



Lisbon School  
of Economics  
& Management  
Universidade de Lisboa

**MESTRADO**  
**GESTÃO DE SISTEMAS DE INFORMAÇÃO**

**TRABALHO FINAL DE MESTRADO**  
**DISSERTAÇÃO**

**THE RELATIONSHIP BETWEEN E-COMMERCE AND FIRM  
PERFORMANCE IN THE LUXURY FASHION INDUSTRY**

**MARGARIDA DE OLIVEIRA ALVES BEXIGA**

**OUTUBRO - 2021**

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**ORIENTAÇÃO:**

**PROFESSORA DOUTORA WINNIE NG PICOTO**

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## GLOSSARY

**B2B** Business-to-business. i, 6, 9

**B2C** Business-to-consumer. i, 6

**EBIT** Earnings Before Interest and Taxes. i

**EBITDA** Earnings Before Interest, Taxes, Depreciation and Amortisation. i

**fsQCA** Fuzzy Set Qualitative Comparative Analysis. i, 12–14, 19, 20, 25–27, 29

**GDP** Gross Domestic Product. i

**OLS** Ordinary Least Squares. i, 12–14, 25–27

**ROA** Return on Assets. i, 8–14, 16, 18, 21, 22, 25–27, 29

**ROE** Return on Equity. i

**VIFs** Variance Inflation Factors. i, 17

## ABSTRACT

This thesis discusses the relationship between e-commerce and firm performance in the fashion luxury industry in 2019. The main goal was to investigate if e-commerce has a positive impact on performance and analyze if different types of e-commerce have different relationships with different types of performance measures. The measures of performance used were ROA and Sales. Firstly, the OLS method was employed to estimate the coefficients associated with the explanatory and control variables. The fsQCA method was used to complement and further comprehend the results. The data regarding performance measures and their determinants were collected from the Orbis Europe database.

The combined results showed a negative relationship between ROA and e-commerce, divided in the brand's website and online sales market, rejecting the hypothesis that these variables have a positive relationship. In sales, evidence supports that e-commerce contributes positively to this performance measure, both in brand's website and online marketplaces, in the luxury fashion industry.

**KEYWORDS:** Firm Performance; E-Commerce; Online Market Place; Luxury Sector; Luxury Fashion.

## RESUMO

A presente tese discute e investiga a relação entre *e-commerce* e o desempenho empresarial, mais especificamente na indústria de luxo na moda, em 2019. O principal objetivo do trabalho não só é investigar se o e-commerce influencia positivamente o desempenho da empresa mas também analisar de diferentes tipos de e-commerce têm relações diferentes com diferentes tipos de medidas de desempenho. As medidas utilizadas de forma a quantificar o desempenho foram ROA e vendas. Inicialmente, o método OLS foi utilizado, de modo a estimar os coeficientes das variáveis explicativas e de controlo. Para complementar e melhor compreender os resultados, foi também utilizado o método fsQCA. Os dados relacionados com as medidas de desempenhos e os seus determinantes foram retirados da base de dados Orbis Europe, durante o mês de março de 2021.

Após combinar e interpretar os resultados, concluiu-se que existe uma relação negativa entre ROA e o *e-commerce*, mais especificamente entre o site próprio de vendas da marca e mercados de revenda *online*. Rejeita-se assim a hipótese que a relação entre estas variáveis é positiva. Relativamente às vendas, o resultados apoiam a hipótese de que o *e-commerce* contribui de forma positiva para o desempenho da empresa no setor de luxo na moda, tanto no *site* próprio da empresa como nos mercados de revenda *online*.

**PALAVRAS-CHAVE:** Firm Performance; E-Commerce; Online Market Place; Indústria de luxo; Moda de luxo.

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*"Unless you try to do something beyond what you have already mastered, you will never  
grow."*

*- Ralph Waldo Emerson*

## 1 INTRODUCTION

The exponential growth of e-commerce (intensified with the current pandemic) created a favorable environment for consumers to compare all options, decrease information asymmetry, and switch costs existent in the market (Saeed et al., 2005).

Given the swift progress of this topic in our society, it still is unclear how companies present in the digital space can build and hold a competitive advantage. Thus, the objective of this work is to understand the impact that sales channels have on the performance of a company in the luxury sector.

According to Deloitte (2020), in 2019, the luxury industry alone generates 281 billion dollars, achieving an 8.5% over sales growth. The same report states that even though this sector had a slow start adopting the "digital revolution", the COVID-19 pandemic reinforced the need to invest in this area. Luxury brands have been more guarded about straying into e-commerce, as consumers' high expectations for a high-end shopping experience do not meet standards (Willersdorf et al., 2020).

The motivations behind this project are related to the fact that this subject has gained more relevance in the business world and has a transversal transformative power over all industries. Farther, and even though there is extensive literature regarding the performance of an organization and its determinants, the first becomes insufficient and limited when added to the equation the luxury industry factor. Hereupon, there is a set of important and complex questions to be answered and explored: (1) "Does the use of e-commerce have an impact on the performance of a fashion luxury company?"; (2) "Do different types of e-commerce platforms have a different impact on performance in the fashion luxury industry?"; (3) "Does e-commerce affect differently distinct measures of performance in the fashion luxury industry?";.

Based on the above, and attending to the fact that no methodology is exempt from limitations and obstacles, this study resorts to a quantitative and qualitative methodology

and positivist philosophy to achieve the most realistic results possible.

This work is composed of seven chapters. The second chapter exposes an extensive literature review that serves as a theoretical basis for the study. It will include a description of the sector, its consumer, and an overview of the concept of luxury. Chapter three is reserved for the determinants of the organization's performance and the hypothesis of the investigation. The fourth chapter is reserved for the data, model, and its variables, as well as the methodology applied. The fifth chapter addresses the empirical results obtained and, in six, their analysis and discussion. Lastly, chapter seven presents the conclusions of the investigation, its limitations, and possible future research.

