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Does the adoption of circular economy principles impact the value proposition and performance of companies? Effects on the origin and sector of activity of the companies

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Abstract: The alarming environmental reality of the planet demands the adoption of practices related to the circular economy principles. In the business world, more studies are needed to investigate the application of circular economy principles to stimulate companies to invest in innovative practices that can open new opportunities to enhance their competitive advantage. This study shows that implementing the circular economy principles can enhance the value proposition of the company to its customers and, therefore, generate financial and operational benefits for companies. The study also reveals differences related to the origin of the companies (domestic vs. foreign) and the sector of activity (industry vs. services) in adopting the circular economy principles. This research adds to the body of knowledge about the introduction of circular economy principles to the performance of companies.

Keywords: circular economy; value proposition; business performance; Portuguese and foreign companies; sustainability; manufacturing; services; structural equation modelling.

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1 Introduction

The current economy generally offers business models focused on low-cost and mass production based on linear economy principles (e.g., everything produced has end-of-life) (Moraga et al., 2019). However, this model negatively affects the planet and needs urgent measures to transform the current model into a more conscious and sustainable model (Nart and Öztürk, 2021).

The circular economy emerges as an alternative to the linear economy (Kalmykova et al., 2018) to generate more sustainable value for companies and society (Ranta et al., 2020). Thus, in practice, a model based on a linear logic of 'take, make, dispose' (Sihvonen and Ritola, 2015) should be abandoned and adopted a circular model based on the logic of 'reduce, reuse and recycle' (3Rs) (Ghisellini et al., 2016; Nuñez-Cacho et al., 2018; Sihvonen and Ritola, 2015). In fact, the efficient management of resources today can lead to huge savings in the future (Amicarelli et al., 2021; Bolton, 2019), including social organisations (Bernardino and Santos, 2019).

However, circular economy practices are not applied among SMEs, as would be desirable (Mura et al., 2020; Silva et al., 2019), mainly due to the diffuse perception about the sustainability of the model and the perception of higher costs for companies (Mura et al., 2020). In fact, leveraging circular models requires creating desirable and affordable proposals that appeal to consumers (Calvo-Porral and Lévy-Mangin, 2020). Also, sustainability can be considered an alternative form of differentiation, in products, companies or even countries, playing a significant role in value creation (Settembre-Blundo et al., 2019). Many companies that implement circular economy practices see them as business opportunities (Mura et al., 2020) and a source of competitive advantage (Settembre-Blundo et al., 2019).

Consequently, more studies are needed to investigate the practices applied by companies that create new business propositions based on circular economy principles and their impact on companies' performance (Ferasso et al., 2020). Thus, this research aims to add empirical evidence that supports the implementation of the circular economy principles in a company.

The structure of this paper is as follows. The next session reviews the literature and the consequent formulation of hypotheses. Then, the methodology used is described and

the results are presented. Finally, the discussion and implications, limitations, and future studies are outlined.

2 Theoretical framework and formulation of hypotheses

2.1 The impact of the circular economy principles on the value proposition

The implementation of the circular economy principles requires a broad transformation of the company's strategy, from a profit-oriented approach to a culture of sustainability (Rodrigo-González et al., 2021). Furthermore, implementing the principles of the circular economy will need different ways of plan, design, and innovate to create new products and regenerate processes and practices (Bolton, 2019).

In a circular economy context, for a company to be ahead of its competitors depends on how it creates value with its business model (Ünal et al., 2019). Manninen et al. (2018) highlight the importance of companies incorporating the principles of circularity in their value propositions along the value chains. Carro-Suárez et al. (2021) indicate a significant correlation between innovation and sustainable development, which is the base of value creation.

