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The relationship between circular economy models and companies' financial performance

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Table of Contents

Abstract	2
Keywords: Circular economy, Business sustainability, companies' performance	2
1. Introduction	3
2. Literature Review	4
2.1 Circular Economy	5
2.2 Circular business model	6
2.3 Motivations for circular economy sustainable practices	10
2.4 Financial performance in sustainable companies	12
3. Methodology	15
4. Results and discussion	21
5. Conclusions.....	24
References	26

The relationship between circular economy models and companies' financial performance

Abstract

Purpose: The aim of this project is to analyze the relationship between circular economy models and financial performance.

Methodology: The sample consists of 15 companies that have been part of the Circular awards (winners, runners and finalist). The financial information has been obtained from Amadeus and comprises data from 2010 to 2018. Differences of means have been performed to detect differences between the implemented practices and financial performance.

Results: The analysis suggests that there are differences in some of the financial ratios regarding the type of circular economy models implemented: upstream or full circular models. Specifically, there are differences for firm size, return on assets and liquidity.

Contribution: The main contribution of this study is the attempt to analyze empirically the relationship as there is a lack of empirical studies on this topic. In addition, the fact that specific models have been analyzed and not only considering circular economy in general.

Keywords: Circular economy, Business sustainability, companies' performance

1. Introduction

In the last years to find a plan to reduce gas emission, carbon pricing and climate change have been an important topic in the European Union (EU). To achieve this goal a commission in charge of transforming the EU's economy for a sustainable future has been created (European Commission, 2019a).

The application of circular economy can help EU countries in reducing the industrial emissions and the negative impacts on the environment and on the climate. Since 2015, the European Commission is creating an action plan for the adoption of circular economy, which includes legislation and some elements of industry policy covering the manufacturing of products. Government at all levels, businesses, innovators, investors and consumers play an important role and contribute to the circular economy process (European Commission, 2019b).

In business research, circular economy is considered a new topic, and most of the studies are focused on describing the relationship between circular business models and innovation and the challenges that companies have at the moment that they are adopting this practice, but there is scarce empirical evidence from research in the topic that analyzed the profitability and competitive advantage that companies obtain at the moment they apply circular economy in there companies (Lahti, Wincent, & Parida, 2018).

Thus, the objective of this project is to analyze the relationship between circular economy models and financial performance. The lack of empirical studies on this relationship allows using information related with corporate sustainability that according to Soytaş et al., (2019) "are the initiatives to improve energy efficiency, reduce carbon emissions in production and transportation, reduce water use, decrease the use of virgin materials, and reuse waste should lead to lower operational costs" and corporate social responsibility, which is every optional action that the firm applies in order to promote social benefits (Soytaş et al., 2019). Both corporate social responsibility (CSR) and corporate sustainability (CS) had been related with sustainability (Soytaş et al., 2019).

Most of the existing literature on the relationship between sustainable business practices and financial performance conclude that there exist a significant and positive impact between these two aspects (Govindan, Rajeev, Padhi, & Pati, 2020; Jan, Marimuthu, Hassan, & Mehreen, 2019; Platonova, Asutay, Dixon, & Mohammad, 2018; Soytaş et al., 2019). For instance, Nelling & Webb, (2009) find that there is not a significant effect between corporate social responsibility and financial performance but employees' relationship is the only characteristic driven by stock market performance. Other studies, such as Eccles, Ioannou, & Serafeim, (2014), found mixed results, which means that they found both positive and negative relationships between corporate sustainability and financial performance.

The contribution of this research is to fill the gap on how the implementation of circular economy (CE) influences on the company's financial performance. Circular economy helps companies in improving their image, client's satisfaction, efficiency and in gaining competitive advantage over competitors, but most of the research does not show the amount related to the financial performance of a company (Lahti et al., 2018; Lewandowski, 2016). For this purpose, we are going to apply an empirical analysis based on financial performance data from 15 European companies that have applied circular economy practices and have been awarded for it.

This paper is structured in this introduction, then the literature review about circular economy is presented, followed by the methodology applied to obtain the results. The conclusions close the paper.

2. Literature Review

According to Jan et al., (2019) the main sustainable business practices are general standards sustainability disclosers, economic sustainability practices, environmental sustainability practices and social sustainability practices. The former, general standards sustainability disclosers are the integrated suitability strategies that are calculated by the sum of total disclosures per section divide to the total possible disclosure per section. The economic sustainability practices refer to the impact that have the use of this practice in the economy from different agents involved in these practices like stakeholders, economic systems at local, national and global level.

Regarding the environmental sustainability practices is measured by the impact that the organization has on the ecosystem, land, water and air. According to Paulraj (2009) in order for a company to become sustainable, it has to apply green practices, which can be divided into internal and external. The external is the supply-side of value, and the company has to collaborate with the suppliers by monitoring and selecting suppliers that have the same environmental goal. The internal green practices require the creation of an ecological efficiency by reducing the use of raw material, energy and also recycling. Finally, the social sustainability practices refer to how the company contribute to the social system in which it operates, for example, taking care about employees by giving them occupational, health and safety work environment, equal remuneration for women and men, training employees and giving importance to the local community.