## 2 LITERATURE REVIEW

### 2.1 *Luxury*

#### 2.1 *Concept*

Over the years, due to the exponential growth of the luxury industry, the number of articles and investigations related to this sector increased significantly (Brun & Castelli, 2013).

However, there is not yet a defined and consensual concept of luxury. It not only changes from country to country but from people with different socioeconomic backgrounds, making it a result of several motivations (Vigneron & Johnson, 1999). Only one point is common in all definitions; luxury is characterized as something that goes beyond what is necessary (Bearden & Etzel, 1982). Adding to that, Csaba (2008) defends that superficiality is also a peculiarity of the concept. With this in mind, one can summarize this idea with this set of criteria: scarcity, extra value, and high quality (Mortelmans, 2005). The first refers to a good produced in limited quantity, and its distribution is selective, making its access restricted (Mortelmans, 2005). Associate to this criteria is that the consumer must feel that he/she belongs to a particular group that possesses this good and has access to it. Second, and according to the same study, the extra value is related to differentiated design and aesthetics even though, at times, this means reduced usability and durability (Mortelmans, 2005). At last, the author finishes this set with "high quality". This unfolds in high-quality raw material and a highly specialized workforce (Mortelmans, 2005).

#### 2.1 *Luxury Fashion*

Luxury can unfold into various categories: fashion, wines, automobiles, tourism, and home furnishing (Fionda & Moore, 2009). One can define a luxury fashion good as apparel, accessory, handbag, shoe, watches, or jewelry. The use or display of such brings

prestige to its owner, aside from any functional utility (Taylor et al., 2009). According to Chevalier & Mazzalovo (2008), a textile and accessory brand will only reach the "luxury" status when a certain level of stability and timeless quality is achieved. With that being said, the luxury fashion sector represents a considerable portion of the overall luxury goods sales. It is one of the categories with the most vigorous growth in the last years (Fionda & Moore, 2009).

In luxury, the success of a brand depends not only on the customer's level of satisfaction but also on the creativity and excellence of its products. Especially in fashion brands, the aesthetic and innovation allied with traditionalism contribute to differentiate them when comparing to other sectors (Lipovetsky, 2009). A perfect example of this is Chanel, a luxury brand that explored and invented design variations of their classic garments. Its innovation is not focused on the design aesthetic but on the fabric, cut, and fit (Kim, 2000). The unmistakable and classic designs are contributing factors to the brand's ongoing success (Finn, 2011).

The awakening of Internet technologies in the retailing industry has transformed and refashioned significant aspects of the shopping experience by modifying essential attributes of what is being offered (Hurtado Gonzalez et al., 2014). Nowadays, the Internet is where consumers interact, communicate, and are mutually influenced (Scott, 2013). It is a trend that luxury fashion brands sell products through online retail platforms such as Net-a-Porter.com and Yoox.com. Luxury fashion brands including Alexander McQueen, Balenciaga, Bottega Veneta, Saint- Laurent, Sergio Rossi, and Stella McCartney have launched stores on Net-a-Porter.com or Yoox.com.

In the luxury fashion community, new and innovative purchase experiences for consumers have taken place in the industry, contributing to an increase in brand awareness (Rovai, 2018). The challenges associated with replicating the brand's experience and identity to the online sales channels kept brands like Prada and Versace investing in their digital strategy (Okonkwo, 2009). Not only that, but contradictory theories advocate the

benefits of e-commerce in this industry. Some claim that by joining the online space, the need to define a restricted target is no longer needed, which goes against one of the most powerful tools in the luxury fashion industry (Mir-Bernal et al., 2018). In a series of interviews with six luxury brand managers, no consensus was found regarding the compatibility of luxury brands and the Internet (Nyeck & Roux, 1997). Although some agreed that it would bring an "innovative twist" to the image of the brand (primarily if it is known for its innovatory ideas), others believed it was not possible to create a harmony between these two concepts (Nyeck & Roux, 1997).

## *2.2 Consumer Profile*

Many factors contribute to the success of e-commerce, but the main focus should be the consumer (Seybold & Marshak, 1998). Not too long ago, luxury fashion brands were backed by considerable companies assets and loyal regular customers (Brogi et al., 2013). However, the new entries in the high-end market gave rise to a set of unforeseen changes in a previously shielded market (Kim & Ko, 2012). Shoppers now have a lower searching cost (Bhatti & Rehman, 2020), and the capacity to search and compare information (Rohm & Swaminathan, 2004).

As the person who buys this sector's goods is an atypical consumer when compared to the large portion of the population, tracing his characteristics and exploring his intentions to purchase luxury products via electronic commerce is necessary (since the treatment through it greatly differs when compared to the one in a physical store). Identifying personalities associated with luxury fashion brands is important to comprehend the consumer-brand relationship within the brand context. Consuming a luxury good is associated with higher quality, performance, and authenticity and a buying experience that fits the customer's lifestyle (Atwal & Williams, 2017).

In addition to status, prestige, and socio-psychological benefits (Roux et al., 2017), buying a high-end product relates to social and cultural factors, emotional value, and even religion (Kapferer & Valette-Florence, 2018; Hennigs et al., 2013; Al-Mutawa, 2013).

The self-congruity theory presents the thesis that consumer behavior is somewhat correlated with the psychological comparison between product-user idea and the consumer's (ideal) self and social image (Aguirre-Rodriguez et al., 2012). In other words, the consumer is more likely to acquire goods from a brand that has an identical image to his self-identity (Engel & Roger, 1990). Luxury goods are the foundation of a new "social protocol" where identity and self-worth are set on by the visible brands one is wearing, playing an essential role in how people define themselves and how they wish to be seen socially (Kapferer & Bastien, 2017; Husic & Cicic, 2009).