A value proposition consists of the company's set of values that it seeks to transmit to its customers. From a marketing perspective, the value proposition aims to highlight the company's product or service as more attractive than those offered by competing companies (Pokorná et al., 2015). O'Cass and Sok (2013) argue that the value proposition can be reflected in different components, namely the quality of the product/service, service support for customers, delivery, suppliers' know-how, time to market, personal interaction and superior customer relationship management. Therefore, value propositions must be oriented toward customers that are increasingly considering environmental, ecological and social factors in their buying criteria (Ranta et al., 2020). Companies can also extend the applicability of circular economy to various products and processes, expanding their business horizons, through, for example, external partners (Dias et al., 2019; Maranesi and De Giovanni, 2020). The circular model could be a source of competitive advantage for companies if they can create differentiated value propositions to surpass the competition and attract more customers (Calvo-Porral and Lévy-Mangin, 2020; Settembre-Blundo et al., 2019). So, the following hypothesis is formulated:

H1: Implementing the Circular Economy Principles has positive and significant effects on the Company's Value Proposition

2.2 The impact of the value proposition on the performance

The "core component of the circular business model is the value proposition" (Lewandowski, 2016, p.16). The creation of a value proposition derives from transforming an idea/concept into tangible results (product prototype, landing page, etc.) (Harrington and Trusko, 2014). The value proposition is represented as the essence of the strategy and very important for business performance (Payne and Frow, 2014). Business performance is the company's ability to create value for its customers (Taouab and Issor, 2019). Also, "business performance or firm performance" could be viewed as a "subset of organisational effectiveness that covers both operational and financial outcomes"

(Al-Matari et al., 2014, p.92). For instance, sales, profit, return on investment, customer satisfaction and retention, and overall satisfaction (Charoensukmongkol and Sasatanun, 2017).

On the one hand, marketers will face the question of how to create and develop sustainable value propositions, while customers will face the question of how to evaluate the various value propositions (Patala et al., 2016). So, in an intensely competitive environment in which companies operate today, value creation based on an outside company approach can be more successful (Payne et al., 2020), as the customer experience is something individual (Taylor et al., 2020). From a practical perspective, involving the customer in value creation, simultaneously as an addressee and contributor, combines value in terms of profitability with value in terms of sustainability (Brozović et al., 2020).

So, based on the previous argument, the following hypothesis is formulated:

H2. The inclusion of circular economy principles in the Company's Value Proposition has positive and significant effects on its Business Performance.

2.3 The mediating role of the value proposition

Based on the causal relationships defined above, it is considered relevant to evaluate the value proposition as a mediating variable between the implementation of the circular economy principles and the company's performance. Preacher and Hayes (2008) explain that a mediating variable is a way in which an independent variable impacts a dependent variable. In this case, the circular economy (independent variable) uses the value proposition (mediating variable) to influence the business performance (dependent variable).

Therefore, this study allows us to formulate the third and last hypothesis:

H3. The Company's Value Proposition has a mediating role between the Implementation of the Circular Economy Principles and the Business Performance

3 Methods

3.1 Sample and data collection

The sample includes companies from various sectors, sizes and countries (although 48.5% are Portuguese). The sample is a convenience sample, collected from Portuguese and foreign business associations. The questionnaire link was sent by email, between 1 March – 8 April, 2021, addressed to production and sales directors, and executives. The email contained an explanatory text about the research, a link for respondents answer the questionnaire and the estimated time response.

At the end of the fieldwork, 204 companies sent responses. Of these responses, 4 were excluded from the sample because they were incomplete. Thus, the final sample compiled 200 responses for statistical analysis.

3.2 Measurements and statistical procedures

The questionnaire survey is based on the literature review. This study uses existing scales validated from previous studies on Likert-type scales with response options ranging from 1 to 5 (where 1 is strongly disagree and 5 is strongly agree).

The questionnaire was designed according to previous studies and the suggestions of Hair et al. (2014). To assess the construct Implementation of the Circular Economy, the study adopts a scale of 6 items proposed by Nuñez-Cacho et al. (2018). The scale of the company's value proposition was adapted from the proposal by O'Cass and Sok (2013) and includes 7 items corresponding to each element of the value proposition (product/service quality, service support, delivery, supplier know-how, time to market, personal interaction and relationship building). Finally, the Business Performance scale was developed based on Charoensukmongkol and Sasatanun (2017) proposal, which comprises 8 items. Table 1 presents the items used.

