



The relationship between upstream vertical integration and environmental sustainability in the luxury fashion industry

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Abstract

Luxury fashion firms increasingly incorporate the principles of environmental sustainability into their supply chain strategies in response to a growing demand for sustainable products. Starting from this premise, the present study explores the relationship between upstream vertical integration and environmental sustainability in the luxury fashion industry. Based on data from a survey and a set of interviews, this paper examines the link between firm size and the importance of environmental sustainability as a driver of upstream integration. In addition, it investigates the connection between the degree of upstream integration and manufacturers' environmental sustainability performance. According to the research results, large corporations attach greater importance than SMEs to environmental sustainability when considering an upstream integration process. Also, higher levels of vertical integration are positively associated with better sustainability performances.

Keywords Upstream vertical integration · Sustainability · Manufacturing · Fashion · Luxury

JEL Classification L00 · L10 · Q56

Introduction

Vertical integration is one of the most widely debated concepts in the business management literature. In general terms, it can be seen as a strategy through which a firm takes control over one or more stages of its external supply chain, to achieve various goals, such as reducing costs, gaining a better market position or securing supplies (Crain and Abraham 2008; Thompson and Martin 2010).

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Debate about vertical integration is centred around a classical dichotomy between in-house production and external procurement of resources needed to deliver a given product. The decision to purchase certain goods or services from outside vendors or to produce them internally has significant implications for a firm in terms of production cycle, relationships with customers and suppliers and, ultimately, competitiveness. Selecting the best option is paramount in today's global economy, because the effectiveness and efficiency of the supply chain are key determinants of firm performance (Panahifar et al. 2018).

In the early stages of market globalisation, vertical integration experienced a sharp decline in popularity, while other strategies, particularly outsourcing, rapidly gained importance among firms from all countries and industries. The need to reduce operational costs and to promptly adapt to environmental changes may explain the crisis of vertical integration and the success of alternative solutions, entailing a higher degree of flexibility and lower investment levels. However, the tendency to integrate the production process downstream or upstream has progressively re-emerged both in traditional and innovative industrial sectors (Zhang 2013).

Although extensive research has been conducted on vertical integration, this strategy has not been carefully examined in connection with the concepts of environmental sustainability and firm size within the luxury fashion industry. In particular, to the authors' best knowledge, there are no studies explaining whether large firms and SMEs attach the same importance to environmental sustainability when deciding whether to expand upstream. Furthermore, no research works are available in the literature on how the degree of upstream integration influences companies' environmental sustainability performance. The present research paper is intended to fill this research gap by providing a thorough analysis of vertical integration processes involving fashion corporations from Italy and France, the world's leading countries in luxury fashion. It is specifically focused on the following questions:

RQ1: What is the connection between firm size and the importance of environmental sustainability as a driver of upstream integration?

RQ2: What is the relationship between the degree of upstream integration and manufacturers' environmental sustainability performance?

To address the aforementioned questions, the sequential explanatory mixed methods design was adopted. In the first part of the study, a survey was performed on a sample of 70 sustainability-focused manufacturers, equally distributed between large firms and SMEs, that expanded upstream between 2009 and 2021. In the second part of the research, semi-structured interviews targeted seven companies purposively selected among survey participants. The present study is justified based on the following considerations: (1) the connection between environmental sustainability and vertical integration in the luxury fashion industry has not been specifically addressed in the literature; (2) sustainable development has become a key challenge for luxury brands (Kapferer and Michaut 2015); and (3) manufacturers increasingly strive to align supply chain strategies and corporate sustainability policies (Wu et al. 2014).

The research outcomes make an original contribution to the business management literature, as they offer insights into the relationship between upstream integration and environmental sustainability in luxury fashion. From a wider perspective, the study provides a deeper understanding of environmental sustainability as a factor influencing manufacturers' supply chain strategies and draws attention to the effects of the supply chain design on environmental performance. Developing an accurate knowledge of such issues is essential for luxury fashion manufacturers, as these increasingly opt for a vertically integrated model of production and are aware that embracing environmental sustainability helps them promote and protect their brand image (Grubor and Milovanov 2017).

This paper begins with a comprehensive literature review, which explores the notion of vertical integration, examines the decline and revival of vertically integrated models of production in the era of globalisation and analyses the role of sustainability and vertical integration in the luxury fashion industry. It successively illustrates the methods used to address the research problem and presents the results of the study. Finally, it identifies and discusses the main research outcomes and critically evaluates their academic and managerial implications.