2.1 Circular Economy

The circular economy is a social, environmental and economic paradigm that has the purpose to prevent the loss of resources and look for environmental regeneration through eco-innovative solutions and products that can be reintroduced in biological and technical cycles (Prieto-Sandoval, Ormazabal, Jaca, & Viles, 2018).

According to Zhou & Li, (2011), the circular economy works by using the three Rs principles: Reduce, Reuse, and Recycle. Reduce means reducing the amount of substance in the process of production and consumption; Reuse is involved in extending the time intensity of product and service; and Recycle focuses on the regeneration of renewable resources after use. Circular economy is a role model that consist in resource – product – waste – renewable – resource (see figure 1).

The benefits that circular economy generates to companies are several, but the most relevant are (Lopes de Sousa Jabbour, 2019): (1) the reduction of raw materials waste by decreasing the use of energy and materials for the production, which, helps the companies to reduce the waste and carbon emission, reducing costs related to energy, waste management and emissions control; and (2) the competitive advantage achieved from innovation in design and processes. This business model also involves sharing costs and resources that can improve social performance image.



Figure 1. Circular Economy Model

Source: European Parliament, (2018)

2.2 Circular business model

For a better understanding of the concept, it is important to know the meaning of a business model that, according Manninen et al., (2018) is "how the company creates, delivers and captures value".

According to Bocken, Short, Rana, & Evans, (2014), a circular business model is a sustainable business model that creates value from waste. This waste becomes a usable and important raw material to other production in the same company. To create value, the company has to produce actions and alliance to remove life cycle waste, this action can guide the company to make an alliance with collaborators that have already build the knowledge, create logistics networks, technology and have the capabilities to operate logistics system efficiently (Lahti et al., 2018).

For Linder & Williander (2017), a circular business model is "a business model in which the conceptual logic for value creation is based on utilizing the economic value retained in products after used in the production of new offerings". Upadhyay, Akter, Adams, Kumar, & Varma, (2019) define it is a sustainable way of doing business for all the companies regardless of their nature or sector. Also, it lets the organization becoming more socially responsible. The main advantage of this model is that it permits the organizations to create a sustainable solution that helps to reduce the waste and time lags associated with operations. Salvador, Barros, Luz, Piekarski, & de Francisco (2020), conducted a literature review and suggest that circular business models

implementation has been scarcely studied and consider it in an early stage of investigation.

According to Aboulamer et al., (2018), a circular business model objective is “to extend the useful life of a product along its cycle if possible, while minimizing resource use and waste”. Companies stand to benefit the most from the circularity of the economy, not only in implicit recognition of the contribution to the sustainable economic model, but from a direct monetary compensation that shareholders will retain through the increase in the value of their equity value.

The main characteristics of a circular business model are that the products are designed with a longer life and companies give a good customer service, which means that the enterprise have interaction between companies and customers in order to retain them for a longer period (Aboulamer et al., 2018). Following Lewandowski, (2016) and Nußholz, (2018), these characteristics are:

- Circular supplies: using renewable energy and of bio-based or fully recyclable inputs.
- Resource recovering: which means recuperating of useful resources from materials, by products or waste.
- Product life-extension: extending product lifecycles by repairing, upgrading and reselling them, as through innovation and product design aimed at durability.
- Sharing platform: connecting product users with each other and encouraging shared use, access or ownership in order to increase efficiency and exploit the synergies in product use.

These practices contribute to the economic growth and environmental resilience by providing goods for multiple consumption cycles and reducing the amount of resources that go into the production process. They give the consumers the opportunity to recycle old products, reduce waste and allow firms to financially benefit from the extended responsibility for the entire product life cycle (Kortmann & Piller, 2016). Thus, the circular business model gives the clients the opportunity to recycle old products and provide a product with a multiple consumption cycle. The profit of this type of companies depends on the contribution of consumers and the work of the shareholders that participate with experience, ability and awareness (Kortmann & Piller, 2016).

An attempt to classify the circular business models was presented by Urbinati, Chiaroni, & Chiesa, (2017). They first conducted a literature review and based on it, they tested the classification proposed in different case studies. They based the classification in two main dimensions: (1) customer value and (2) the value created between internal and external suppliers. The way that they measured this classification was by using these variables: price, promotion and design for the practices that companies implemented. They also use a variable to measure the degree of implementation of design for recycling, design for remanufacturing and reusing, design for disassembly and design for environment practices that use each firm. According to these two aspects and by measuring the variables they concluded that there are three types of circular business models (see figure 2):

- 1) Downstream circular. These companies create value by investing money in marketing campaign on the "use" and "re-use" of a product. The main objective of this campaign was to create market acceptance between the company and the client and give information to the customer on how the enterprise provide the option for re using the product. The product design, suppliers and internal activities were not circular. These companies could be a pay-per-use model or intermediary's platforms of circular economy products.
- 2) Upstream circular. These firms invest in the internal factors by adopting circular principals in the product design and creating good relationships with the suppliers to create advantage in cost efficiency. They do not increase the price of the product or invest in marketing camping.
- 3) Full circular. They generate value by creating products minimizing the waste and energy consumption internally and externally. To achieve this, they produce the product base on the principles of circular economy, also the suppliers and producers are taking part of implementation of circular economy. They invest a big amount of money on marketing to create a link between the customer and the companies.