Table 1 Measurement model

Constructs	*Items*	*Mean*	*Standard deviation*	*Factor loadings*	*Total Explained Variance*	*KMO*	*Cronbach's Alpha*
	Adapted from Nuñez-Cacho et al. (2018).						
Implementation of the circular economy	Our company design according to Circular economy principles	3.15	1.335	0.728	64.95%	0.841	0.963
	There is an environmental awareness in our company	3.59	0.834	0.587			
	Our company take into account environmental issues	4.29	0.922	0.697			
	Our company dispone of a board indicator for management of materials	3.81	1.394	0.782			
	Our company aims the transformation to Circular economy model	3.79	1.480	0.780			
	Our company use technological systems that help to plan, design, build and manage resources more efficiently	3.73	1.362	0.773			
	Our company design according to Circular economy principles	3.15	1.335	0.728			

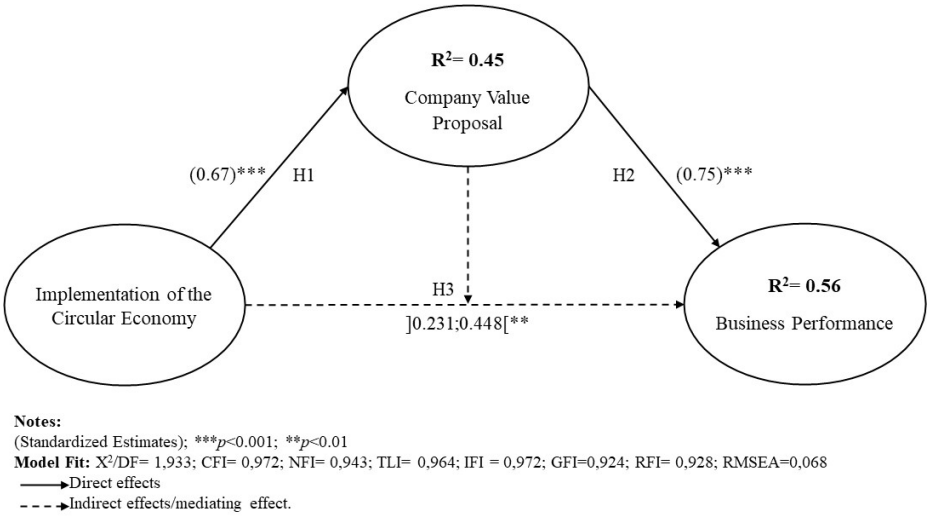
Table 1 Measurement model (continued)

Constructs	*Items*	*Mean*	*Standard deviation*	*Factor loadings*	*Total Explained Variance*	*KMO*	*Cronbach's Alpha*
	Adapted from O'Cass and Sok (*2013*)						
Company value proposal/offer	We provide our customers with better product/service quality	4.55	0.714	0.738	71.64%	0.971	0.890
	We provide our customers with better services	4.06	1.062	0.649			
	We perform better in meeting our customer's delivery date (schedule)	4.19	0.903	0.751			
	We provide our customers with better access to product/ services	4.31	0.887	0.714			
	We are better at helping our customers improve their time to achieve their product/service requirements	4.27	0.871	0.790			
	We have a better relationship with our customers	4.50	0.723	0.813			
	We provide our customers more benefits in our relationship	4.47	0.832	0.796			
	Adapted from Charoensukmongkol and Sasatanun (2017)						
Business performance	Sales volume	3.71	0.861	0.857	77.77%	0.865	0.928
	Sales growth	3.69	0.985	0.803			
	Profit	3.65	0.907	0.854			
	Profit growth	3.67	0.979	0.834			
	Return on investment	3.66	0.938	0.873			
	Customer satisfaction	4.26	0.833	***0.454****			
	Customer long-term retention	3.78	0.828	0.604			
	Overall satisfaction with business performance	3.71	0.861	0.865			

Varimax rotation method of Kaiser normalisation; Sample adequacy measure – Kasier-Meyer-Olkin (KMO) = 0.920; Significant Bartlett's Test: 0.000; Total Explained Variance: 73.97%; All Factor Loadings are significant $p < 0.001$. *Deleted Item.

Regarding the statistical treatment of data, the study used the Structural Equation Modelling (SEM), which is an adequate methodology to statistically test a conceptual model (Schumacker and Lomax, 2016). In other words, SEM is a set of statistical techniques used to measure and examine the causal and multivariable relationships between observed and latent variables. Departing from a hypothetical model, the relationships shown in Figure 1 were estimated to test the research hypotheses. The software used in the statistical analysis and estimation process was the SPSS 26.0 and the AMOS 22.0 versions, which are adequate for applying the SEM. This software estimates the causal relationships between the constructs, while accounting for measurement error (Byrne, 2016).