Literature review

The concept of vertical integration

According to Mpoyi (2003), vertical integration is the degree to which a company controls the activities designed to produce its inputs and distribute its outputs. From another perspective, it occurs when various phases of the production-marketing chain are combined under a single ownership (Den Ouden et al. 1996). For the purposes of the present research, the term can be interpreted as a strategy through which a firm expands its operations towards its suppliers or buyers, thereby bringing in-house one or more tasks which were previously performed by external partners (Dyer et al. 2017). This definition implies that vertical integration can be of two types, showing opposite movements through the supply chain. In particular, it is *backward/upstream/uphill* when a firm acquires its supplier's functions and *forward/downstream/downhill* when it engages in processes until then implemented by distributors, retailers or other operators acting as customers.

Vertical integration can be described and analysed based on different criteria. One criterion is the integration breadth, referring to the number of tasks that a company accomplishes internally. It is a key aspect, because performing a wide range of activities might prevent a firm from achieving the expected economies of scale. Equally important is the number of integrated stages, as a firm might find it overly complex to manage several steps of its supply chain. To have a complete picture of a vertically integrated approach and assess its complexity and convenience, it is necessary to also consider the degree and form of integration. The former dimension can be defined as the share of production that a business unit transfers to or receives from sister units. It significantly impacts business operations, because a company might have an overcapacity and consequently waste resources or need to sell the

exceeding share of production to outside players (Harrigan 1985). Adelman (1955) defined the degree of vertical integration as the extent to which a company depends on the market at specific stages of its production/distribution process. Different methods can be used to measure the degree of vertical integration. According to the value-added to sales approach (VAS), vertical integration can be calculated by dividing value-added by sales. Other common approaches are the inventory to sales ratio and the income to sales ratio (Adelman 1955; Kaiser and Obermaier 2020). In comparing different measurement methods, Adelman (1955) observed that a simple way to determine the degree of backward vertical integration is to calculate, with respect to a given product, what percentage of inputs used by the firm is produced in-house. A company producing in-house all the resources needed for its production process has a vertical integration index equal to 1, whereas a firm buying all its factors of production has an index of 0. Likewise, the extent to which a company depends on the market for its sales determines the degree of forward integration.

The form of integration draws attention to the type of arrangement chosen to take control over upstream or downstream activities (Harrigan 1985). In this regard, it is worth pointing out that a firm does not necessarily need to acquire another company; it may alternatively decide to achieve integration through a process of internal development (Barney and Hesterly 2019).

The decision to adopt a vertically integrated approach may arise from firm- and industry-specific dynamics. Suppliers tend to have a strong bargaining power when their number is limited and their products/services play an important role in the client's production process. In such a scenario, an uphill expansion may allow the client firm to avoid unfavourable deals and thus achieve cost savings (Leiblein and Miller 2003). In the era of globalisation, supply chains are increasingly wide, as they involve an ever-growing number of players from different countries and continents. Such a complex context entails a remarkable degree of uncertainty for the buyer in terms of quality, quantity and timely delivery of supplies, with possible negative effects on its business operations (Vieira 2008).

Backward integration can significantly mitigate supply-related risks and lead to improved scheduling and higher quality standards, because it enables a firm to exert direct control over the production of its inputs. Similarly, downstream integration typically allows for more efficient management of activities being performed at a later stage of the supply chain; it reduces distance between a company and its customers and may thus result in higher profits and a better market knowledge (Clinton et al. 2008). Nevertheless, both types of integration entail some disadvantages. A major problem is the need to invest sizeable financial resources in business facilities, staff and any other tangible and intangible asset required by the expansion process. In addition, pursuing an integration strategy may reduce a firm's flexibility, as it involves the simultaneous coordination of multiple activities of different types, such as manufacturing and distribution (Rothaermel et al. 2006). Each activity requires specific expertise and thus poses difficult challenges, especially to SMEs, which traditionally suffer from limited material means and knowledge gaps. Furthermore, the products resulting from an integration process may become obsolete, more expensive or less appealing compared to those provided by outside firms, due to the rapid evolution of technology or fast-changing consumer trends (Den Ouden et al. 1996).

For these reasons, some firms reduce their involvement in upstream or downstream tasks and, thus, opt for what is referred to as *vertical disintegration*. A company may decide to disintegrate in a reactive or proactive manner. In one case, disintegration can be viewed as a response to an existing competitive disadvantage and consequent poor performance; in another case, it occurs at an earlier stage and is part of a strategy aimed at improving a firm's overall competitiveness. Disintegration may be the most appropriate solution considering a company's internal and external context. However, its implementation may have severe effects on the disintegrating company from a financial and organisational standpoint, because it puts an end to well-established cooperation relationships between different business units, reshapes resource allocation procedures and impacts, to a greater or lesser extent, hierarchical levels, roles and functions within the organisation (Desyllas 2009).