This study also concluded that geography, industry, size of the company and age are not factors that affect the type of circular business model that the company decides to implement (Urbinati et al., 2017).

Regarding the implementation of these models, van Loon & Van Wassenhove, (2020) present case studies of four different companies that were planning to implement circular economy and distinguish two ways to implement it: (1) by reusing the product

and (2) by remanufacturing it. For the former, when the company implements circular economy, the costumers should change their behavior in order to understand that the product has a different process and they have to take care of it to keep the good quality and that the product could be reused. Companies applying the circular economy by reusing the product have to consider additional costs like return transport cost, credit checks, management of payment and high maintenance experience, and this cost could be considered a limit on feasible leasing fees. The company has to understand the client’s needs, behavior and segment to do this and it has to analyze realistic data driver evidence that will help in calculating on profitability as a function of customer behavior. The company has to invest money in a good marketing information campaign which will help the customer to better know the process of reuse.

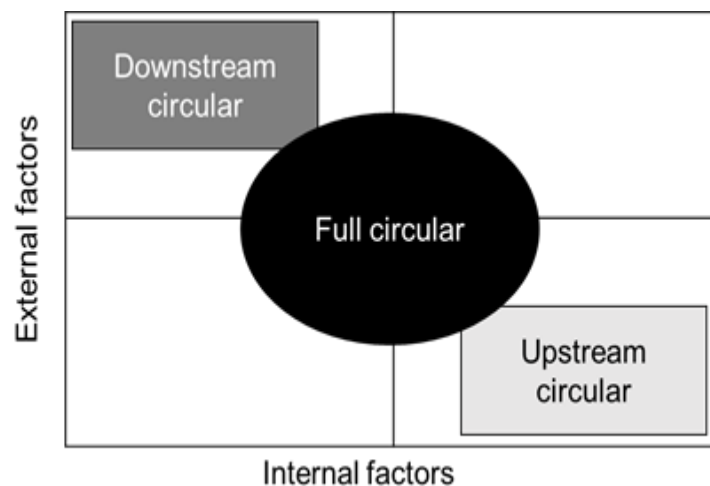


Figure 2. Circular Economy models classification

Source: own elaboration based on Urbinati et al., (2017)

If an enterprise wants to apply circular economy by remanufacturing (van Loon & Van Wassenhove, 2020), the product will have an expensive price because this kind of companies tend to produce a small volume and apply, in some cases, manual production. In addition, they have to invest in raw material to create products with good quality and find suppliers that give this kind of material. The success of a remanufacturing business is using expensive and durables assets.

According to van Loon & Van Wassenhove, (2020), in both cases, by reusing and remanufacturing, the company should invest in technology to create a new design that

leads the product to become a circular one. The data that these companies have to use to obtain the estimation of the profitability of a remanufacturing business are: realistic sale prices, size of the market, sale channel and find how to balance the demand with the supply. They conclude that the principal challenges that companies face are:

- To understand the market for recirculated products.
- To have to create good quality product in order to be recirculated.
- To invest money in technological processes and which will increase the cost of circular business model.

2.3 Motivations for circular economy sustainable practices

According to Gusmerotti, Testa, Corsini, Pretner, & Iraldo, (2019), there are four main factors that motivate companies to adopt circular economy: (1) economic, (2) regulatory, (3) environmental value and (4) resource related risk. All are explained below.

1) Economic drivers. The economic motivations may be the most important factor in explaining the adoption of circular economy practices. The circular economy is based on the concept of resource efficiency by producing more for less, improving other factors like the companies' image, client's satisfaction and, the efficiency, that in turn, will make the company gaining a competitive advantage over competitors (Linder & Williander, 2017). Improved environmental performance is a potential source of competitive advantage as found in Iraldo, Testa, & Frey, (2009), who conclude that the implementation of Environmental Management System (EMS) can provide considerable competitive benefits to a company.

In addition, the reduction of pollution and environmental impact may improve the company's image or make the company gaining more prestige, which will make customers loyalty or support sales effort to increase (Ambec & Lanoie, 2008). An example of this can be found in Miroshnychenko, Barontini, & Testa, (2017), who investigated the impact of corporate green practices on financial performance, by using a sample of 3,490 companies from 58 different countries over 13 years, concluding that the reduction of pollutant emissions makes the efficiency of the company to improve and consequently companies profitability also increase.

- 2) Regulatory drivers. These motivations are based on ensuring law compliance and preventing future law requirements. Governments and institutions play a crucial role at the moment of the implementation of circular economy, in fact, their strategies include developing new legislation, standards and eco-labels in order to recognize the company's products (European Commission, 2019a).

