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Are small and medium enterprises defining their business models to reach a symbolic or substantive environmental legitimacy?

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Involvement of small and medium enterprises (SMEs) is critical to the decarbonization of economies; however, legitimacy theory, climate change strategies, and the business model (BM) literature have not addressed this issue in depth. This research analyses whether SMEs define their environmental BMs to achieve substantive legitimacy by reducing their carbon dioxide (CO₂) emissions. We analyze the relationships among environmental value proposition, creation, and capture using partial least-squares structural equation modeling with the data for 695 SMEs. The results show that SMEs' environmental value proposition takes into account symbolic and substantive environmental legitimacy. This broad definition of the value proposition drives SMEs to undertake environmental value creation initiatives, but these initiatives are not very effective in reducing CO₂ emissions. These results indicate that SMEs seek symbolic legitimacy more than substantive legitimacy, which has important implications for managers and policymakers who want SMEs to contribute to the transition to a low-carbon economy.

Keywords: SMEs; symbolic and substantive legitimacy; environmental business models; decarbonization; PLS

1. Introduction

There is a 50% chance of the annual average global temperature temporarily reaching 1.5°C above the pre-industrial level for at least one of the next five years (2022–2027); after this warming, climate impacts will become increasingly severe (WMO 2022). The Intergovernmental Panel on Climate Change of the United Nations considers that ‘the evidence is clear: the time for action is now’. Without immediate and deep emissions reductions across all sectors, limiting global warming to 1.5°C is out of reach (IPCC 2022). This transition to a low-carbon economy is a process that must involve governments, firms, and society (Schanes, Jäger, and Drummond 2019; Sampene *et al.* 2021).

Traditionally, large firms or those with more emissions have attracted greater attention than SMEs (Haque and Ntim 2020; Nguyen *et al.* 2021; Cadez and Czerny 2016; Damert, Paul, and Baumgartner 2017). However, SMEs must be involved in this challenge to decarbonize economies (Schanes, Jäger, and Drummond 2019) because they represent around 99% of companies and jointly contribute 60%–70% of industrial pollution in Europe (Koirala 2019). They are, therefore, critical for speeding up this

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process (Baranova and Conway 2017; Conway 2015). Moreover, SMEs need legitimacy to gain customers' acceptance of their small and unknown firms and products (Sahida and Rahmanb 2019). One way to gain this legitimacy is through environmental legitimacy; that is, when the companies' performance with respect to the natural environment is in accordance with the expectations of their stakeholders (Bansal and Clelland 2004). Analyzing how SMEs achieve this environmental legitimacy is relevant to learning whether SMEs are really contributing to the transition to a low-carbon economy. Nevertheless, neither the legitimacy literature nor the climate change strategy literature, nor the business model (BMs) literature has addressed this issue in depth.

The legitimacy literature has analyzed the strategic importance of legitimacy for SMEs (Sahida and Rahmanb 2019; Ivanova Ruffo *et al.* 2020), different ways to obtain legitimacy (Di Tullio *et al.* 2020) and environmental legitimacy (Bansal and Clelland 2004; Berrone, Fosfuri, and Gelabert 2017), and how SMEs incorporate the different forms of environmental legitimacy (symbolic and substantive) (Crossley, Elmagrhi, and Ntim 2021). However, we did not find works that study how SMEs' search for legitimacy influences their contribution to the decarbonization of the economy.

On the other hand, the climate change strategy literature has studied carbon reduction and climate change strategies (Hoffman 2007; Cadez and Czerny 2016; Wahyuni and Ratnatunga 2015), enablers of and barriers to such strategies (Backman, Verbeke, and Schulz 2017), and the consequences of decarbonization strategies (Damert, Paul, and Baumgartner 2017). However, these traditional visions appear to have had an insufficient and slow effect on the transition to low-carbon economies, which is why researchers see BMs as tools that will accelerate the decarbonization of economies (Markard, Geels, and Raven 2020; Mangelsdorf 2010). Among BMs, environmental or green business models (EBMs) stand out; these are models that offer products and development activity systems with environmental benefits, reduce resource use/waste, and are economically viable (Sommer 2012). These BMs achieve a lower environmental impact than traditional BMs (FORA 2010; Beltramello, Haie-Fayle, and Pilat 2013) through the definition of environmental value proposition, creation, and capture for their stakeholders (Méndez-León, Reyes-Carrillo, and Díaz-Pichardo 2022; Bocken, Boons, and Baldassarre 2019). Thus, SMEs can create and redesign their BMs to effect the necessary environmental change for the transition to a low-carbon economy (Baranova and Conway 2017).

Nevertheless, the BM literature has not delved into the level of integration of carbon management in SMEs' BMs (Renukappa *et al.* 2013). Some studies examine decarbonization and BMs, but they focus on the energy sector (Hannon, Foxon, and Gale 2013; Karneyeva and Wüstenhagen 2017). Other papers more generally on EBMs or circular BMs expand the scope of industries, but do not explicitly analyze decarbonization. Many papers are theoretical, and most of them empirically analyze large corporations (Ritala *et al.* 2018; Abuzeinab, Arif, and Qadri 2017). Consequently, research on SMEs is restricted to the study of a few cases and has a selection bias toward environmental proactivity (Rauter, Jonker, and Baumgartner 2017; Morioka *et al.* 2017). There is still much room to improve the understanding of SMEs' contribution to decarbonization. To our knowledge, only Quintás *et al.* (2018) have studied the composition of SMEs' BMs and their contribution to a low-carbon economy, but this study did not analyze the relationship between their components. Herein lies the core of our contribution.