Alternative approaches

A firm may find it difficult or not convenient to perform an integration through a green-field investment or a full acquisition. It may, therefore, prefer other solutions, requiring less efforts and offering similar benefits. Joint ventures and franchising may be valuable alternatives in different situations, such as an industry context showing rapid technological advances (Barney and Hesterly 2019; Harrigan 1983). The adoption of such strategies is commonly defined as *quasi-integration* (Fearne et al. 2001).

Long-term contracts with buyers or suppliers are a viable solution when the risks related to buying inputs or purchasing outputs are perceived to be high. For instance, a manufacturing firm may address the risk of strong and rapid fluctuations in the price of raw materials through a multiyear pricing agreement with its supplier. Similarly, a buyer company may reduce the likelihood of supply shortages through a long-term exclusive contract with a supplier (Stengel 2011). Such options have a lower impact on a firm's costs and organisation compared to a full integration, but they do not provide direct control over operations related to other stages of the supply chain. As a result, they may be unable to guarantee the same level of performance in terms of cost and efficiency of the overall production process. Companies may also choose a mixed approach, combining the integration of uphill or downhill activities with a process of market exchange (Besanko et al. 2013). More specifically, they may decide to make in-house a certain portion of their inputs and to purchase the remaining part from outside providers or to sell a given percentage of their products by internal resources and the remainder through external channels. Such a hybrid arrangement, which is known as *taper integration*, may help a firm maximise its own capacity through the involvement of outside players. This approach implies all the risks that firms normally experience when relying on external forces (Rothaermel et al. 2006).

The luxury fashion industry

Luxury fashion constitutes the highest segment of the fashion market. Products and services falling under this conceptual category are typically associated with a set of attributes including but not limited to brand identity, quality, craftsmanship,

high price and exclusivity. The luxury fashion industry is highly diverse, as it can be divided into three sub-segments, namely inaccessible, intermediate and affordable luxury. As the term suggests, the first class includes precious and rare/unique items destined for a limited number of customers. High price points and exclusive distribution channels act as entry barriers to a wider audience in this category. Intermediate luxury refers to products with a lower degree of exclusivity, such as prêt à porter collections, accessible to a larger, but still small group of customers. Finally, affordable luxury encompasses high-end items designed for consumers with fewer financial means (Cabigiosu 2020).

The luxury fashion industry is dominated by three conglomerates: Moët Hennessey Louis Vuitton, commonly referred to as LVMH, Kering and Richemont. The first group is the largest player in the market, with revenues of almost €45 billion and 150,000 employees in 2020. It owns 75 fashion houses and has a highly diversified production, covering different sectors of the luxury world (LVMH 2021a). Kering ranks second in terms of annual turnover and controls world-renowned brands, such as Gucci, Balenciaga and Bottega Veneta (Donzé 2017). Richemont, the third largest group in the industry, particularly focuses on jewels, watches and other fashion accessories. It encompasses leading firms, such as Cartier and Montblanc. In luxury fashion manufacturing, the aforementioned conglomerates coexist with large independent corporations, such as Armani, Chanel and Hermès, and a wide variety of smaller brands. It is worth noting that two out of the three largest players, namely LVMH and Kering, are headquartered in France, but the highest number of luxury brands is concentrated in Italy. For these reasons, Italy and France are deemed to be the two leading countries in terms of supply. China and the United States are the main destinations for luxury fashion products. Other well-established consumer markets are Europe and Japan, where high income levels are associated with a widespread consumption of high-end products (Cabigiosu 2020).

In the first two decades of the twenty-first century, luxury fashion expanded at a fast pace, especially in developing economies, where a growing number of wealthy consumers stimulated demand for high-end goods. It suffered a setback only in 2008–2009, because of the global economic downturn, and in 2020, as a consequence of the COVID-19 pandemic, which caused supply chain disruptions, store closures, travel bans and, ultimately, a sharp decline in corporate sales and profit. However, most fashion brands quickly recovered from the pandemic-driven market crisis by strategies focusing on sustainability and digital technologies (Faccioli and Sheehan 2021).

Towards an environmentally sustainable business approach

A steady depletion of natural resources, rising pollution levels and climate change constitute a global emergency, stressing the importance of integrating environmental sustainability and economic growth (Lukman et al. 2016). The need for such an integration draws attention to entrepreneurial activities, which are a major driver of economic growth (Kritikos 2015), and raises two main questions: what is a sustainable business model and what costs and benefits does it imply for a firm?

According to Rahman et al. (2012), an environmentally sustainable business approach entails minimising waste, conserving energy and preventing adverse effects on ecosystems. Similarly, Vachon and Mao (2008) argued that a company is environmentally sustainable if it has a limited impact on the environment in terms of waste and emission levels and exploits natural resources at a slower pace than their self-regeneration. Environmental sustainability is widely seen as a source of competitive advantage, as it can improve corporate image and operational efficiency. Indeed, companies with sustainable business practices typically become more attractive and trustworthy in consumers' eyes. In addition, they reduce inputs, minimise waste and, ultimately, enhance their competitiveness (Guimarães et al. 2017; Walsh and Dodds 2017). Embracing sustainability often implies an increase in fixed costs, as firms may need to procure new equipment, implement different procedures or develop monitoring systems. However, a sustainable business model ideally leads to cost savings and better financial results in a long-term perspective (Pomarici et al. 2015).