According to previous studies there is an evidence that institutional pressures can encourage firms to participate in environmental agreements having a relevant impact on production activities (see, e.g., Gusmerotti, Testa, Amirante, & Frey, 2012).

- 3) Environmental value drivers. This driver focusses on two main aspects, which are the reduction of the environmental footprint and the reduction of the company's environmental impacts. Companies make an effort to find a way to reduce the company dependence on raw materials and obtain environmental values. An example of this is presented in Kalaitzi, Matopoulos, Bourlakis, & Tate, (2018), through a case study where the company tried to reduce the dependence on petroleum in order to reduce the carbon footprint by using renewable resources such as soy-based polyurethane foams for automotive application.
- 4) Resource related risk drivers. This could be done by reducing a company's dependence on scarce raw materials. According to the Natural Resources Dependence Theory (NRDT), all organizations depend directly or indirectly on natural resources, because the natural capital or the resulting ecosystems are the source of the raw materials for all physical assets. This, coupled with the growing scarcity of natural resources could put supply chains at risk if managers fail to address the pending scarcity issues especially in conjunction with the growing demand for goods and services (Gusmerotti et al., 2019).

Motivations can also come from stakeholders (Govindan et al., 2020). The stakeholders of a firm are all the individuals or groups that are affected by and can affect the decision that a firm makes (Freeman, 1994). According to the stakeholder theory, stakeholders are an important factor for companies and they must have a good relationship with them, based on certain functions and obligations that they have between each other (Freeman, 1994). This theory assumes that there is a positive relationship between sustainability practices and financial performance, which means that it includes customers, employees, suppliers, government, communities, etc. (Jan et al., 2019). Thus, sustainable companies should adopt stakeholders' engagement

practice, because the companies that work together with stakeholders and build a long-term relationship to create strategies to solve social and environmental issues generate benefits and a larger amount of contracts (Eccles et al., 2014; Govindan et al., 2020).

2.4 Financial performance in sustainable companies

The review realized in this paper did not allow finding an empirical study analyzing the relationship between circular economy implementation and its impact on financial performance (Lahti et al., 2018; Lewandowski, 2016). For this reason, papers related to sustainability (specifically corporate environmental strategy and the corporate social responsibility) and financial performance has been analyzed.

Table 1 summarized the papers found analyzing the financial performance in sustainable companies. 22 articles have been identified and some of them applied meta-analysis and others are empirical studies from 2001 to 2020. 13 of these articles show that exist a positive and significant impact between the sustainable practices and financial performance (see, e.g., Vuță, Cioacă, Vuță, & Enciu, 2019; (Nobanee & Ellili, 2016)Mallin, Farag, & Ow-Yong, 2014; Margolis, Elfenbein, & Walsh, 2007; Orlitzky, Schmidt, Rynes, & Rynes, 2003). 7 of them show that exist a negative between these two variables (see, e.g., Hou, Liu, Fan, & Wei, 2016; Wang, Dou, & Jia, 2016; Dixon-Fowler, Slater, Johnson, Ellstrand, & Romi, 2013; Lin, Yang, & Liou, 2009), and 2 articles show mixed results (Miras-Rodríguez, Carrasco-Gallego, & Escobar-Pérez, 2015; Revelli & Viviani, 2015). The most common variables that these studies to study the financial performance are Return On Equity (ROE), which is a ratio used to compared companies that are in the same industry and show the ability that managers have to create income from available equity, and Return On Assets (ROA), which is a ratio which use of the assets of a company to generate incomes (Keskin, Dincer, & Dincer, 2020).

Table 1: Comparison between various studies that show the relationship of the financial performances and sustainable practices.

Author	Sample	Dependent Variable	Independent Variable	Methodology
Positive relationship				
Govindan et al., (2020)	1500 articles (2010-2018)	Financial Performance	Supply Chain Sustainability	Meta-Analysis
Vuță et al., (2019)	61 companies	CSR index	Log value of total assets; Log value of equity; Log value of market capitalization; Log value of sales; Soles growth; Average member of employees; Sales per share	Empirical Study; Regression; Panel data
Miroshnychenko et al., (2017)	3490 companies from 58 countries (13 years)	Tobin's; ROE	Internal Pollution Prevention Index; Green Supply Chain; Management Index; Green product index; ISO 14001	Empirical Study; OLS; Regressions; Correlation
Nobanee & Ellili, (2016)	16 Banks (2003-2013)	Growth of short-term deposits	Differenced lagged; Variable of leverage measured by the first differences of total liabilities to equality; First difference of the degree of sustainability	Mann-white test Panel data
Mallin et al., (2014)	90 Banks from 13 countries	CSR index	ROE; ROA	Empirical Study; Data set; Cross-section
Golicic & Smith, (2013)	31 articles (2000-2011)	Financial Performance; ROA; ROI	CSR	Meta-analysis
Quazi & Richardson, (2012)	51 articles (1974-1999)	Financial Operational	Environmental Supply Chain Practice	Meta-analysis
Orlitzky (2011)	52 articles (1972-1997)	Financial Performance	CSR	Meta-analysis
Jan et al., (2019)	16 banks from Malaysia (2008-2017)	ROA; ROE; Tobin's Q	General standards sustainability; disclosures; Economic sustainability; Environmental sustainability; Social Sustainability	Empirical Study; Regression
Margolis et al, (2007)	167 articles (1972-2007)	ROA; ROE; Shock returns	CSR	Meta-Analysis

