, perfumery, luxury goods, and ready-to-wear.
Company B	Jewellery, Watches, Cut glass	€3,080 b	Austria	Their crystals have become an essential ingredient for international design.
Company C	Jewellery, luxury goods	€1,069 b	Italia	Jewelry and luxury goods brand has several product lines including jewelry, watches, fragrances, accessories, and hotels.
Company D	Luxury fashion, leather goods	€3,195 b	England	A global luxury brand with a distinctive national identity.
Company E	Leather goods	€1,131 b	Italia	One of the world's premier luxury brands with its signature discretion, quality, and craftsmanship.
Company F	Luxury goods, fragrance, watches	€3,497 b	Italia	One of the world's preeminent luxury brands, recognised the world over for its fashion innovation and impeccable craftsmanship.
Company G	Leather goods, luxury goods	€8,272 b	France	A legend in the art of creating luggage, bags and accessories.
Company H	Leather goods	€250 b	Spain	Globally known for its leatherwear, ready-to-wear and silk accessories & fragrance.
Company I	Luxury goods	€5 m	UK	Collections include women's ready-to-wear, accessories, lingerie, eyewear, fragrance and kids are leather free
Company J	Luxury goods, clothing, leather goods	€3,587 b	Italy	Leather goods, clothing and footwear, combining contemporary, cutting-edge sophistication with one-of-a-kind, sublimely-crafted products.
Company K	Clothing and accessories	$3,444 b	USA	Lifestyle brands
Company L	Luxury jewelry	$4,250 b	USA	Worldwide luxury jewelry and specialty retailer.
Company M	Premium jewellery, watches, leather goods,clothing	€1,0649 b	South Africa	Luxury goods, with particular strengths in jewellery, luxury watches and writing instruments.
Company N	Luxury fashion, accessories, childrenswear, fragrance	€1,495 b	France	Globally known luxury goods brand with principles of freedom, lightness and femininity.
Company O	Jewellery, wrist watches	€5,438 b	France	Jewelry and luxury goods brand.

3.3. Research Methodology

Websites of a total of 15 fashion companies were content analysed based on their sustainability matters. Sustainability reports of 15 luxury fashion companies for the last five years (2010-2014) – in total 75 reports – were further analysed to identify 'addressed and 'not addressed KPIs, and explore practices by using content analysis. All reports were read then KPIs presented in the introduction or in a performance scorecard were highlighted. All charts, tables, and quantitative information were recorded to trace back to sustainability practices. A database encompassing KPIs, related aspects – where KPIs are regrouped –, and companies' environmental sustainability practices, was developed. Furthermore, according to companies' sustainability performance and annual carbon emissions, environmental impact was calculated in terms of carbon footprint as tonnes CO2 equivalent (t-CO2e). Carbon intensity was then measured to highlight the environmental impact of the luxury fashion industry as tonnes per €1 revenue. Industry average for both environmental impact and carbon intensity was assigned and companies were positioned according to their actual intensity. Results are provided in the following section.

4. Results

The results are presented in this section. Section 4.1 presents a summary of indicators addressed and not addressed in the reports. This is followed by Section 4.2, which details the use of aspects according to the sustainability indicators. Section 4.3 analyses environmental practices implemented by luxury companies while Section 4.4 provides an overview of environmental impact and carbon intensity of the industry. Finally, following this section, discussion will take place by explaining how to reduce intensity and improve the overall picture of sustainability in the luxury fashion industry.

4.1. Indicators 'addressed' and 'not addressed' in Sustainability Reports

The Global Reporting Initiative (GRI) structures environmental indicators in nine categories and describes a total number of 30 environmental indicators. Our findings suggest that 15 companies in our sample portrayed their environmental initiatives to address a total number of 18 KPIs. This implies that 18 KPIs were largely expressed in sustainability reports of luxury fashion companies. Whereas, surprisingly it was found that, a total of 12 KPIs were hardly addressed in sample reports. Nevertheless, it is highly important to highlight what is NOT addressed in the luxury fashion industry. Therefore, Table 1 clusters KPIs that were NOT, but should be, featured by luxury fashion companies.