Sustainability-related issues are increasingly important among firms of any size, but SMEs are generally seen as less committed to sustainability than large corporations (Jansson et al. 2015; Revell et al. 2010). A wide range of factors may obstacle the adoption of a sustainable business approach in SMEs. Some of the most common barriers are a limited availability of resources, high costs associated with the implementation of sustainable policies and insufficient expertise (Álvarez Jaramillo et al. 2019). Another major hurdle is a lack of environmental awareness: some business owners/managers tend to ignore or underestimate the impact of their firm on the environment or do not perceive the benefits of sustainability (Revell et al. 2010). The aforementioned obstacles are a serious reason of concern in fashion, as this is the second largest polluting industry at a global level (Jacometti 2019).

Vertical integration and environmental sustainability in the luxury fashion industry

In the initial phase of market globalisation, several fashion firms externalised a number of operations, particularly non-core activities, to decrease production costs, focus all efforts on key tasks and/or adapt more quickly to market changes. The expansion of outsourcing and the new competitive context reduced the appeal of vertical integration during that historical period (Zhang 2013). However, vertically integrated models have gradually regained popularity among world's leading brands, particularly in the wake of the 2008 global financial crisis (Kaiser and Obermaier 2020). For instance, LVMH expanded towards its suppliers through multiple operations, such as the 2011 acquisition of Heng Long, a Singapore-based tannery processing exotic leather (Heng Long 2019). Chanel acquired full ownership of the Spanish leather supplier Colomer in 2018 (Chanel 2019) and took control over four French silk suppliers in 2016 (Wendlandt 2016). Two years earlier, Ermenegildo Zegna acquired Achill Farm, a company producing merino wool (Gaddy 2016). In motivating their upstream expansion processes, fashion manufacturers emphasised their commitment to environmental sustainability, as well as their focus on product

quality and customer responsiveness. For example, LVMH publicly pledged to continue the vertical integration of farming and tanning in order to produce in harmony with nature (LVMH 2021b). Similarly, Kering stated that the acquisition of France Croco, an Australian crocodile farm, would allow its brands to secure a sustainable supply of high-quality raw materials (Kering 2013).

It is worth noting that the influence of sustainability on firm behaviour is not limited to single acquisitions or other forms of vertical integration across the fashion supply chain. Rather, the need for a more sustainable model of production inspires and drives fashion manufacturers' overall strategies and operations. Indeed, most fashion brands incorporate the principles of sustainability into their strategy statements and invest sizeable financial resources in new technologies and other measures to reduce the environmental impact of their business activities. Such efforts can be seen as a response to a growing social sensitivity to climate change, human-driven pollution and other major environmental issues. Fashion consumers, especially new generations, attach great importance to firms' environmental approach when making purchasing decisions (Deloitte 2020). For this reason, fashion brands increasingly disclose their commitment to environmental protection through detailed sustainability reports (Pero et al. 2020).

Hypotheses

Based on the theoretical and practical issues analysed in the literature review, the following hypotheses were formulated:

H1: There is a positive relationship between firm size and the importance of environmental sustainability as a driver of upstream integration. Thus, large firms attach greater importance than SMEs to environmental sustainability when assessing a possible upstream expansion process.

H2: The degree of upstream integration and environmental sustainability performance are positively correlated in luxury fashion manufacturing.

This first hypothesis moves from the assumption that environmental sustainability has become a matter of concern for consumers in the era of globalisation and has consequently gained importance in firms' decision-making process. The described phenomenon is widely documented in the literature with specific regard to the luxury industry. For instance, according to Gazzola et al. (2017), sustainable consumption increasingly impacts luxury firms' strategic choices and business models. The importance of sustainability concerns is supposed to be higher in large corporations than SMEs, as the latter typically display a number of gaps and limitations reducing their ability or willingness to adopt a sustainable business approach (Álvarez Jaramillo et al. 2019; Revell et al. 2010).

The second hypothesis entails that a higher degree of upstream integration corresponds with better environmental performances. As previously observed, vertical

integration allows the integrating firm to exert direct control over uphill or downhill stages of its supply chain (Clinton et al. 2008). From the researchers' perspective, this enables the firm expanding vertically to better align environmental policies and production activities, with positive effects on environmental performance.