Elsayed & Paton, (2005)	227 companies from UK (1994-2000)	Financial Performance; Tobin's Q; Return on assets; Return on sales; Log total assets; Leverage; Investment Capital	Environmental performances	Empirical Study; Panel Data; Regression
Orlitzky et al., (2003)	52 articles (1972-1997)	ROA; ROE; Earnings per share	CSR; Reputation index	Meta-Analysis
Orlitzky, (2001)	20 articles (1975-1997)	Financial Performance	CSR	Meta-analysis
Negative relationship				
Keskin, & Dincer, (2020)	58 firms (2014-2016)	-	ROE; ROA; Leverage; Company size	Empirical Study; Discriminant Analysis
Hou et al., (2016)	28 articles (2001-2015)	Financial Performance	CSR	Meta-Analysis
Wang et al., (2016)	42 articles (2004-2011)	Corporate financial performance	CSR	Meta- Analysis
Dixon-Fowler et al., (2013)	39 articles (1970-2009)	Financial Performance	CSR	Meta-Analysis
Rathner, (2013)	25 articles (1991-2011)		Socially responsible investment	Meta-regression analysis
Lin et al., (2009)	33 firms from Taiwan (2002-2004)	Return on individual stock	CSR; Jensen measure; Amended Jensen measure; Treynor measure; Sharpe measure; MSC measure	Empirical Study; Regression
Nelling & Webb, (2009)	Data from KLD data base (1993-2000)	Weighted social responsibility score from KLD data base	ROA; Stock returns; Sales Financial; Leverage	Empirical Study; Sires fixed effect
Mixed results				
Miras-Rodríguez et al., (2015)	103 articles (2001-2013)	Financial Performance	CSR	Meta-Analysis
Revelli & Viviani, (2015)	85 articles (1972-2012)	Financial Performance	Socially responsible investing	Meta-Analysis

Source: Updated from Govindan et al., (2020)

3. Methodology

The methodology to analyze the relationship between the means of the financial ratios and the circular economy model that the company applied is quantitative.

The sample used is built with the companies that have been part of the circular economy awards (winners, runners and finalist). This award offers recognition to individuals and organizations across the globe that are making notable contributions to the circular economy in the private and public sector and society. The annual awards are hosted at the World Economic Forum's Annual Meeting in Davos and have been presented since 2015 (The Forum of Young Global Leaders, 2019). A total of 42 companies have been part of this award from 2015 to 2018 (see table 2): 19 multinationals, 11 public and 12 small and medium size enterprises (SMEs). In order to analyze the relationship of these practices with the financial performance, the awarded companies were searched in the Amadeus financial database (Baureau van Dijk, 2020), which contains the financial statements of more than 21 million companies in Europe. The cross-checking made the sample to be reduced and the financial statements information of only 18 companies (out of the 42) was available (companies highlighted in table 2).

The statistic technique applied is the one-way analysis of variance (ANOVA), which is used to estimate the lack of discrimination of financial variables means across the clusters (Raymond & Croteau, 2006). The parametric test one-way analysis is used to compare and to test each of the financial performance variables across the three groups of circular economy model. This analyze will help us to find if there exist a difference between the mean of each ratio of financial performance and the classification of business model.

As there is a lack of empirical studies analyzing the relationship between circular economy and financial performance within a company, a specific variable has been created to define the independent variable to be used in this analysis (see table 3). Specifically, and following Urbinati et al., (2017), we create three groups or clusters based on the classification of circular economy model for the sample: downstream, upstream and full circular economy. In order to obtain this information, all the companies webpages (Aktiebolag, 2020; Anheuser-Busch InBev, 2019; Balfour Beatty, 2020; DSM, 2019; Freeman, 1994; HMgroup, 2020; Inter IKEA, 2020; Minter, 2010; Renault, 2020; Schneider Electric Global, 2020; SE, 2020.; Tarkett, 2020-a, 2020-b; THE CIRCULARS., 2018; Unilever, 2020; vandebron, 2020) were used as well as the information provided in

“The Circular Economy Awards” (2019). The index used is based on the proposal of CSP index by Fiori, Donato, & Izzo, (2007) and Vuță et al., (2019).