### 2.3 *Previous Investigations*

Evidence from previous empirical investigations has sought to prove the effect of e-commerce on firm performance. While investing in online commerce has been a priority for brands, researchers still do not understand how these expenses improve their business performance (Zhu & Kraemer, 2002). Another investigation breaks down this relationship in terms of the type of business, Business-to-consumer (B2C) and Business-to-business (B2B). Kraemer et al. (2002) find empirical evidence that confirms that while coordination and integration of business processes contribute to a "global convergence" in B2B, the forking preferences of consumers lead to a more local phenomenon in B2C.

According to Totonchi & Kakamanshadi (2011), companies with a deeper adoption of e-commerce will significantly impact their performance, especially efficiency and coordination. A firm that uses the Internet for marketing or sales and transactions with suppliers and procurement will experience a higher performance than those who use it as a marketing website. In a study about the mediating role of internet sales channels regarding the relationship between e-commerce and firm performance, Šaković Jovanović et al. (2020) conclude that although the relationships between these two variables is negative, gains of e-commerce measured in sales are more accentuated when brands use online market places and commercial websites.

There are some investigations regarding the financial performance of the retail indus-

try and the adoption of e-business in the company (Motiwalla & Khan, 2003). In a study conducted by Ika et al. (2021), the financial performance decreased after the e-commerce boom, although these changes did prove not to be statistically significant. Additionally, Guercini & Runfola (2015) distinguishes two e-commerce actors in the luxury industry, ones more oriented towards international markets and other to domestic ones. Companies with elevated degrees of internationalization through e-commerce necessitate to integrate the technical, political and culture liabilities into their strategy (Guercini & Runfola, 2015).

Even though the literature has not yet dabbled in the financial impacts of e-commerce in the luxury sector, the importance of the entry of this industry in the online world has very much been discussed and investigated. As stated by Okonkwo (2009), luxury is not an object like a product but an identity, culture, and philosophy. As an open and affordable channel, the Internet did not appear compatible with the exclusive, timeless, and expensive look that luxury brands are known for (Kapferer & Bastien, 2012). As times evolved, the conversation shifted from whether the luxury industry should adopt e-commerce to how brands should act online (Yu et al., 2018). The limitations, such as the lack of sensory attributes encountered with e-commerce, have to be overcome by using personalization and target technologies that spot luxury customers and cater to their needs accordingly (Okonkwo, 2010). Lastly, and according to Kapferer (2012), there are apparent tensions between the continuous growth of luxury retailers and the premise of exclusivity in luxury brands.

### 3 INVESTIGATION MODEL AND HYPOTHESIS

As the goal of the present investigation is to study the impact of e-commerce on firm performance, it is crucial to determine the measures of performance used in previous literature and variables that affect it.

By representing a crucial factor in obtaining a competitive advantage, evaluating a firm's performance and its innovation represents, progressively, a challenge to organizations (Evangelista, 2017). This task becomes incredibly complex and arduous when added to the equation that the first can be measured through objective or subjective indicators (Dawes, 1999) that are affected by distinct managerial priorities (Diamantopoulos & Kakkos, 2007). Therefore, business performance should be, and according to Guni (2016), an ongoing concern to all economic agents, and their focus of attention must be adjusted according to their role.

In order to quantify the financial business' performance, one of the ratios used will be Return on Assets (ROA). Used in many studies (Brown & Caylor, 2006; Zabri et al., 2016), as an indicator of the organizations' performance, ROA is calculated through the division of the difference between total profits and financial expenses, and the average total assets (Yu, 2013). This ratio represents the actual return rate of a company and its ability to generate results, regardless of its financial structure (Kassai et al., 2002). Therefore, ROA expresses the organization's assets capability to create profit, despite how the latter funds it (Oliveira, 2016). With that being said, ROA is widely considered to be a good indicator of a company's profitability (Choi et al., 2010).

Another popular measure of performance is sales. Recent studies confirm that sales revenue has become the most frequently used performance measure in executive annual incentive plans (Smith & Stradley, 2010). In a survey conducted by Hubbard & Bromiley (1994), sales were the most common goal mention by senior managers. Scholars like Pekovic & Rolland (2016) recognized that the possibility to compare sales between firms

and the fact that it gives a direct value of returns on investments are benefits associated with the use of sales as a measure of performance.

The literature diverse when it comes to the definition of e-commerce. DeLone & McLean (2004) characterize it as the Internet to facilitate, execute and process commercial transactions. Other authors describe it, in an organizational context, as sharing information, maintaining relationships and transactions through "telecommunication networks" (Vladimir, 1996).

The relevance of this variable increases when studies prove that the more the e-commerce channel is used for transactions, the better is the company's performance (Kraemer et al., 2005). However, depending on the sector, the adoption of e-commerce can positively impact business results (Zhu & Kraemer, 2002). While an increase in costs of sold goods in traditional manufacturing production is observed, the opposite occurs in the technology sector (Zhu & Kraemer, 2002). Other investigations hug the conclusion that a negative relationship between e-commerce and performance exists (Šaković Jovanović et al., 2020).

According to GartnerInc (n.d.), a sales channel is an approach in which a B2B sales company goes to market, either through direct or indirect paths, to sells its products or services to end consumers. This present investigation considers a brand's website as an online platform in which there are no intermediaries between the brand and customer and a sales channel as a website with intermediaries between the brand and consumer. Adding to that, and following the same guidelines as Šaković Jovanović et al. (2020), in an online sales channel, the website is managed by third parties that array the sale for several manufacturers and are responsible for the payment.