Methods

Data collection and analysis

The relationship between upstream vertical integration and sustainability was investigated through the explanatory sequential mixed methods design. This approach involves starting with a quantitative phase of data collection and analysis and moving sequentially to a qualitative phase (Creswell and Plano Clark 2017). It provides a higher degree of detail than a single method, thereby leading to a better understanding of the research problem (Hesse-Biber 2010). Its rationale is to use qualitative data to explain and interpret quantitative findings (Creswell 2009).

In the initial phase of the research, a survey questionnaire consisting of three sections was administered to 70 fashion manufacturers, equally distributed between large corporations and SMEs. The first section was designed to assess whether and to what extent the need for a more sustainable production model played an important role in participants' decision to move towards the initial stages of the supply chain. To measure the perceptions of respondents with regard to the construct under study, a five-point Likert scale was used. This instrument allows participants to select the option that best supports their view and goes beyond the simple choice between yes and no. Consequently, it generates responses with a higher level of accuracy and precision compared to a dichotomous rating scale (Joshi et al. 2015). The second section was developed with the aim of determining firms' degree of integration. All companies were asked to assess their degree of upstream integration by stating, with regard to a certain product or family of products, what percentage of components (measured by value) was produced in-house (Aldeman 1955; Li et al. 2016). Each firm was requested to quantify its level of upstream integration on a scale ranging from zero to one, where zero means no integration and 1 full integration. The third section of the questionnaire was conceived to define participants' sustainability performance. Respondents were asked to answer a set of close-ended questions on environmental performance extracted from the Corporate Social Responsibility Self-Assessment Handbook for Companies, a tool created under the auspices of the European Commission to foster the sustainable development of the private sector (Alijošiuė et al. 2010). A total score ranging from 0 to 20 was awarded.

Measures of frequency were employed to summarise the survey data. To understand the relationship between firm size and the importance of sustainability as a driver of upstream integration, some association tests (e.g. Pearson's Chi-Square) and an ordinal logistic regression analysis were performed. The latter is frequently used when the independent variable is continuous or categorical and the dependent variable is measured on an ordinal scale, like in the present study (Abreu et al. 2008). To analyse the relationship between firms' degree of

upstream integration and sustainability performance, a simple linear regression analysis was conducted. This statistical test was deemed suitable for the purposes of the present research, because it is commonly employed to examine the relationship between a continuous dependent variable and a single predictor variable (Denis 2018).

In the second phase of the study, semi-structured interviews targeted seven fashion manufacturing companies, consisting of five SMEs and two large corporations. All interviewees were purposively selected based on their ability to provide detailed information on the research problem. They were asked to describe the relationship between sustainability and vertical integration in their specific case. A thematic analysis was successively implemented to derive meaning from participants' responses. This tool displays a high degree of flexibility and is particularly suitable for analysing experiences, perceptions and understandings (Herzog et al. 2019).

The description of the research process reveals that data analysis involves employing both quantitative and qualitative analytical techniques and integrating their outcomes in a consistent and meaningful manner (Onwuegbuzie and Combs 2011). Such an integration activity is characteristic of mixed methods research and typically displays a high degree of complexity. It is worth noting that priority may be given to either quantitative or qualitative data within a hybrid approach. In the sequential explanatory design, greater emphasis is placed upon quantitative research, as this informs the way qualitative data are collected and analysed (Creswell 2009).

Sampling techniques and procedures

All the survey participants were selected through the convenience sampling technique among Italian and French luxury fashion manufacturers that: 1) expanded upstream between 2009 and 2021; 2) pursued sustainability policies. Each firm was required to fulfil both criteria.

The interview session targeted seven companies, which were purposively selected among survey participants with different degrees of vertical integration. The research sample consisted of both large corporations and SMEs, as defined by the European Commission. According to this EU institution, SMEs are companies with fewer than 250 employees and an annual turnover equal to or lower than €50 million, or a balance sheet total not exceeding €43 million, whereas large corporations are firms with values above the aforementioned thresholds (Karadag 2015). The convenience sampling technique was employed for the survey as it involves collecting data from readily available and easily accessible respondents and thus minimises the time and costs associated with the research process. Purposive sampling was used for the qualitative phase of the work because it allows researchers to select participants with extensive knowledge or experience of the phenomenon under study (Creswell and Plano Clark 2017). The survey sample consisted of 16 large corporations and 15 SMEs from France, 19 large corporations and 20 SMEs from Italy. The interview sample was made up of one large corporation and two SMEs from France, one large corporation and three SMEs from Italy.

The present research work targeted the 2009–2021 period, because vertical integration has regained momentum in the manufacturing industry especially after the 2008 global financial crisis (Kaiser and Obermaier 2020).

The survey was performed via e-mail, whereas all interviews were conducted face-to-face. Prior to engaging in the research, respondents received detailed information about the study’s goals and content and signed an informed consent form. The survey questionnaires were returned within fifteen working days. Each interview had a duration of approximately ninety minutes and was transcribed.