Table 2: Companies awarded and selected for the sample

COMPANY		COUNTRY	SECTOR	SECTOR ACTIVITY	CIRCULAR ECONOMY AWARDS	
					YEAR	STATUS
1	Anheuser-bush inbev	Belgium	Multinational	Fast moving consumer goods	2019	Runner up
2	Balfour Beatty	London	Multinational	Research and professional services	2015	Finalist
3	Basf Se	Germany	Multinational	Chemicals	2017	Finalist
4	C&A	Belgium	Multinational	Retail	2018	Finalist
5	Canon Europe LTD	The Netherlands	Multinational	Wholesale of photographic articles	2016	Winner
6	Circle Economy	Amsterdam	Public	Government company	2018 -2017	Finalist
7	Circular Glasgow	Scotland	Public	Government company	2019	Finalist
8	Danish Business Authority	Denmark	Public	Government company	2015	Winner
9	Desso	UK	Multinational	Fabrics Apparel Carpets Textiles	2015	Finalist
10	Drivy	France	SME	Software and online services	2016	Finalist
11	Enel	Italy	Multinational	Research and professional services	2017- 2018	Finalist
12	Essity	Denmark	Multinational	Retail	2019	Finalist
13	European Commission	Brussels	Public	Government company	2019	Winner
14	Fairphone	Amsterdam	SME	Telecommunications	2018-2017	Finalist
15	Flanders Materials Programme, Belgium	Belgium	Public	Government company	2016	Winner
16	H&M -	Sweden	Multinational	Retail	2018	Finalist
17	I:CO	Germany	SME	Recovery of products and materials	2017	Runner up
18	Ikea SA	Spain	Multinational	Furniture, textile and flooring, retail	2018	Winner
19	Johnson Controls	Ireland	Multinational	Research and professional services	2017	Finalist
20	Mba Polymers,Inc	UK	SME	Plastic recycling market	2017	Winner
21	Ncc Industry	Sweden	Multinational	Software and online services	2017	Finalist
22	Olleco	UK	SME	Recovery of products and materials	2019	Runner up
23	Parkflyrent	Netherlands	SME	Software and online services	2015	Finalist
24	Perpetual Global	UK	SME	Recovery of products and materials	2018	Runner up

	Technologies Limited					
25	Positive Luxury	UK	SME	recovery of products and materials	2016	Finalist
26	Renault	France	Multinational	Automotive and transport manufacturing	2015	Finalist
27	Royal DSM	Spain	Multinational	Chemicals	2019	Runner up
28	Royal Philips	Spain	Multinational	Electronic and Electrical Equipment	2016	Winner
29	Safechem Europe	Germany	SME	Chemicals	2017	Finalist
30	Schneider Electric SA	Spain	Multinational	Energy	2019	Winner
31	Scottish government	Scotland	Public	Government company	2017	Winner
32	Sitra	Finland	Public	Government company	2018	Winner
33	Sunderland Partnership	UK	Public	Government company	2015	Finalist
34	Tarkett	France	Multinational	Furniture, textile and flooring, retail	2016	Finalist
35	The Ministry of environment and food of Denmark	Denmark	Public	Government company	2019	Finalist
36	The ministry of infrastructure water management of Netherlands	The Netherlands	Public	Government company	2019	Finalist
37	Unilever plc	UK	Multinational	FMCG and Packaging	2016	Finalist
38	Unusual Riggins ltd	UK	SME	Construction	2017	Finalist
39	Vandebron	The Netherlands	SME	Utility	2015	Finalist
40	Vaude	Germany	SME	Retail	2018	Finalist
41	Veolia	France	Multinational	recovery of products and materials	2016	winner
42	Wrap	UK	Public	Research and professional services	2017	Finalist

Source: Own elaboration based on The Forum of Young Global Leaders, (2019) and Bureau van Dijk (2020)

Table 3: Circular economy model classification model.

COMPANY		Downstream			Upstream circular			Full circular		
		Invest money in marketing	Intermediary platforms pay-per-use	Internal practices and product are not circular	Invest in internal factors adopting circular economy	Product design circular	Create a good relationship with the suppliers	Internal and external factor circulars	Customer value proposition interface	The firm communicate the implementation to the costumers
1	Anheuser-bush inbev				X	X	X			
2	Balfour Beatty							X	X	X
3	Basf Se				X	X	X			
4	Canon Europe LTD				X	X	X			
5	Desso							X	X	X
6	Essity				X	X	X			
7	H&M							X	X	X
8	Ikea SA							X	X	X
9	Johnson Controls				X	X	X			
10	Renault				X	X	X			
11	Royal DSM				X	X	X			
12	Royal Philips				X	X	X			
13	Schneider Electric SA							X	X	X
14	Tarkett							X	X	X
15	Unilever plc							X	X	X
16	Unusual Riggins ltd				X	X	X			
17	Vandebron	X	X	X						
18	Veolia				X	X	X			

Source: own elaboration base in Urbinati et al., (2017)

This circular economy classification (the independent variable) results on 1 company classified into the downstream model, 10 companies in the upstream level and 7 in the full circular model.

The dependent variable that we are going to use for the financial performance are the ratios listed below. The information was gathered from Amadeus (Baureau van Dijk, 2020) and from different years, specifically from 2010 to 2018, for each company. This timespan was not available for all the companies and thus, the final sample used in this study is 15 organizations (Vendedron, Essity and Johnson Controls were not considered): 8 companies in the upstream level and 7 in the full circular model.