Figure 1 Structural model



Notes:
(Standardized Estimates); ***p<0.001; **p<0.01
Model Fit: X^2/DF= 1,933; CFI= 0,972; NFI= 0,943; TLI= 0,964; IFI = 0,972; GFI=0,924; RFI= 0,928; RMSEA=0,068
——▶Direct effects
- - - ▶Indirect effects/mediating effect.

4 Results

4.1 Sample characteristics

The sample consisted of 200 responding companies, of which 60% are industries/producers and 40% are services/others. In relation to turnover, 57.5% sell less than €5 million and 42.5% sell €5 million or more per year. Regarding the age of the companies, 38% are under 10 years old, 49.5% are between 10–50 years old, and 12.5% are over 50 years old. About the export volume, 26% had no exports, 32% export up to 50% of their turnover and 42% export more than 50% of their turnover. Finally, 48.5% of the responding companies are Portuguese, and 51.5% are foreign.

4.2 Evaluation of measurement model

Table 1 reveals that the measurement model respects all the general requirements to validate the model. First, KMO values ≥0.70 are considered adequate (Watkins, 2018). In relation to the total explained variance, the constructs present values > 60%, considered adequate values (Izquierdo et al., 2014; Watkins, 2018). Second, the factor loadings are

generally high (>0.60), except for the 'Customer satisfaction' item which is less than 0.50 and thus it was deleted from the final analysis (Watkins, 2018). Third, as shown in Table 1, Cronbach's Alpha values are superior to 0.8, indicating high reliability of the constructs (Hair et al., 2014).

Regarding the analysis of convergent and discriminant validity, the commonly used indicators are: composite reliability (CR), average variance extracted (AVE), maximum shared variance (MSV) and average shared variance (ASV) (Fornell and Larcker, 1981).

According to Fornell and Larcker (1981), for adequate discriminant validity, the recommended values are MSV < AVE and ASV < AVE and the square root of AVE must be greater than the correlation between constructs. Regarding the convergent validity test, the AVE must be > 0.5 and the CR > 0.70.

Therefore, the results in Table 2 respect the authors' recommendations (Fornell and Larcker, 1981) revealing an adequate convergent and discriminant validity of the constructs.

Table 2 Convergent and discriminant validity of the constructs

Constructs	*CR*	*AVE*	*MSV*	*ASV*	*1*	*2*	*3*
1 – Business performance	0.927	0.808	0.530	0.486	***0.899***		
2 – Implementation of the circular economy	0.854	0.606	0.442	0.432	0.665	***0.778***	
3 – Company value proposal/offer	0.901	0.647	0.530	0.476	0.728	0.649	***0.804***

Composite reliability (CR); average variance extracted (AVE); maximum shared variance (MSV); average shared variance (ASV). Diagonal elements (*bold* and *italic*) represent the square root of average variance extracted (AVE).

4.3 Evaluation of structural model

The most used indicators to examine the validity of the model are X^2/DF (X^2 – chi-square; DF – degrees of freedom), CFI – comparative fit index, NFI – normed-fit index, TLI – Tucker Lewis Index, IFI – incremental fit index, GFI – goodness of fit index, RFI – Relative fit index and RMSEA – root mean square error of approximation. A model is considered well-fit when the indicator values meet predetermined criteria (X^2/DF = 1.00–5.00; CFI > 0.90; NFI > 0.90; TLI > 0.90; IFI > 0. 90; GFI > 0.90; RFI > 0.90; RMSEA < 0.08) (Hair et al., 2014).

Therefore, based on the maximum likelihood algorithm, the results obtained were: X^2/DF = 1.933; CFI = 0.972; NFI = 0.943; TLI = 0.964; IFI = 0.972; GFI = 0.924; RFI = 0.928; RMSEA = 0.068. These results confirm a good fit of the structural model to the data (Hair et al., 2014). Furthermore, the R^2 values (which reveal the weight of one variable over another) obtained in this study (R^2 = 0.45; R^2 = 0.56) are also robust values (Hair et al., 2014).