Table 2 – Categories of KPIs not addressed in reports

Category	Explanation
Energy	Energy saved due to conservation
Water	Water sources significantly affected by withdrawal of water
Biodiversity	Location and size of protected areas and areas of high biodiversity value
Biodiversity	Habitats protected or restored
Emissions	Indirect greenhouse gas emissions by weight
Emissions	NOx, SOx, and other significant air emissions by weight
Water	Total water discharge by destination
Water	Total number and volume of significant spills
Overall	Total environmental protection expenditures by type
Overall	Monetary value of total number of non-monetary sanctions

4.2. Sustainability Indicators by Aspects

KPIs can be organized in numerous ways. We followed the approach of classifying them in terms of aspects according to the triple bottom line. Aspects, which can also be defined as topics, are those that reflect the organization's significant economic, environmental and social impacts; or substantively influence the assessments and decisions of stakeholders. As for the environmental aspects, GRI catalogues fundamental environmental indicators in (i) Material sourcing and use, (ii) Energy consumption, (iii) Water management, (iv) Biodiversity, (v) Waste & emissions & effluents, (vi) Product & services, (vii) Compliance, and (viii) Transport. Even though, the breakdown of indicators into environmental aspects is interesting, it is equally important to highlight that some performance indicators are related to more than one aspect. The most frequently aspects addressed by the luxury fashion companies are,

 (i) Energy consumption (23%),
(ii) Process & packaging (22%),
(iii) Waste and emissions (20%),
(iv) Biodiversity (12%),
(v) Materials sourcing and use (11%),
(vi) Water (4%),
(vii) Supplier management (20%)

An analysis of this breakdown suggests that aspects do not represent a balanced breakdown along the environmental dimension. The majority of focus was devoted to energy and packaging. Nevertheless, water management, biodiversity, and material sourcing require more attention due to their profound importance in the industry. It is also interesting to see that supplier management is becoming more and more important,

and companies employ strategies to reinforce it. Nonetheless, further collaborations are much needed to advance environmental aspects across value chains. Key aspects emerged in our database are as follows:

- Energy Consumption: This category groups all indicators related to direct energy consumption, indirect energy consumption, energy savings, renewable energy based products, energy efficiency, initiatives for energy reduction, and energy improvements.

- Process & Packaging: Indicators in this category deal with the initiatives to mitigate environmental impact, plastic use and management, resource use efficiency, chemical use and discharge, heavy metal and chemical use, and industrial processes.

- Waste & Emissions: These indicators detail total direct and indirect greenhouse gases emissions, other relevant indirect and significant air emissions, waste by type and disposal method, any kind of spills, and percentage of transported waste.

- Biodiversity: This category deals with areas of high biodiversity value, description of significant impacts of activities, and services on biodiversity, and activities to mitigate the impact on numerous species and biodiversity.

- Materials Sourcing & Use: These category regroups all indicators related to materials used, percentage of materials used that are recycled, cotton sourcing, recycled materials and synthetic fibres, wood-based products from responsibly managed forests.

- Water: Indicators linked to water consumption, water treatment, water sources affected by withdrawal of water, percentage and total volume of water recycled and reused.

4.3. The Most Frequently Implemented Environmental Practices
Subsequent to the identification of KPIs, and aspects addressed in sustainability reports; it is equally important to illustrate what practices are deployed in the industry. The percentage of environmental practices implemented by companies for each aspect is depicted in Figure 1.
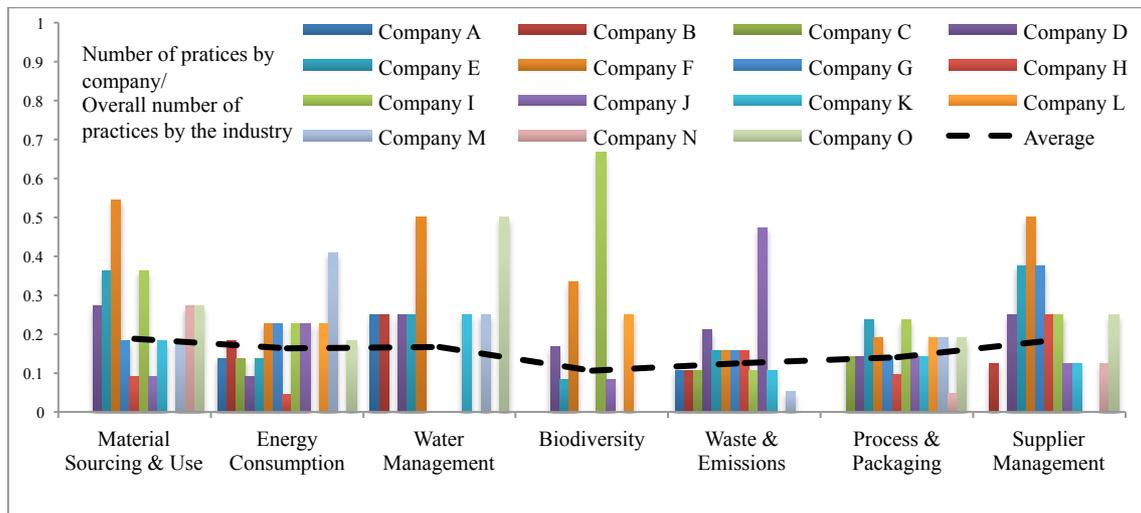