Therefore the following hypothesis are put forward:

***H1a:** Brands' e-commerce website have a positive relationship with ROA in the fashion luxury sector.*

***H1b:*** Brands' e-commerce website have a positive effect on sales in the fashion luxury sector.

One can define an online marketplace as a platform that allows the buyer and seller to exchange information about prices and product supply (Bakos, 1997). It differentiates from other online selling methods since the seller is not the website's owner, just a user that sells his products (Humaizi et al., 2020). Supported by a sample of 100 companies, Xia & Zhang (2010) establishes their hypothesis that the presence of organizations on online sales channels has a positive impact on sales, costs, inventory, and investment returns. However, the more accessible access to every price practiced allows consumers to choose in which platform they will buy and makes retailers match the asking price, so they do not lose sales (McWilliams, 2004). Consequently, performance can suffer in a significant and negative way (McWilliams, 2004).

Although electronic markets have gained popularity, there are still unique advantages that bind consumers to purchase on the brand's website. According to Wright (2002), buyers opt for the retailer's website because prices are lower than in marketplaces. That is, they are more aware of the rates practiced in online markets.

***H2a:*** Online Sales channels have a positive effect on ROA in the fashion luxury sector.

***H2b:*** Online Sales channels have a positive effect on sales in the fashion luxury sector.

As organizations grow over the years, they should be able to learn, that is, to invest in research and development, education for their employees, and observe behaviors from firms in the same industry (Loderer & Waelchli, 2010). The increased attentiveness of scholars in the sphere of firm age and performance has contributed to the relevance of this variable for this research (Coad et al., 2018). Contributions such as March (2013) explain how young businesses meet higher risks of failure. Young firms require promoting internal and external social interactions to sustain the learning costs (March, 2013). In a study conducted by Coad et al. (2013), the evidence supported that firms with age were expe-

riencing higher profits and productivity. On the other hand, research about the influence of size and age in Indian organizations concluded that older firms were less profitable but more productive (Majumdar, 1997).

Taking into consideration previous investigations, it is common to measure the size of a company by the number of its employees (Lerner et al., 1997; Swamidass & Kotha, 1998; Frank & Goyal, 2003). Many studies prove that factors such as the firm's size have a significant influence on the adoption of information technologies by companies (Kraemer et al. (2005)). This happens because more prominent firms have a set of resources and knowledge to invest and implement in this area (Kuan & Chau, 2001).

Although many use it to measure firm performance, the profit margin is also an excellent ratio to include when analyzing dependent variables such as ROA (Delen et al., 2013). Profit margin is measured as profit before tax divided by the operating revenue. According to Tumanggor (2020), the profit margin has a significant effect on ROA. This variable tends to have a more considerable influence in industries where advertising is crucial and the opinions and judgment of the consumer weights significantly (Lieberson & O'Connor, 1972). Management decisions regarding these aspects will have a bigger impact on profit margins than in markets less oriented for consumers (Lieberson & O'Connor, 1972).

The theoretical perspectives discussed above leads to believe that selling online contributes to enhancing a company's performance in the fashion luxury industry. With this being said, the hypothesis elaborated will enable us to investigate the relationships and answer the research questions.

## 4 DATA AND METHODOLOGY

Intending to get the sweeping conclusions and results from this analysis, the methodology used in this investigation is mixed.

The goal of this investigation is to investigate whether e-commerce has a positive or negative impact on firm performance. For that reason, the data collected was directed towards different factors that could influence the latter and were previously explained in chapter two.

The first method employed was the Ordinary Least Squares (OLS). Commonly used in social sciences, this quantitative method assumes that the errors do not include individual effects, that is, the personal characteristics of each company. Using OLS, various variables can be analyzed concurrently to disclose complex investigation hypotheses (Šaković Jovanović et al., 2020).

To further comprehend the results given by linear regression, the method Fuzzy Set Qualitative Comparative Analysis (fsQCA) was used. This qualitative approach, first introduced by Ragin & Fiss (2008), differentiates from regression analysis by uncovering the different conditions that lead to a particular outcome (Skarmeas et al., 2014). In contrast, the first method attempts to investigate the net effect of independent variables on dependent ones (Gligor & Bozkurt, 2020).

### *4.1 Data Collection and Sampling*

This research explored the firm's performance relationship with non-financial organizations, specifically the fashion luxury sector. The data provide information on various performance measures (ROA and Sales) and their components, such as age, size, and profit margin. The sample includes companies employing 1 to 16300 employees in the luxury fashion industry. The variables previously mentioned were obtained from Orbis Europe during March of 2021, and the author collected data regarding the presence of

online sales platforms of brands. The study period is 2019.

After excluding companies whose data was insufficient and in- consistent, with negative values of equity (Osma & Noguer, 2007; Park & Shin, 2004; Liu et al., 2014), the initial sample of 340 firms was reduced to 223.

#### 4.2 Variables, Methodology and Model

To identify the impact of determinants of the profitability of a company to its relative assets (ROA) was defined the following model:

$$ROA = \beta_0 + \beta_1 AGE + \beta_2 PROFMARGIN + \beta_3 EMP + \beta_4 COMWEB + \beta_5 MARKET + \mu_i \quad (1)$$

Moreover, in order to determine the factors that influence sales (SALES) in a company, was defined the following model:

$$SALES = \beta_0 + \beta_1 AGE + \beta_2 PROFMARGIN + \beta_3 EMP + \beta_4 COMWEB + \beta_5 MARKET + \mu_i \quad (2)$$

Where, in both models,  $i=1, \dots, 223$  (number of companies).