Finally, the analysis of trajectories or paths enables the analysis of the statistical significance of the causal relationship between the variables (Marôco, 2014). Therefore, based on the results obtained, the Implementation of the Circular Economy has a positive and significant effect on the Company's Value Proposition (β = 0.353; p < 0.001), so H1 is supported. It is also verified that the Company's Value Proposition has a positive and significant effect on Business Performance (β = 0.972; p < 0.001), consequently, H2 is also supported. Figure 1 shows the structural model, as well as the values obtained.

4.4 Test for mediation

To assess the mediating role of the value proposition the non-parametric bootstrap method was used (Marôco, 2014). The results of indirect effects between "Implementation of the Circular Economy" and 'Business Performance' within a 95% confidence interval are within the limits of]0.231; 0.448[, so H3 is also supported.

4.5 t-test for comparative analysis between Portuguese and foreign companies

In their study, Santos et al. (2019) revealed that Portugal still needs improvements in environmental sustainability indicators. On the other hand, Ly and Tan (2021) show that foreign companies tend to follow circular economy principles to become more competitive in international markets. In this sense, it is interesting to evaluate whether there are significant differences between Portuguese and foreign companies, regarding the implementation of the circular economy practices. Thus, the t-test of independent samples was used. This test allows comparing two groups based on the mean value of the responses of a continuous variable (Gauthier and Hawley, 2015). In this case, the t-test will be applied based on the origin of the responding companies (Portuguese vs. foreign) on the six variables observed in the "Implementation of the Circular Economy".

As can be seen in Table 3, the null hypothesis that population means are equal is rejected in four variables of the circular economy: "Our company take into account environmental issues" t (198) = –3.158, p = 0.002, "Our company dispose of a board indicator for management of materials" t (198) = –3.613, p = 0.000 and "Our company aims the transformation to Circular economy model" t (198) = –2.038, p = 0.043. Finally, about "there is an environmental awareness in our company" the difference is significant only at 90% significance t (198) = –1.918, p = 0.057.

Table 3 Independent samples *t* test (Portuguese vs. Foreign)

Items	*t-value*	*DF*	*p-value*
Our company design according to circular economy principles	–0.642	198	0.522
There is an environmental awareness in our company	***–1.918***	***198***	***0.057****
Our company take into account environmental issues	***–3.158***	***198***	***0.002*****
Our company dispone of a board indicator for management of materials	***–3.613***	***198***	***0.000*****
Our company aims the transformation to Circular economy model	***–2.038***	***198***	***0.043****
Our company use technological systems that help to plan, design, build and manage resources more efficiently	–0.395	198	0.693

**Sig. 90%*; ***Sig. 95%*; Sig. 99%.

Bold and italicised values emphasise their significance.

It should be noted that a negative t-value indicates a reversal in the effect's directionality (Gauthier and Hawley, 2015).

The results suggest that Portuguese companies are partly less active or dynamic than international companies regarding the implementation of the circular economy practices. Specifically, statistically significant differences were found in the consideration of

environmental issues, the implementation of an indicator framework for materials management and the change to a circular economy model.

In conclusion, as Santos et al. (2019) pointed out about wine, Portuguese companies need to improve their performance regarding the "implementation of the circular economy". On the contrary, foreign companies seem to follow the circular economy principles in order to gain competitive advantages in international markets (Ly and Tan, 2021).

Therefore, the origin of the company seems to be mediated by the adoption of the circular economy principles.

4.6 t-test for comparative analysis between industry and services

The circular economy is studied by researchers in different sectors, including manufacturing and services (Ferasso et al., 2020).

Circular Economy is a strategic concept based on the 3Rs principles (reduce, reuse and recycle) of materials and energy. Most of the actions have been taken by companies, such as cleaner production or more sustainable industrial processes (Prieto-Sandoval et al., 2018). Other strategies are essentially based on circular design, material and energy efficiency, and disassembly and integration (Acerbi and Taisch, 2020). Inversely, the opportunities of the circular economy for the service sector are relatively limited (Upadhyay et al., 2019). However, there is potential for service-oriented companies to offer services that can contribute to circularity in other companies (Heyes et al., 2018). In fact, service innovation based on the circularity principles increases customer satisfaction which is relevant and applicable in the service context (Upadhyay et al., 2019). Service companies can also be considered sustainable when they focus on continuously improving society's social, environmental or cultural conditions (Swanson and Bruni-Bossio, 2021).