Figure 1 – Breakdown of highlighted aspects by practices per company

15 luxury companies were further investigated based on their disclosures. In accordance with the key aspects, a total of 23% of environmental practices were classified in **Energy Consumption**, the most frequently addressed environmental aspect. Despite the industrial inclination and companies' growing efforts, only seven companies were seen above the industry average.

Company M fostered energy efficiency through solar panel installation. Furthermore, the company is currently producing its own hot water. Company F, and similarly Company G, were actively engaged in installation of automatic dimmer switch, and heat recovery development. Other companies in the sample were partially certified with LEED for their warehouses, and energy efficient store lighting emerge as a hot trend. Nevertheless, energy efficiency should be further improved across the industry. Creation of e-learning modules on sustainability, sustainable building constructions, efficient use of heating and cooling systems could be promoted to foster this. The analysis was further broken down into other aspects. **Process and packaging** related practices accounted for a total of substantial 22% of all practices. The majority of the luxury companies, except Company N due to its very poor performance, were spotted on industry average. Company E and Company I dominated the industry through the use of natural materials, recycled plastic, and alternative plastic materials. Company F also work on these issues, and modify its box sizes to reduce the packaging material required. Fashion companies commonly use recycled and certified raw materials; however it was observed that incentives are required to incorporate these actions at upstream supplier level. When it comes to **Emissions and Waste**, a total of 20% of environmental practices were implemented to deal with residues, climate change, and waste. Only Company J, followed by Company D, performs above the average by going towards zero waste and emission control. Company J replaced its cooling and heating systems to reduce greenhouse gas emissions. It also actively associated its waste with recycling processes. Company D similarly reused and/or recycled more than 70% of its waste. REACH regulation was observed emerging as a hot trend, yet regulations must be improved with respect to the chemical use in the industry. As for the aspect of **Biodiversity**, a total of 12% of practices were categorized in this group. Company L made its biggest contribution to improve animal welfare and protect precious species. This could be explained thanks to its business model, which highly depends on the use of precious materials.

Similarly, Company F and Company I deployed practices to source materials from certified tanneries. Nonetheless, considering the small number of companies actively engaging in this aspect, practices deployed in this category should be urgently improved as luxury fashion heavily depends on natural resources and valuable materials. Furthermore, a total of 11% of the practices implemented were classified in **Material Sourcing and Use**. Only eight companies in the sample implement distinctive environmental practices in terms of material sourcing and use. Company F was observed dominating this category through its well-established material sourcing strategy, and its collaborative actions with upstream suppliers. Similarly, Company E and Company I, were spotted performing above the average on this regard. Following these brands, Company D invests on material sourcing from responsibly managed forests. Nevertheless, the remaining companies of our sample were found below the average. This suggests that material sourcing and use should be further promoted in the industry. **Water Management** is in need for further enhancement even though eight companies intensely advanced their infrastructures. It is important to highlight that each company reported their progression on **Supplier Management**.

This is not surprising considering the dominating impact of vertically disaggregated supply chains in the fashion industry. Nevertheless Company B, J, K, and N failed in disclosing their substantial activities or improvement strategies across supply chains.