The model parameters, designated by  $\beta$ , refer to the estimation coefficients associated with the respective explanatory variables. The residual is represented by  $\mu_i$ .

The parameters of both regressions are unknown, being necessary to estimate through the available sample. For that purpose, the method used will be OLS. According to Pohlman & Leitner (2003), this method is the most usual linear model analysis for social sciences, especially in one-year statistics. The same authors advocate that OLS reflects the relationship between a dependent variable and a compilation of independent variables, being the first determined as a linear combination of the independent variables and the error term ( $\mu_i$ ).

To complement and deepen the investigation, the other method used will be fsQCA.

This method approaches the data using Boolean algebra and identifies the arrangements of conditions associated with an outcome of interest (Crilly et al., 2012). Allowing a more holistic path (Woodside, 2013), fsQCA is not based on correlation (unlike multivariate logistic regression) and tries to establish logical connections between combinations of causal conditions and the outcome, resulting in rules that compile the sufficiency between the subsets of all possible combinations. (Korjani & Mendel, 2012). Each of these rules is a viable path from the casual conditions to the outcome and represents "equifinal causation" (different casual combinations heading to the same result) (Korjani & Mendel, 2012). The software used will be version 3.0 of fsQCA.

Regarding the OLS model, the influence of e-commerce on the firm's performance will be measure through the two independent variables: if it has its commercial website (COMWEB) and if they are present or not in other online sales channels (MARKET). Other factors also impact performance. To measure those, control variables were included in the model: age of the company (AGE); the number of employees (EMP), and profit margin (PROFMARGIN). The last one relates closely to benefits regarding e-commerce. The first two have the characteristic of firms that are well studied and that literature has shown to be associated with its performance.

The dependent variables are ROA and Sales since the goal of the investigation is to evaluate the relationship between the presence of e-commerce and firm performance. ROA is obtained by dividing the net income and total assets of the companies. This ratio reveals the capability of the firm's assets to create profit (Oliveira, 2016). This variable was also used by authors like Sarumpaet (2005), Brown & Caylor (2006), and Zabri et al. (2016). It is a continuous variable that varies between 0 and 1 in module. For example, if a firm's ROA is 0.08, this means that for every dollar invested in assets, it has generated 8 cents of net income. So, the higher ROA is, the better. This means the company is earning more money on less investment. Concerning Sales and following previous research, we use the natural logarithm of total sales to ease the interpretation of coefficients. This measure is used by other authors like Bayer et al. (2020) and McAlister et al. (2016).

The independent variables in the model (COMWEB, MARKET) built are the ones that correspond to the investigation question in the present study. We decided to employ dummies to represent companies' presence (or absence) in the e-commerce space. Regarding the brand's website (COMWEB), this variable takes the value of 1 if the company sells its products on its website and 0 otherwise. The same happens with their existence in online sales markets (MARKET), the variable is 1 if they are present and 0 if they are not.

In regards to the variable concerning the firm's dimension (AGE and EMP), these control variables are usually used in models related to corporate management (Capon et al., 1990; Burca et al., 2014). The first, AGE, is measured by the number of years the company is ascertained. Concerning EMP, this variable is measured by the firm's number of employees in the year studied. Finally, the variable concerning profit margin (PROFMARGIN) is calculated by dividing the net income by revenue (Delen et al., 2013).

## 5 EMPIRICAL RESULTS

### *5.1 Descriptive Statistics and Correlations Table*

The following paragraphs examine By analyzing Table I, one can conclude that, on average, the luxury brands in the study present a ROA of 6,25%. The maximum reached 87,32% and the minimum -36,78%. In sales, the highest value recorded was 60 292 870 thousand dollars and the lowest 46184 thousand. Regarding the age of the companies being studied, although the average is almost 30 years old, the maximum of the brands reach 197 years and a minimum only 4. Profit margin conferred an average of 6,38%, a maximum of 72,39%, and a minimum of -50,22%. Concerning the firm's number of employees, the average calculated corresponds to 55, with a minimum of 1 employee and a maximum of 163309 employees registered. Lastly, About 81% of the brands have a commercial website, and almost 89% are represented in an online marketplace.

TABLE I: Descriptive Matrix

Variable	Obvs	Median	AVG	STD	Min	Max
ROA	223	0.0315	0.0625	0.1430	-0.3678	0.8732
Sales	223	7.2276	7.3197	1.1505	4.6645	10.7802
COMWEB	223	1.0000	0.8100	0.7490	0.0000	1.0000
MARKET	223	1.0000	0.8900	0.3110	0.0000	1.0000
AGE	223	25.000	29.730	24.576	4.0000	197.000
PROFMARGIN	223	0.0352	0.0638	0.1413	-0.5022	0.7239
EMP	223	55.000	1422.42	11599.1	1.0000	16330

**Source: Author**

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Variables: ROA Quotient between net income and total assets; Sales Natural Logarithm of company sales; COMWEB, takes the value of 1 if the brand has its commercial website and 0, otherwise; MARKET, takes the value of 1 if the brand uses an online marketplace to sell its products and 0, otherwise; AGE Number of years of the firm; PROFMARGIN, Profit before tax divided by the operating revenue; EMP, Number of firm employees.

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TABLE II: Correlation Matrix

	ROA	SALES	AGE	PROFMARGIN	EMP	COMWEB	MARKET
ROA	1						
SALES	0.174*	1					
AGE	-0.037	0.476**	1				
PROFMARGIN	0.847**	0.254**	0.089	1			
EMP	-0.013	0.307**	0.192**	0.094	1		
COMWEB	0.058	0.230**	-0.012	0.094	0.026	1	
MARKET	-0.076	0.011	-0.136	-0.061	-0.205**	-0.27	1

**Source: Author**

\*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% level, respectively.