In addition, the literature advocates offering services instead of products as a form of increasing circular economy (Barros et al., 2021). For instance, digital platforms can be a source of circularity (Schwanholz and Leipold, 2020).

In general, more research is needed to clarify the role of the activity sector (industry vs. services) in implementing the circular economy principles (Heyes et al., 2018).

Therefore, based on the previous discussion, a comparative examination based on the sector of activity will be undertaken.

The results in Table 4 highlight the difference between industry and services. Specifically, all the variables "Our company design according to Circular economy principles" t (198) = 3.512, p = 0.001; "Our company take into account environmental issues" t (198) = 2.245, p = 0.026; "Our company dispose of a board indicator for management of materials" t (198) = 7.457, p = 0.000; "Our company aims the transformation to Circular economy model" t (198) = 3.702, p = 0.000; and "Our company use technological systems that help to plan, design, build and manage resources more efficiently" t (198) = 1.952, p = 0.052; "There is an environmental awareness in our company" t (198) = 5.231, p = 0.000 are statistically significant.

As expected, it seems that the industry sector is more active in implementing the circular economy principles than the service sector. These results corroborate the idea that the idiosyncrasies of the industry sector fit well into the principles of the circular economy (Prieto-Sandoval et al., 2018). On the contrary, the adoption of the circular

economy principles on the service sector seems to be more limited as suggested by Upadhyay et al. (2019).

Table 4 Independent samples *t* test (Industries/Producers vs. Services/Others)

Items	*t-value*	*DF*	*p-value*
Our company design according to circular economy principles	***3.512***	***198***	***0.001******
There is an environmental awareness in our company	***1.952***	***198***	***0.052****
Our company take into account environmental issues	***2.245***	***198***	***0.026****
Our company dispone of a board indicator for management of materials	***7.457***	***198***	***0.000******
Our company aims the transformation to Circular economy model	***3.702***	***198***	***0.000******
Our company use technological systems that help to plan, design, build and manage resources more efficiently	***5.231***	***198***	***0.000******

**Sig. 90%*; ***Sig. 95%*; Sig. 99%.

Bold and italicised values emphasise their significance.

5 Discussion

The present investigation aimed to test and validate a conceptual model that adds knowledge about how companies can profit from the new opportunities provided by the implementation of the circular economy principles.

The results reveal that Circular Economy positively influences the Value Proposition (H1). The Value Proposition positively influences Business Performance (H2). Finally, the Value Proposition plays a mediating role between the implementation of the Circular Economy and Business Performance (H3). These results suggest that the implementation of practices of circular economy in the company impacts enhances the value proposition in the eyes of the customers leading to an increase in the business performance of the company.

The most relevant theoretical contribution of the present study is the conceptual framework, as it provides a better understanding of the circular economy principles, combining them with the customer-focused value proposition and business performance. In the context of circular economy practices, previous studies highlight environmental based value propositions (Lewandowski, 2016; Maranesi and Giovanni, 2020; Manninen et al., 2018). However, the results show that the value proposition does not necessarily have to be environmental. In other words, this research reveals that the value proposition can be focused on customers' interests while incorporating circular economy principles. So, the value proposition can be developed in different dimensions, namely product/service quality, service support, delivery, supplier know-how, time to market, personal interaction and relationship building (O'Cass and Sok, 2013), with financial and operational benefits for the company (Al-Matari et al., 2014). The analyses of t-test differences, indicate that Portuguese companies are generally less active than foreign companies in applying circular economy principles, mainly in the consideration of environmental issues, application of indicators for management of materials, and goals

regarding circular economy model. This result recalls the study by Lewandowski (2016), when he mentions two conditions in the transition to the circular economy – the political and business conditions. From the political point of view, the implementation of circular economy practices in Portuguese companies needs to be reinforced by designing appropriate policies and incentives for companies. From a company point of view, the differences detected between Portuguese and foreign companies bring to the discussion the lack of competitiveness of Portuguese companies. Implementing the principles of the circular economy could be an opportunity for increasing the competitiveness of Portuguese companies as it is increasingly emerging as a credible source of competitive advantage (Settembre -Blundo et al., 2019).