Nevertheless, it is important to highlight that this proportion is not consistent with the required global breakdown. This could suggest that the core environmental indicators should appear in reports through a greater and better agreement. Figure 2 illustrates where each company is located within the luxury fashion industry based on their environmental sustainability disclosure. 15 companies' environmental performance is estimated as a ratio between (i) number of practices employed by the company, and (ii) overall number of practices employed within the industry – it was enlisted that 97 practices are widely used in the luxury fashion industry. Industry average is assigned and each company was positioned according to their performance assessment. Figure 2 suggests that Company F has the best alignment in terms of its environmental performance compared to its counterparts. To this end, Company I, Company E, Company J, and Company D take other high positions in terms of environmental sustainability.
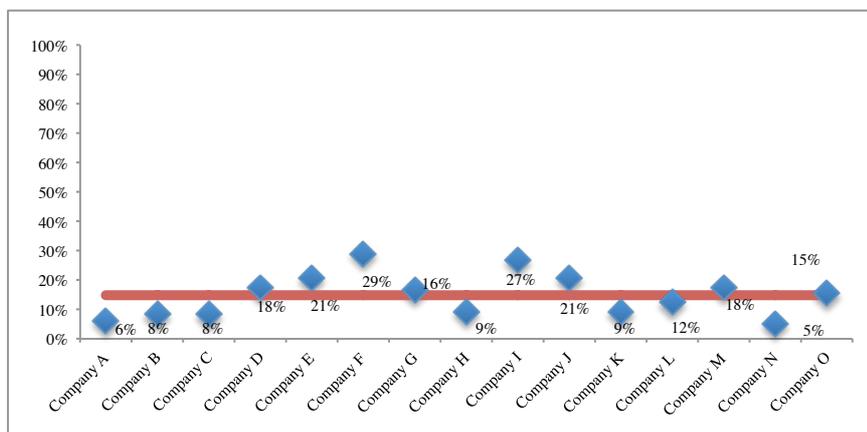

Figure 2 Company alignment based on environmental practices

4.4. Environmental Impact and Carbon Intensity of the Luxury Fashion Industry

Subsequent to the exploration of environmental indicators and aspects, and the alignment of luxury fashion companies, this section aims at providing an overview of environmental impact and carbon intensity. Within this study, we evaluate the impact on the environment created by a company in terms of carbon footprint. According to Greenhouse Gas Protocol (GHG), carbon footprint could be defined as the total sets of greenhouse gas emissions caused by an organization. Carbon footprint is often for the amount of carbon (usually in tonnes) being emitted by an activity or organization, and it is a common type of measurement for the environmental impact generated by a company. Therefore, it was logical to assess companies' impact based on their annual carbon footprint. We decided to focus on the top five companies in our sample that have higher environmental performance scores than their counterparts. Company F, Company I, Company E, Company J, and Company D were chosen to assess the luxury fashion industry's environmental impact. Nevertheless, despite its disclosure performance, Company J did not provide its annual carbon footprint in reports. Therefore, Company G replaced Company J for the assessment. Table 3 details the annual carbon footprint of five luxury fashion companies as tonnes CO2-e. An industry average was also provided to compare companies listed.

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Table 3 – Carbon footprint of luxury fashion companies and industry average

Annual Carbon Footprint (ton CO2-e)					
	2014	**2013**	**2012**	**2011**	**2010**
Company E	30,224.90	30,614.97	20,827.95	20,230.27	35,522.37
Company F	93,454.00	98,929.12	80,204.14	93,094.78	278,826.29
Company G	70,426.80	57,394.71	52,210.17	41,947.74	40,569.66
Company D	41,821.16	36,948.16	32,579.48	31,521.00	23,700.00
Company I	133.62	130.04	88.00	115.22	243.31
Industry Average	**47,212.10**	**44,800.4**	**37,181.95**	**37,381.80**	**75,772.32**