Results

Survey

Out of 70 target respondents, 62 participated in the survey. Hence, the participation rate was 88.5%. The survey participants were distributed as follows: 16 large corporations and 14 SMEs from France, 15 large corporations and 17 SMEs from Italy. As shown in Table 1, 10% of SMEs classified as important the role of environmental sustainability concerns in their decision to integrate upstream. None of them attached very high importance to the variable at issue. In contrast, 90% of large corporations considered important or very important the role of environmental sustainability.

The null hypothesis, according to which firm size and the level of importance of sustainability are not associated, was rejected based on Pearson’s Chi-Square, Likelihood Chi-Square and Fisher’s Exact tests, because all of these statistical tests yielded a *p* value=0.000. Cramer’s *V*, Gamma and Kendall’s tau-*b* coefficients were calculated (Table 2). Their values, equal respectively to 0.825, 0.979 and 0.719, reveal a strong association between the level of importance of sustainability

Table 1 Frequency data

Level of importance of environmental sustainability	Firm size		Total
	SMEs	Large corporations	
1 Not important	5 8.06	0 0.00	5 8.06
2 Slightly important	9 14.52	0 0.00	9 14.52
3 Moderately important	14 22.58	3 4.84	17 27.42
4 Important	3 4.84	14 22.58	17 27.42
5 Very important	0 0.00	14 22.58	14 22.58
Total	31 50.00	31 50.00	62 100.00

Table 2 Measures of association

Pearson chi2(4)=	42.235	Pr=0.000
Likelihood-ratio chi2(4)=	54.262	Pr=0.000
Cramér's V=	0.825	
Gamma=	0.979	ASE=0.017
Kendall's tau-b=	0.719	ASE=0.035
Fisher's exact=	0.000	

Table 3 Ordered logistic regression

	Coef	Std err	z	P> z	[95% conf. interval]	
Firm size	4.664	0.856	5.450	0.000	2.986	6.342
	Odds ratio	Std. err	Z	P> z	[95% conf. interval]	
Firm size	106.098	90.850	5.450	0.000	19.807	568.307
/cut1	-1.659	0.488			-2.617	-0.702
/cut2	-0.211	0.361			-0.919	0.496
/cut3	2.332	0.609			1.137	3.527
/cut4	4.875	0.851			3.207	6.543

Log likelihood = -68.224

Number of Obs = 62

LR $\chi^2(1) = 53.120$

Prob > $\chi^2 = 0.000$

Pseudo $R^2 = 0.280$

and firm size, because the abovementioned measures of association range from -1 to +1, where ± 1 indicates perfect agreement or disagreement and 0 indicates no relationship.

A logistic regression analysis was then performed (Table 3). The null hypothesis of the log likelihood ratio chi-square test was that the predictor does not contribute to the model, or the one-predictor model is not better than the null model with no independent variables. The alternative hypothesis was that the predictor variable significantly contributes to the model, or the one-predictor model is better than the null model with no independent variables. The associated p-value with the log likelihood ratio chi-square test was 0.000. Hence, the null hypothesis was rejected. Based on these data, it can be stated that the one-predictor model provides better fit than the null model with no independent variables in predicting cumulative odds of being at or below a category of level of importance. Information measures, AIC and BIC, were used to compare the null model (AIC = 197.568, BIC = 206.076) and the one-predictor model (AIC = 146.449, BIC = 157.085). Smaller AIC and BIC statistics indicate a better fitting. In conclusion, the one-predictor model is better than the null model.

The null hypothesis for the Wald Test was that the coefficient of the predictor variable is zero, whereas the alternative hypothesis was that the coefficient of the predictor variable significantly differs from zero. The associated p value of the Wald

z statistic (5.450) was 0.000. Therefore, the null hypothesis was rejected. Consequently, the predictor variable (firm size) is a significant predictor of the ordinal outcome (the level of importance of environmental sustainability). The logit regression coefficient (4.664) indicates that for a unit increase in the predictor variable, the change in logit, or log odds, of being beyond a category is 4.664.

The estimated odds ratio for the predictor shown in Table 3 (106.098) refers to the change in odds of being beyond a category versus being at or below that category. By substituting the value of the coefficient (4.664) in the logit equation (for large firms), an OR = 0.009 was obtained. This value indicates that the odds of being at or below a category of level of importance (i.e. lower level of importance) for large firms are 0.009 the odds of SMEs. Another way to interpret it is that being a large firm decreases the odds of being at or below a category of level of importance by 0.009.

Simple linear regression was used to test if the level of upstream integration significantly predicted environmental sustainability performance (Table 4). The fitted regression model was:

$$\hat{y} = 21.880X - 0.572.$$

The overall regression was statistically significant ($R^2=0.950$, $F(1,60)=1210.190$, $p<0.001$). Based on the analysis results, the level of upstream integration significantly predicted the environmental sustainability performance ($\beta=21.880$, $p<0.001$).