For the measure of the financial performance and according to the literature review, the ratios that are more used and the ones that we are going to compare are:

- The return on equity (ROE) using P/L before tax (%): $\left(\frac{P}{L} \text{ before tax}\right) * 100$

This ratio manifests the ability of management to generate income from available equity. That show the use of investments to create earning growth (Keskin et al., 2020).

- The return on assets (ROA) using P/L before tax (%): $\left(\frac{P}{L} \text{ before tax}\right) * 100$

This ratio shows how the enterprise uses their assets to generate incomes (Keskin et al., 2020; Miroshnychenko et al., 2017).

- The return on invested Capital (ROCE) using P/L tax (%):

$$\left(\frac{\frac{P}{L} \text{ before tax} + \text{Interest paid}}{\text{Shareholders fund} + \text{non current liabilities}}\right) * 100$$

This ratio measures the efficiency in which its capitals and the profitability are used.

- EBITDA Margin (%):

$$\left(\frac{\text{Operating } \frac{P}{L(EBIT)} + \text{Deprecion Amortization}}{\text{Operating revenie (Turnover)}}\right) * 100$$

This is a ratio that allows comparing the real company performance between companies of different industry and represents the company operating profit as a percentage of its revenue.

- Liquidity ratio (LR): $\left(\frac{\text{Current assts} - \text{Stock}}{\text{Current liabilities}} \right)$

According to (Liu, Wu, Zhong, & Liu, 2020), this ration measures the speed of liquidating firm money in operation management as some outstanding firm could have adequate reserves to addresses potential risk.

- Net asset: $\left(\frac{\text{Operating revenue (Turnover)}}{\text{Shareholders funds} + \text{Non current liability}} \right)$

It measures the ability of the manager to use the firm's net assets to generate sales revenue.

- Firm size: $(\log \text{ of total assets})$

The size of the company helps to have more resources to win an award (Liu et al., 2020)

For this study we use the mean of each ratio, and after certifying that the data have a normal behavior and homoscedasticity, we applied the one-way ANOVA or K Kruskall-Wallis. Using One-way ANOVA statistic will help us know if there exist a significant difference in the mean of each financial ratio compared between the two circular economy models: Full Circular and Upstream. If the Prob>F is higher than 0.05 we said that there is not a difference in the mean of the financial ratio between the two models, so, a not significant relationship between the mean of the financial ratio and the Circular economy models. This means that regardless of the type of business model that the enterprise applied there is not a significant difference in the financial ratios. We can have said that the benefits of applying circular economy practices is not being reflected in the financial ratio. If the Prob>F is less than 0.05 we can say that exist a significant relationship between the mean of the financial ratio and the circular economy model implemented.

4. Results and discussion

The results of the one-way ANOVA are presented in table 4, where the ratios that are different between Full circular and Upstream model are highlighted in grey.

During this inquiring process we found that according to the means of profitability and the following ratios (see table 5): ROE, ROCE, EBIT, Net Asset, there is no significant difference between the circular economy models that the company applied (Upstream or

Full circular). These three first correlations can focus on the profitability obtained from the used resources or the ability of the company to generate sales or benefits.

Table 4: One-way ANOVA results

Ratio	Prob > F (Significant Value)
Firm Size	0.0052
ROE	0.4386
ROCE	0.5677
ROA	0.0450
Net Asset	0.1050
Liquidity	0.0200
EBITDA	0.2912

Source: own elaboration

According to Orlitzky et al., (2003), the Return on Equity (ROE) captures the internal efficiency in full circular companies. In this case, the average ROE is 20.57 with a standard deviation of 43.16. Essentially, the data from the sample is more dispersed from the mean, and in upstream the average is 12.659 with a standard deviation of 10. As a result, we can say that the managers from the companies in the sample using full circular economy know how to invest the shareholder's money to obtain incomes.

Table 5: Statistic summary of the ratios that have not a significant difference

Ratio	Measures	Circular Economy model	
		Full circular	Upstream
ROE	Mean	20.575	12.659
	Standard deviation	43.16	10.56
ROCE	Mean	23.588	10.63
	Standard deviation	27.569	9.49
Net asset	Mean	5.167	1.851
	Standard deviation	5.71	1.396
EBITDA	Mean	8.262	14.425
	Standard deviation	6.87	11.64

Source: own elaboration

The mean of the Return on Equity (ROCE) in a full circular model is 23.58, and the Upstream is 10.63. As far as we are concerned, full circular companies make better use of the shareholders' investment capital. Besides, we must consider that the standard deviation is higher so, on full circulars companies the average ROCE will variate between each other (Full circular 27.588 - Upstream 9.49).

Full circular companies have an average net asset ratio of 5.157 and standard deviation of 5,71. However, upstream companies have a 1.851 mean with a standard deviation of 1,396. This ratio represents the price of potential investment opportunities, because of this, we can say that there is a higher price in full circular economy.

The EBITDA shows the cash profit that a business's make in an industry, that's why in upstream companies have more cash profit, the mean is 14.425 with a standard deviation of 11.64 and in circular economy the mean is 8.262 with a standard deviation of 6,87.