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Table II shows the correlation matrix between the different variables. Analyzing it and considering all independent variables, we can conclude that some of them present significant associations between each other. The strongest correlation is between ROA and PROFMARGIN, with a coefficient of 0.847 (p-value < 0.05). Another high correlation that stands out is between the variables AGE and SALES, with a value of 0.476 (p-value < 0.05).

With the primary goal of finding out if multicollinearity exists within the data, Variance Inflation Factors (VIFs) were calculated. The results showed no trace of linear relationships between variables, as all values were lower than 5 (Craney & Surles, 2002). For that reason, all will be included in the regressions.

## 5.2 *Linear Regression Method*

After verifying that the data does not present multicollinearity, one can proceed to analyse the results from the linear regression model. As stated before, authors such as Pohlman & Leitner (2003) advocate this method for investigations that require an explanation regarding the relationship between a dependent and a collection of independent variables.

By analyzing the first linear regression (ROA) outputs, one can verify that the variable AGE presents a negative and statistically significant relationship for every level considered. The variable PROFMARGIN also shows significance in all levels studied but has a positive relationship with the dependent variable. Regarding the variable, EMP has a significance level of 10% and 5% and affects ROA positively.

When it comes to the variables in the study, COMWEB has a positive relationship with ROA but is not statistically significant at any level. MARKET, although it has a negative relationship, it is also not significant in the model.

The overall model has an  $R^2$  of 72,7%, which is a good result. The independent variables can explain the firm performance extensively (Chicco et al. (2021)).

Regarding the second linear regression (SALES), the results slightly differ. Although AGE is also statistically significant at all levels, the relationship with the dependent variable is positive. PROFMARGIN and EMP also present a positive relationship and are statistically significant with ROA.

The most significant difference between the two models is visible concerning the two main variables in the investigation, COMWEB and MARKET. The two variables show a positive relationship with ROA and are statistically significant at 10%.

In this second regression, the  $R^2$  is 25%. Although the capacity of the independent variables of explaining firm performance is lower than the first regression, that is not a problem since the investigation aims to study the impact of e-commerce on firm perfor-

TABLE III: Linear Regression Results

Independent Variable	Coefficient	Predicted	ROA	SALES
Intercept	$\beta_0$	?	0.050*** (0.007)	6.297*** (<0.001)
AGE	$\beta_1$	+ -	-0.001*** (0.004)	0.015*** (<0.001)
PROFMARGIN	$\beta_2$	+ -	0.890*** (<0.001)	1.473*** (0.001)
EMP	$\beta_3$	+ -	0.009** (0.040)	0.002234*** (<0.001)
COMWEB	$\beta_4$	+	0.004 (0.594)	0.134* (0.10)
MARKET	$\beta_5$	+	-0.024 (0.151)	0.382* (0.061)
N° Observations			223	223
Adjusted R Squared			72.7%	25%

Source: Author

\*, \*\* and \*\*\* represent statistical significance at 10%, 5% and 1% level, respectively.

Variables: ROA Quotient between net income and total assets; Sales Natural Logarithm of company sales; COMWEB, takes the value of 1 if the brand has its commercial website and 0, otherwise; MARKET, takes the value of 1 if the brand uses an online marketplace to sell its products and 0, otherwise; AGE Number of years of the firm; PROFMARGIN, Profit before tax divided by the operating revenue; EMP, Number of firm employees.

mance and not the variables that explain it (Grace-Martin (2012)).

### 5.3 fsQCA Method

Working with fsQCA demands turning variables into sets calibrated regarding three thresholds: full membership, full non-membership, and the point of maximum ambiguity,

also known as the crossover point (Ragin, 2009*b*). Calibration is an essential first step as it reduces sample dependence. The set membership is defined relative to substantive knowledge instead of the sample mean (Fiss, 2011). To do this we followed the instructions given by Fiss (2011). Full membership matches the original values, corresponding to those above 95th percentile; crossover point matches the average value, and full non-membership is the original value under the 5th percentile (Fiss, 2011).

Subsequently to this step, a truth table is generated. Each row of this data matrix represents the  $2^k$  logically possible combinations where  $k$  is the number of causal conditions used in the investigation (i.e., independent variables) (Fiss, 2011). In this process, one must select the ideal consistency threshold. The importance of this relies on the fact that a low consistency may originate more necessary conditions, reduce type II errors (false negatives), and increase type I errors (false positives) and vice-versa (Dul, 2016). This research uses a refined measure of consistency proposed by Ragin (2006), allowing minor penalties for small inconsistencies and significant to major ones. With that being said, the lowest satisfactory consistency for solutions is  $\geq 0.85$ , going above the minimum suggested of 0.75. Another good indication for selecting this value is to identify if changes in the consistency of each combination (i.e., a jump from 0.85 to 0.82 from rows) (Papamitsiou et al., 2018).

After sorting the truth table, fsQCA computes three sets of sufficient solutions: complex, parsimonious and intermediate. The first presents all possible combinations of conditions when traditional logical. Because it can be pretty difficult to interpret, usually impractical, and be very numerous, this solution will not be considered in this investigation (Papamitsiou et al., 2018). It can also be needlessly complex and affords little insight into casual configurations (Fiss, 2011). The parsimonious solution is a simplified version of the first solution and exhibits the most relevant conditions that cannot be ignored from any solution. Lastly, according to Ragin (2009*a*), intermediate solutions are superior to complex and parsimonious solutions. Therefore they should be essential in every application of this method since these do not allow the dismissal of necessary con-

ditions. Conditions that are both presents in the parsimonious and intermediate solutions are called "core conditions" (Picoto et al., 2019). The conditions that are part of the intermediate solution but not part of the parsimonious solution go by "peripheral conditions" (Fiss, 2011).