The results illustrated above highlight that, in spite of companies' disclosures and a growing number of reporting initiatives, annual carbon footprint of the industry constantly grows. We took into consideration the past five years and developed our database by tracing sustainability performance from 2010 up to date. Therefore, it is highly visible that in 2010, when sustainability was barely emerging, carbon footprint was extremely high, 75,772 t CO2-e. While ethical consciousness was growing, companies took measures toward reducing carbon footprint. With efforts, it drastically dropped to 37,381 t CO2-e in 2011. Nevertheless, despite this great success in reduction, sustainability could not be sustained, and from 2011, carbon footprint led to a constant growth – 44,803 t CO2-e in 2013, and 47,122 t CO2-e in 2014. At the company level, Company E, and Company G increased their annual carbon footprint. Company I, on the other hand, managed to reduce its carbon footprint throughout the years. Even though change is not significant, this can be considered a success story given that the company was growing in terms of size and revenue. Company D similarly managed to have the same amount of carbon intensity while financially growing. Among these companies, the most volatile performance was recorded belonging to Company F. Even though this company is taking the lead in many aspects, its carbon footprint could not maintain a healthy performance, as it decreased then increased significantly.

These findings suggest that luxury fashion companies, even the most sustainable ones in our sample, need to further improve their practices since industry average for carbon footprint is growing considerably. Table 4, moreover, illustrates carbon intensity of luxury companies as tonnes CO2-e per €1 revenue.

Table 4 – Carbon intensity in terms of tonnes CO2-e per €1 revenue

Carbon Intensity (t CO2 / €1 revenue)					
	2014	**2013**	**2012**	**2011**	**2010**
Company E	26.72	27.78	22.04	29.62	69.52
Company F	32.00	30.00	25.00	32.00	111.94
Company G	8.00	9.00	8.00	5.00	6.00
Company D	13.09	13.48	12.79	15.32	14.58
Company I	26.00	27.00	24.00	27.00	69.52
Industry Average	21.16	21.45	18.37	21.79	54.31

An industry average was also provided to see what €1 revenue constitutes in terms of its environmental impact, and what luxury companies must do to reduce it. Carbon intensity is a measure of how efficiently organizations use their energy resources.

As Table 4 shows, great progress was made in reducing the fashion industry's carbon intensity. Industry's intensity was 54 tonnes while it was reduced to 21 tonnes per €1 revenue. Nevertheless, in the last three years industrial emissions as well as carbon intensity have risen. Even though some of our sample companies are ramping up renewables, all companies still rely on global distribution to drive economic growth. In order to decrease the carbon intensity, companies must ensure that their carbon emissions grow at a slower rate than their revenues. Based on luxury fashion companies' sustainability performances, the following section was created to provide elaborative suggestions to better embark sustainability in order to reduce the environmental impact of the luxury fashion industry.

5. Discussion and Implications

According to the results, the following propositions are highlighted to improve sustainability implementation in the luxury fashion industry. As it was highlighted in Table 1 and shown in Figure 1, material sourcing, biodiversity, and water are the aspects that require a greater and better attention. Environmental impact is largely generated during raw **material sourcing**. Thus, fashion companies must implement strategic collaborations. **Biodiversity**, on the other hand, is a vital topic, and therefore suppliers must employ accepted practices and humane treatment in sourcing. To this end, brand owning companies and/or fashion groups must regularly control suppliers to ensure high standards in management practices. The procurement of precious skin should follow international regulations and procedures. For example, a luxury fashion group, Kering, has implemented detailed internal policies for raw material sourcing and set very high standards for sourcing practices. The context of sustainable use of raw materials is a complex topic. Within the industry, there is a need of taking a number of initiatives to enhance traceable, and sustainable sourcing. It is fundamental that NGOs, local communities, and government agencies – such as the International Union for Conservation of Nature Special Commission – collaborate to overcome the challenges of sustainable sourcing, traceability, and conservation of natural resources species. Leather, an essential raw material for luxury fashion products, must come from responsible and verified sources that do not cause damage in sensitive ecosystems. Thus, improving sustainability in the leather trade, and tracking the leather through a traceability system could be ensured with a very important priority. 'Made in Origin' signature is a critical success factor for the luxury fashion industry. Hence, fashion brands must trace back leather back to its original source to verify procurement and management practices. Guidelines, principles, recommendations, and requirements on supply chain traceability, certification, and animal welfare must be ensured through supply chains. 'Zero Deforestation Handbag' project by Gucci could be given as a major example of product innovation setting in traceability and ecological certification for leather sourcing. Bottega Veneta, similarly, launched an ambitious leather traceability project that aims at certifying the entire product life cycle of a signature bag by encompassing leather suppliers from tanning processes to transportation. Luxury fashion industry needs more initiatives and collaborations to guarantee and verify responsible sourcing. Gold, diamonds, and precious stones are also important raw materials for the industry. In the pursuit of sustainable raw materials, mining operations should also be traced not to have a negative impact on biodiversity and local communities. Sourcing from the verified and certified mines having high social and environmental standards must become a business strategy. Collaboration between companies, and government agencies and NGOs must be reinforced.