In fact, the type of circular model a company used does not demonstrate a significant difference in the profitability ratios of the sample analyzed. The same effect happens with the Net asset ratio (asset turnover) despite the fact that the circular economy model applied does not demonstrate a significant difference in the efficiency of a company to generate revenue or sales.

In addition, we found that there were significant differences between the circular economy model that the company applied in terms of the mean of three financial ratios analyzed (see table 6): firm size, ROA and liquidity. These two last ratios are used as a common indicator for financial performance and CSR studies according to (Vuță et al., 2019).

Table 6: Statistic summary of financial ratios that are significant difference

Ratio	Measures	Circular Economy model	
		Full circular	Upstream
Firm size	Mean	6.573	7.542
	Standard deviation	0.5816	0.5386
ROA	Mean	9.625	5.441
	Standard deviation	13.65	6.424
Liquidity	Mean	0.834	1.458
	Standard deviation	0.363	0.522

Source: own elaboration

The firm size is a relevant ratio because it shows the possible existence of scale economies and this is inherent in environmentally oriented investment (Elsayed & Paton,

2005). According to Keskin et al., (2020), companies with larger size are more potential to adopt sustainable activities. It is also considered a critical variable likely the level of corporate financial performance (Quazi & Richardson, 2012). There is a difference between the company size means the applied circular economy model, full circular companies have a mean of 6.573 with a standard deviation of 0.5816. In the other hand, upstream companies have a 7.542 average. In contrast from our results, the (Urbinati et al., 2017) study concludes that the size of the company does not affect the type of circular economy applied by the company.

The return on assets (ROA) is a ratio that represents the use of the company assets to generate income, the limitation of this ratio is that this variates according of the industry of the company (Keskin et al., 2020). For this reason, we can say that there is a difference between the mean ROA and the circular economy model that the company uses. This could have happened because the ROA is a variable that is affected by the type of industry that is analyzing an in our sample there exists different kinds of industries. Moreover, according to Ay, Keskin, & Akilli, (2019), Miroshnychenko et al., (2017) and Nelling & Webb, (2009), this ratio is not a significant determinant of financial performance in CSR. This ratio has 9.625 mean in full circular model with a standard deviation of 13.65 and in upstream a mean of 5.44 of ROA with a standard deviation of 6.424. In addition, the Urbinati et al.,(2017) research tell us the company has to invest a big amount of money in the asset in order to create a product, minimizing the waste and energy consumption. For this reason, the mean of a full circular economy model is higher than the mean of an upstream model.

When we calculate the one-way ANOVA for liquidity, there is a significant difference between means and the model chosen of circular economy. The ability that the company has to pay their short and long terms is almost the same, in the sample we obtain a mean of 0.834 in a full circular company with a standard deviation of 0.363 and in Upstream a mean of 1.458 with a standard deviation of 0.522.

5. Conclusions

The aim of this project is to analyze the relationship between circular economy models and financial performance. After performing a quantitative methodology analyzing 15 companies awarded for their implementation of circular economy models, the following conclusions could be extracted.

First, the lack of empirical studies analyzing this relationship has made necessary the creation if a variable representing the different types of circular economy models, based

on the classification presented by Urbinati et al., (2017): Downstream, Upstream and Full circular. This proxy variable has allowed us to compare and test each financial performance variables across the three groups of circular economy model.

Second, the results obtained by testing one-way ANOVA, show that there is a difference in the means of some of the financial ratios. Specifically, those ratios that are more link to financial performance like ROE, ROCE and EBITDA have not a significant difference in means between the circular business models analyzed. However, for the sample analyzed, we found that there is a significant difference in means for the ratios firm size, ROA and liquidity. Thus, although we cannot state that there is a significant financial impact regarding the implementation of circular economy, as the majority of the existing literature supports (see e.g., Govindan et al., 2020; Jan et al., 2019; Margolis et al, 2007), there is a difference in the mean of financial ratios depending on the type of circular economy models applied.

The main contribution of this study is the attempt to analyze empirically the relationship as, according to Lahti et al., (2018), there is a lack of empirical studies on this topic. In addition, the fact that specific models have been analyzed and not only considering circular economy in general is giving value to the study as well as the creation of the proxy variable.

The managerial implications of the results obtained are related to the type of circular economy model. As can be observed in this study, there are differences depending on the type of model implemented and thus, companies will need to decide how they want to implement the practice and the expected benefits. It could also help decision-makers to promote a certain type of implementation of these practices.

The main limitation found at the moment of making the empirical analysis was the lack of the financial information of the companies, not all the companies were in our databases, and the ones that were in, did not have all the ratios or not for the analyzed years and thus, our sample of 42 companies was reduced to 15 companies. Another limitation that we found is that there is not an index that help us to recognize and measure the circular economy in contrast to others sustainability practices like CSR.

For future research it will be interesting to analyze deeper the impact of the circular economy. We can do this by comparing the financial influence that the companies have considering the difference industries or by focusing only on the marketing and research development investment that according to the literature review are two aspects that companies invest the most. Also, it will be interesting to create an index of circular economy practices and contribute to more empirical studies in this area.

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