Beyond consistency, another measure to assess the quality of results is coverage (Picoto et al., 2019). Ranges from zero to one indicate the percentage of cases that take a particular path to the outcome and permit evaluating the significance of diverse casual paths (Fiss, 2011).

As the calibration method used in this research, a better performance corresponds to a higher number. For example, the top selling company has a rank value of 0.99, and the worst selling brand, value o 0. Thus, the variable of interest in this case is the absence of High ROA and High Sales.

Table IV shows the results of the fuzzy set analysis on high and low performance. The notation used for this table, and following Ragin & Fiss (2008), is that black circles represent the presence of a condition, and empty circles its absence. Moreover, larges circles refer to core conditions, and small circles symbolize peripheral conditions.

All solutions display meet the minimum satisfactory values of consistency of 0.75. Regarding coverage, most solutions also reach the minimum conventional acceptable threshold of 0.25, which means these solutions are informing (Woodside, 2013).

The sufficient analysis for high performance measured by ROA shows two different solutions. The first solution (R1) shows that the older the firm is, the better its performance. This configuration is very consistent (0.935) and represents 59,4% of the cases. Regarding R2, the presence of the variable MARKET shows evidence of a higher ROA. Like the first configuration, this one also is highly consistent (0.929) and presents high coverage (80,5%). In both solutions, R1 and R2, data shows that the presence of a higher profit margin can lead to a higher ROA.

Regarding the analysis for lower performance measured by ROA, four different con-

figurations are presented, showing that the paths that lead to high and low performance are not the same. Configuration  $\sim R1$  exhibits that older firms, with a higher profit margin and fewer employees performance worse. This configuration has robust coverage of 0.966 and an acceptable coverage of almost 49%.  $\sim R2$  shows that younger brands with lower profit margins and online sales shops have a lower performance. The coverage is slightly lower than before (0.929), but the coverage is higher (55,6%).

Regarding the third configuration ( $\sim R3$ ), this indicates that companies with more employees and that use e-commerce (whether through their website or with marketplaces) have a lower ROA. Lastly, configuration  $\sim R4$  registers that firms perform worse when they are older have a more significant number of employees, and do not have a presence in the online commerce world.  $\sim R4$  is highly consistent (0.929), but the coverage and this configuration represent 11,47% of the cases.

The next columns relate to the other measurement of performance, sales. S1 shows that firms with higher sales, if they are older have a higher profit margin but do not use online marketplaces to sell their products. This configuration is considerably consistent (0.921) and represents 15,6% of the cases. The second configuration (S2) indicates that they have a better performance are older and employ more. This configuration is reasonably consistent (0.895) and has a coverage of 36,7%. Ultimately, configuration S3 suggests that firms with higher sales are once again older, with a higher number of employees, and use their website and online sales markets to sell their merchandise.

The last three columns report to lower firm performance, measured by sales. The first configuration ( $\sim S1$ ) exhibits that younger firms that use both channels of e-commerce perform worse. This configuration is very consistent (0.914) and represents around 26% of the cases. Configuration  $\sim S2$  shows that younger firms with lower profit margins that use their website as an online sales platform and do not use online marketplaces do not achieve higher sales. Although this configuration only represents 12,4% of the cases, it is has a firm consistency of 0.947. Finally, configuration  $\sim S3$  indicates that older

firms with a lower profit margin, a higher number of employees, and that do not use their website and other sales channels as a platform to sell their products have lower sales. Once again, this configuration is exceptionally consistent (0.968) and represents 12,1% of the cases.

TABLE IV: Configurations for intermediate and parsimonious solutions

	High ROA		Low ROA				High Sales			Low Sales		
	R1	R2	~R1	~R2	~R3	~R4	S1	S2	S3	~S1	~S2	~S3
AGE	●		●	○		●	●	●	●	○	○	●
PROFMARGIN	●	●	●	○			●				○	○
EMP			○			●	●	●	●	●	●	●
COMWEB				●		○			●	●	●	○
MARKET		●				○	○		●	●	○	○
Consistency	0.935	0.929	0.966	0.929	0.948	0.929	0.921	0.895	0.898	0.914	0.947	0.968
Raw coverage	0.594	0.805	0.489	0.556	0.457	0.114	0.156	0.367	0.312	0.259	0.124	0.121
Unique coverage	0.080	0.291	0.108	0.169	0.072	0.008	0.033	0.067	0.044	0.164	0.031	0.027
Overall solution consistency			0.927	0.924					0.882		0.908	
Overall solution coverage			0.885	0.843					0.444		0.317	

Source: Author

Note: The presence of the condition is indicated by a black circle and absence is indicated by a white circle. Large circles correspond to core conditions and small circles to peripheral conditions. Blank spaces indicate “do not care.”

## 6 DISCUSSION

The following discussion was based on the results provided by the linear regression model and fsQCA. By applying two different methods in this investigation, it becomes necessary to discuss and combine the different results and interpret them.

To simplify the interpretation of the previously presented results, the following discussion will start with the measure of ROA's performance.

The variable regarding the company's age, AGE, exhibits some agreement between the two methods. The older the firm is, the worse it performs. Although these results shock, in the linear regression, the low value of the coefficient (-0.001) should be considered. This conclusion contrasts with the one defended by March (2013) that demonstrated that older firms produce higher profits and productivity since younger companies have higher learning costs.

Profit Margin and ROA present a harmonious result between the two methods applied. This positive and significant relationship between these variables goes hand in hand with the resolutions achieved by Tumanggor (2020), mainly when we focus on the idea that this variable has a more significant impact in industries that heavily rely on advertising like the fashion luxury one.