Interviews

Six out of seven firms participated in the interview session, notably one large corporation and two SMEs from France, one large corporation and two SMEs from Italy. Therefore, the participation rate was 85.7%. In discussing the importance of environmental sustainability in their decision to integrate upstream, all interviewees stressed the central role of global warming and pollution-related issues in the public debate and the consequent need for firms to develop sustainable production processes. The two large corporations participating in the interview session identified environmental sustainability concerns as a key determinant of their

Table 4 Linear regression

	Coef	Std. Err	<i>t</i>	<i>P</i> > <i>t</i>	[95% conf. interval]	
Degree of VI	21.880	0.628	34.790	0.000	20.622	23.138
_Cons	-0.572	0.372	-1.540	0.130	-1.317	0.172
Number of Obs = 62						
$F1(1,60) = 1210.190$						
Prob > <i>F</i> = 0.000						
<i>R</i> -squared = 0.952						
Adj <i>R</i> -squared = 0.952						
Root MSE = 0.976						

vertical integration strategy. They explained that being sustainable is a priority in luxury fashion, especially for well-established brands with a wide customer base and high media exposure. From their perspective, acquiring direct control over uphill stages of the supply chain through an upstream integration process is the most effective way to reach high sustainability standards and achieve other strategic goals, such as securing supplies and improving product quality. In this regard, a large manufacturing company specialising in leather accessories commented:

“We found difficulty in sourcing high-quality leather due to a growing demand for luxury accessories and a consequent lack of raw materials in the market. Also, we could not fully implement our environmental sustainability policy, because our main suppliers’ production process was not in line with our needs and expectations in terms of environmental impact. As a consequence, we could not always deliver our products on time and we felt under pressure when mass media, investors and other stakeholders required us to document our efforts for reducing waste and emission levels. We realised that expanding upstream was the only option to procure inputs in the right quality and amount and to achieve our sustainability goals”.

Based on the interview outcomes, the need to improve product quality and secure supplies was the main driver of vertical integration for SMEs, because these firms frequently experienced shortages of raw materials and were dissatisfied with the quality of some externally sourced inputs. Conversely, sustainability-related issues had moderate or limited importance in their decision to integrate upstream. From SMEs’ standpoint, moving towards a sustainable production model is beneficial, in terms of brand reputation and overall business performance, especially to companies with a large audience and high visibility. In addition, it requires significant financial and organisational efforts, which are not limited to integrating companies operating at uphill stages of the supply chain. In this respect, a small manufacturer of premium ties literally stated:

“Like many other fashion brands, we engaged in upstream integration by acquiring some of our historical suppliers. Our primary goal was to overcome some procurement problems, especially silk shortages, and to produce higher quality ties than our competitors, by exerting direct control over key upstream activities. During the strategic planning process, we considered all pros and cons associated with a vertical expansion, including the opportunity to introduce new processes and technologies reducing costs, waste and emissions. However, the prospect of achieving sustainability-related benefits incentivised, not determined our upstream growth. Being truly sustainable requires emission monitoring systems, periodic sustainability reports, well-trained staff in charge of environmental issues and other assets and operations incompatible with our financial and organisational resources. In our view, environmental sustainability is a priority especially for large fashion corporations, as these display a high level of international visibility and thus need to show attention to our planet’s health”.

With regard to RQ2, three companies with a degree of integration ranging from 0.60 to 0.80 reported a significantly better environmental sustainability performance as a result of their upstream expansion. They explained that bringing in-house some tasks allowed them to develop new production processes with a lower environmental impact or to run their pre-existing manufacturing processes in a more sustainable manner. They attributed such improvements to more effective coordination mechanisms and communication flows within their organisation. In this regard, a shoe manufacturer declared:

“Prior to integrating upstream, we were not always able to achieve our environmental sustainability goals, because our main raw material supplier sometimes misinterpreted our operational instructions. That company served a wide range of clients and, as a consequence, could not accurately analyse and meet our needs. The acquisition of another supplier with similar characteristics enabled us to avoid misunderstandings and improve our environmental sustainability performance”.

Conversely, three firms with a level of integration ranging from 0.20 to 0.40 perceived slight or moderate improvements in terms of sustainability performance. All of them emphasised that most of their production process depended on outside suppliers and thus it was not feasible for them to implement a number of sustainability-related measures requiring extensive control over the supply chain. One of these companies reported as follows:

“Acquiring a yarn supplier has allowed us to achieve costs savings and improve product quality. In addition, it has enabled our company to slightly reduce carbon emissions and thus to improve the overall sustainability performance of our manufacturing process. However, we are still far from achieving our sustainability goals, because we still purchase a significant portion of inputs from outside firms and we have, therefore, limited control over certain activities and their environmental impact”.