Another theoretical contribution of the study is related to the discussion about adopting circular economy principles by industries and services. In fact, the adoption of circular economy principles in the service sector is relatively limited (Upadhyay et al., 2019). However, the validation of the conceptual model (including industrial and service companies) suggests the existence of opportunities for the implementation of some circular economy practices by the service sector. Currently, the circular economy principles are much more than reduce, reuse and recycle, as the whole value chain of sustainability must be addressed (Prieto-Sandoval et al., 2018). Thus, the service sector can adopt multiple circular strategies aimed at creating value, regardless the position of the service company in the value chain.

The practical contributions of this research are oriented toward implementing a culture of circularity, based on the hierarchy of the 3Rs: the principle to reduce, reuse and recycle products/materials (Nuñez-Cacho et al., 2018). This circularity culture can start with adopting sustainable behaviours within the company. For instance, companies can create and/or adopt efficient systems in the management of resources and circulation of materials (Amicarelli et al., 2021; Bolton, 2019; Ranta et al., 2020), specifically in the adoption of cleaner production processes, introduction of digital processes, improvement of energy efficiency, development of joint distribution/logistics systems, among other measures.

Since the value proposition is a core component in the circular economy context (Lewandowski, 2016), this research also reinforces the importance of the value proposition as critical to the performance of the companies. However, the study shows that value proposition must be also attractive and transparent to customers (Pokorná et al., 2015) and translated into positive business performance levels (Taouab and Issor, 2019). For instance, developing useful products and services for customers and designed for multiple life cycles, economically viable and ecologically efficient (product/service quality), more digitisation and reduce bureaucracy to customer (service support), sharing of logistic services with benefits for the customer (delivery), partnerships within the value chain based on circular economy practices (supplier know-how), streamline processes to customer (time to market), value co-creation (personal interaction and relationship building), among other practices.

It should also be noted that this study has concrete implications for Portuguese companies as they are relatively more lagging behind in the circular economy against foreign companies. This situation can affect the competitiveness of Portuguese companies, as the circular economy increasingly assumes a relevant role in defining competitive advantages (Settembre-Blundo et al., 2019). Consequently, it is essential that Portuguese companies adopt, as soon as possible, the principles of circular economy, otherwise they may lose even more international competitiveness.

Furthermore, this study has practical implications for managers and entrepreneurs. As the nature of business activities in the industrial and service sector differs significantly, the adoption of circularity principles is uneven (Upadhyay et al., 2019). This put several challenges and opportunities for industries in order to diversify the adoption of the principles of circular economy in the various activities that the manufacturing sector includes. Several actions could be taken such as the exploration of raw materials, new processing and transformation methods, development of new products or commercial activities. This diversity of actions becomes increasingly important for industry competition, especially in the international context.

The sector of services is relatively more limited in the introduction of circular practices. However, the challenges for this sector are growing as the development of new technologies can contribute to increasing sustainability and new concepts of ecology and sustainable tourism are being discussed.

Finally, this study also offers contributions to business associations and public entities supporting business development, because political and business conditions are important for the development of the circular economy (Lewandowski, 2016). So, it is important that these entities and business associations support companies in the circular economy processes. For instance, elaboration of diagnoses, investment projects, action plan about circular economy, legislative measures to encourage the circular economy, among others.

6 Conclusion

In conclusion, it is worth adopting the circular economy principles as a challenge for transforming businesses. This approach could bring more benefits for the customer, and solutions for corporate and environmental sustainability. The present study reveals that introducing the circular economy principles in a company as an antecedent in the process of value proposition creation may lead to better business performance. In fact, circular economy promotes an economic model that encompasses more efficient management of resources. This model is characterised by a dynamic process that requires a match between the circularity principle and the business results, conducting to the development of new products and services that are more economically sustainable and ecologically efficient.

The main limitation of this investigation is the nature of the sample used. Future studies with random and higher sample numbers are recommended to increase the possibility of extrapolation of the results. However, in a preliminary study, the sample is considered sufficient for the analysis and the results could be considered significant and relevant for the purposes of the study. Furthermore, it is also suggested that future investigations explore different strategies to implement value propositions in the context of circular economy in different industries (food, furniture, metalworking, chemistry). These studies might be interesting as they could present a different operational approach in introducing the circular economy principles, considering the specific characteristics of each industry. Finally, the theoretical framework for understanding the impact of the circular economy principles on the value proposition and business performance could be replicated in other countries where different cultural mindsets may constrain the full implementation of the circular economy principles.

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