Finishing the control variables studied, the number of employees, EMP, takes a bigger impact when it comes to companies with a lower ROA and little to no known significance in firms that have a better performance. The same results are supported by the OLS method that supports that a higher number of employees has little effect on the dependent variable. These results make sense since productivity, the relationship between sales and employees (Morbey & Reithner, 1990), naturally influences a company's performance.

More importantly, it is to discuss the impact of e-commerce. The results show that, when it comes to higher values of ROA, a brand's website to sell their products has no real significant effect in the luxury fashion industry. One explanation for this outcome might

be that, as stated by Zhu & Kraemer (2002), manufacturing production industries (such as the luxury fashion one) increase the cost of sold goods, which impacts significantly performance, especially when is measured by ROA. These results do not agree with the ones found by Šaković Jovanović et al. (2020) and support that further research needs to be done regarding e-commerce and firm performance.

Considering the results above, it can be discussed that the use of online marketplaces negatively influences ROA. However, more studies need to be done in order to have more certainty and solid conclusions. OLS results show a negative relationship between performance and this variable. It also takes a more considerable expression in fsQCA when negated configurations of ROA are displayed or take no place in them. It is possible to justify this inconclusive outcome by the more difficult access to have data regarding sales on this sales platform.

Another interesting finding is that when age is significant, as shown in configuration  $\sim R4$ , older firms report worse results when they do not have their website as an online sales platform. However, when age is not significant, with particular attention to configuration  $\sim R3$ , brands that use e-commerce also report lower values of ROA. Perhaps the traditionalism of older brands is becoming a barrier to adopting new ways of selling and, consequently, their performance. In summary, hypothesis H1a) is partly rejected, and H2a) is rejected.

Equally important is to give attention to the sales, the other measure of performance used.

Analysis of the data suggests that age does have a positive impact on sales. These results go hand in hand with both results shown in the two methods used, OLS and fsQCA. One justification for this might be that older firms already gain confidence from consumers, so they rely on them to buy products they know have good quality and have proven they are trustworthy.

The evidence suggests that likewise in ROA, Profit Margin has a positive impact on

sales. However, it does not have a meaningful significance in it, especially when sales are reported high. By contrast, it has a more expressive value when low sales are reported. As Tumanggor (2020) identified, this variable has an actual weight in ROA, so that can explain why it is less relevant in sales.

Companies in the luxury fashion industry with a higher number of employees have reported higher sales. Nevertheless, this does not mean that firms that have fewer workers perform worse. This variable loses significance in most configurations when low sales are published, as one can see by results from fsQCA and the small coefficient in linear regression results. Considering Kraemer et al. (2005) theory and configuration  $\sim S3$ , bigger firms have an easier time adopting technologies, mainly because they have more resources available.

Comparing the results obtained in ROA regarding e-commerce, sales shows how different performance measures can change the outcome and conclusions achieved. The ability to purchase from the brand's website contributes positively and significantly to sales, as shown by the two methods used. This theory makes sense once the consumers trust the source of their purchase and associate it as another way to buy the brand's product. These results identify with the theory wrote by Kraemer et al. (2005) that conclude that the more a company uses e-commerce, the better it performs.

It can be seen that although in OLS, the evidence shows that being present in online sales markets helps boost sales, the results in fsQCA are mixed. Configurations for high sales, with particular attention to  $S1$  and  $S3$ , explain the difference between selling products in online marketplaces. In the fashion luxury industry, the brand does or not sell their products on their website. Perhaps one reason for configuration  $\sim S1$  suggesting that having online marketplaces has a significant impact when low sales are reported is that it also highlights the younger years of the firm. As stated before, younger brands, especially in the luxury industry, have not yet gained most consumers' trust, particularly the older ones that have a more traditional view and taste.

In brief, both hypotheses H1b) and H2b) are accepted regarding these two variables.

## 7 CONCLUSIONS

This thesis investigates the impact of e-commerce on firm performance, measured by ROA and sales. It was also questioned if different types of e-commerce approaches (brand's website and online sales market) have a different impact on performance. Finally, this investigation also analyses if these different performance measures conclude different results. This research uses linear regression to attain how each determinant affects a firm's performance. To further answer these questions and gain a more profound comprehension of the linear regression results, was also used a fsQCA approach to recognize the presence of casual paths that guide high performance.

After examining all the results, research questions can finally be answered. Regarding whether or not e-commerce has a significant and positive impact on firm performance in the luxury fashion industry, conclusions are mixed. When measuring performance through ROA, it has a negative to a slightly positive impact on the company. When distinguishing the different approaches between e-commerce (research question number two), the brand's website has a minimal positive effect, almost null, and online sales market negative relationship with ROA. However, when looking at performance measured by sales, both online sales markets and brands' websites have a positive impact, showing that overall e-commerce has a good relationship with sales. In brief, it can be concluded that, dependent on the measure, e-commerce may have a positive relationship with a firm's performance.

This thesis research provides further knowledge about the impact of e-commerce on firm performance in the fashion luxury industry. The use of fsQCA complements results from the linear regression model by determining the multiple combinations of conditions that give light to the outcome.

For academics, this investigation grants a more detailed approach between the different types of e-commerce platforms. For professionals of the area, this study can better

understand how the industry and its consumers react and welcome the newly adopted way of shopping and how it affects the brand's performance.

The limited samples size and the data available regarding different variables of the current study did not allow further statistical testing for the linear regression and fuzzy set analyses. These situations naturally limit the capacity to draw firm conclusions and request further studies to establish the current findings.

Regarding further studies, future research should investigate this matter in other luxury sub-sectors, such as luxury tourism. Additional work is also needed by adding more variables regarding e-commerce and different periods, especially considering the consequences and effects of the pandemic.

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