Conclusion

A positive relationship between firm size and the importance of environmental sustainability as a driver of upstream integration was observed through a logistic regression analysis. Specifically, large corporations attached greater importance to sustainability-related issues than SMEs when deciding whether to integrate upstream. All interviews confirm this outcome and reveal that large firms, under the pressure of the mass media and a wide customer base, prioritised environmental sustainability in their strategic decisions. In contrast, SMEs perceived the adoption of a sustainable production model as an overly expensive and organisationally complex process. Consequently, being more sustainable was not a major driver of their upstream integration strategies.

The linear regression outcomes show a positive correlation between a company's degree of upstream integration and environmental sustainability performance.

Hence, firms with higher levels of vertical integration reported better results from an environmental standpoint. The interview findings lead to the same conclusion, emphasising the idea that companies expanding vertically can exert tighter control over their supply chain and, thus, implement sustainability-related measures more effectively.

Therefore, both the hypotheses proposed through the present paper are in line with the research outcomes. These provide insights into how environmental sustainability influences the supply chain design in SMEs and large corporations. They also explain how corporate environmental sustainability performance changes in response to different levels of upstream integration. From a wider perspective, this research contributes to understanding the interconnections between environmental sustainability and strategic business management.

The difference between large corporations and SMEs observed in this study is in agreement with the literature, notably with the argument that scarce organisational resources and high costs associated with the implementation of sustainable practices have a negative impact on SMEs' attention to sustainability (Álvarez Jaramillo et al. 2019). Unlike previous research works, this study relates the aforesaid difference to a firm's decision to expand upstream, thereby shedding light on how companies of different size incorporate environmental concerns into their supply chain strategies. The positive correlation between the degree of upstream integration and environmental sustainability performance emerging from the linear regression analysis is consistent with the study performed by Murcia et al. (2020). However, the present research paper specifically focuses on the relationship between upstream integration and environmental sustainability performance in the luxury fashion industry and relies on primary data for measuring the degree of vertical integration. It, therefore, enriches the existing body of knowledge by providing a better understanding of the trade-off between environmental sustainability and vertically integrated models of production in a key business sector.

This study has significant implications from both a managerial and theoretical standpoint: since moving towards suppliers is positively associated with better environmental sustainability performances, a backward expansion can be a viable option for luxury fashion manufacturers pursuing environmental sustainability policies. Hence, vertical integration should be seen not as an obsolete and ineffective strategy, but rather as a solution helping companies meet a growing demand for sustainable products and remain competitive in an increasingly eco-sensitive market. Such observations imply the need for manufacturing firms to evaluate whether and to what degree outsourcing is compatible with their commitment to sustainability, given that externalising some business activities entails a loss of control over the supply chain and thus moves in the opposite direction from vertical integration (Kremic et al. 2006). In addition, the differences observed between large corporations and SMEs suggest that policy makers should carefully consider firm size when promoting the development and implementation of sustainable supply chains.

The main limitations of the present study lie the nature of the research methods and the sample size. In a sequential explanatory design, the results stemming from the first quantitative phase may influence how data are collected and interpreted in the second qualitative phase (Dawadi et al. 2021) However, combining qualitative

and quantitative methods offers a better understanding of research problems than a single method (Molina-Azorin 2016). Generally, too small samples may negatively affect the validity of a research work (Faber and Fonseca 2014). Nonetheless, the oligopolistic structure of the luxury fashion industry justifies the decision to focus on a relatively limited number of companies. Another possible limitation is the subjective and self-reported measurement of vertical integration: managers and entrepreneurs from different firms may interpret a product's components and their value in a different manner. Despite such a possible inconvenience, the self-made input percentage method seems to be more reliable than indirect measures of vertical integration (Li et al. 2016). Similarly, measuring environmental sustainability performance based on information provided by participants on a voluntary basis may be seen as an additional limitation. In this regard, it is worth observing that environmental disclosure is mainly voluntary and not standardised. As a result, it is difficult to collect objective data and using company surveys is a common practice (Schultze and Trommer 2011). Future studies might focus on downstream integration processes to develop a comprehensive understanding of the relationship between vertical integration and environmental sustainability in the luxury fashion industry and ultimately provide firms with strategic and operational insights into the evolution of their supply chains. Also, future research might target other industrial sectors to ascertain whether and to what extent sector-specific dynamics influence the relationship between the described variables.

Author contributions All authors contributed to the study conception and design. AA performed the literature review, collected all primary data, reported the interview findings and drafted the methodological note and the concluding remarks. LG analysed and reported the quantitative data. All authors read and approved the final version of the submitted paper.

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