Because of natural resource scarcity, fashion companies must commit to sourcing from sustainably managed forests to achieve a balance. Given that recycled paper uses less water, chemicals and energy than production from virgin fibres, sourcing recycled materials could be a great option for packaging. Some big fashion brands are currently ensuring that their paper and packaging comes from certified sources and sustainable forest management. To this end, the Forest Stewardship Council (FSC) provides extensive certification programs. Moreover, sustainable retail packaging that are coming from recycled and certified materials must be further promoted within the luxury industry. Deforestation is an important problem and supporting sustainable forest management could increase the value in addressing deforestation challenge. Therefore, sourcing recycled and certified paper and wood products play a vital role. PVC (polyvinyl chloride) is the third most commonly used plastic as a leather substitute and to replace rubber. Nevertheless, PVC holds a significant environmental and health threats throughout its life cycle. Thus, it is extremely needed to incorporate sustainable materials and renewable resources in processes. Material and product life cycle assessment could be further enhanced within the industry to evaluate the environmental performance of materials. In this vein, Stella McCartney shall be given as an important example of how to find greener, and more sustainable solutions. The designer has concentrated on biodegradable and vegetable oil materials and has launched a number of shoe collections by incorporating bio-plastic, non-leather and biodegradable materials. As for the chemicals, across the clothing industry, there are more than 10,000 chemicals used in the manufacturing processes carry potential negative impacts for health and environment. Therefore, chemicals should be managed and new yet innovative ways should be explored to reduce and/or avoid use of chemicals. **Water** is also an extremely important topic that should be carefully taken into account. Guidelines including recommendation on management systems, certification and supplier engagement must be provided to ensure water efficiency across supply chains. Hence, water must be managed in an efficient fashion through awareness raising programs and management guidelines. Waste is also an important aspect to carefully consider. Inefficient use of materials causing waste generation leads to more production and extraction of raw materials that have a significant environmental impact. Efficient material usage, responsible sourcing, and waste minimisation could lead to reductions in energy and water use. Awareness raising campaigns, supplier engagement, and smart utilization and recycling based programs must be enhanced within the industry. Given that climate change and water scarcity are the biggest global challenges – it is predicted that 40% shortfall in water will be faced within the next 30 years – responsibility of a business should be driven towards becoming more responsible and sustainable.

6. Conclusion

From the institutional theory point of view, the story of sustainability reporting illustrates how a corporation could emerge in a dynamic fashion as a result of interactions among many actors. This study provided insights on sustainability reporting, environmental aspects, and practices adopted by luxury fashion companies. Therefore, this study makes an original contribution by assessing the comprehensiveness of sustainability reports, and categorizing 'NOT addressed' indicators in terms of aspects. The results showed that the indicators disclosed in annual sustainability reports were not equally distributed along the environmental aspect of sustainability. The study also revealed that some aspects, which could be clustered based on the indicators, received more attention because of the practices deployed.

This underscores that in the luxury fashion industry, while some indicators are paid attention and companies invest in implementation of environmental measures, some indicators, and some crucial aspects, are not equally taken into consideration. Environmental aspects and practices database developed in this study represents an original contribution that provides advancement in research on sustainability reporting in the luxury fashion industry. This allowed aligning companies based on their environmental footprint and carbon intensity, thus a benchmarking was provided to further suggest what could be advanced in luxury fashion to better embark and communicate in sustainability. Suggestions were provided according to what was found as lack in real life, and several implications were addressed throughout the paper.

There are numerous possibilities for future research in this area. Questionnaires could be used to explore in greater depth how the usefulness of sustainability reporting is perceived among corporations, to what extend companies are willing to advance their practices, and how sustainability practices could influence their network design. Further research would provide the basis for additional comparisons and opportunities to explore the impact of sustainability implementation on company objectives in terms of operations and supply chain configurations.

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