This research combines the lens of SMEs' search for environmental legitimacy with the theoretical framework of the EBM. The papers that combine these two theories are scarce; most of them are case studies (Wu, Zhao, and Zhou 2019; Laïfi and Josserand 2016; Adiloğlu-Yalçınkaya and Besler 2021) and do not analyze the final contribution of the BMs to the decarbonization of the economies. The search for environmental legitimacy is an incentive for SMEs' owner-managers to define/redefine their BMs to include environmental issues (Hu, Zhang, and Yan 2020). Moreover, the way in which they want to achieve environmental legitimacy (substantive or symbolic) (Crossley, Elmagrhi, and Ntim 2021; Ashforth and Gibbs 1990) will influence the definition of EBMs and their effectiveness in reducing carbon dioxide (CO₂) emissions. This study answers the following questions using a database of 695 SMEs:

- How does the search for environmental legitimacy influence the environmental value proposition (symbolic or legal compliance and substantive or voluntary compliance)?
- Do SMEs with a greater environmental value proposition have greater environmental value creation? What type of environmental practices are implemented, substantive or symbolic?
- Finally, do SMEs with greater environmental value creation have greater environmental value capture (reductions in CO₂ emissions)?

The answer to these questions is a first step in improving SMEs' contribution to decarbonization of economies and facilitating the enhancement of the definition/redefinition of their EBMs and the design of environmental policies that are more suited to their needs.

In section 2, we analyze the literature on how BMs include environmental matters in their components and the relationships between them to gain legitimacy. Section 3 describes the variables and the methodology we used in our analysis. Section 4 presents the results of the SME-PLS analysis. Finally, in Sections 5 and 6, we discuss the results and the main conclusions, respectively.

2. Environmental legitimacy through SMEs' EBMs

Governments and other stakeholders are increasing their pressure on firms to reduce their CO₂ emissions (Weinhofer and Hoffmann 2010). Stakeholder and legitimacy theories explain how these pressures (external and internal) influence environmental management. Initially, the literature paid more attention to how large firms have responded to these pressures than to SMEs (Cadez and Czerny 2016; Haque and Ntim 2020), but this is changing (Cai *et al.* 2022) because SMEs globally have a significant environmental impact (Koirala 2019). SMEs are embedded in the local community (Ivanova Ruffo *et al.* 2020) and their relationships with stakeholders are close, so they seek to ensure that their practices fit in with the values and expectations of the local community (Kechiche and Soparnot 2012) to achieve environmental legitimacy (Bansal and Clelland 2004; Crossley, Elmagrhi, and Ntim 2021).

Legitimacy theory proposes that firms can gain legitimacy by adopting symbolic and/or substantive legitimacy strategies (Ashforth and Gibbs 1990). Symbolic environmental strategies seek to demonstrate organizational commitment to environmental practices, but implementation of such practices seeks to win the support of

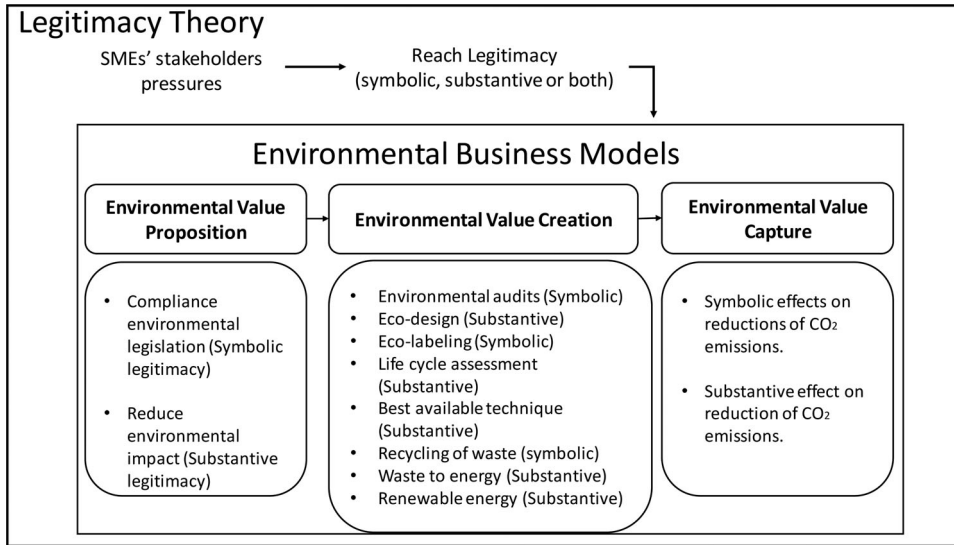


Figure 1. The influence of legitimacy theory in the definition of environmental business models.

stakeholders rather than to bring about meaningful change in an organization's environmental behavior. By contrast, substantive strategies seek to implement environmental practices that bring about real and fundamental changes in an organization's environmental behavior. It is most common for firms to have a mixture of symbolic and substantive management strategies (Crossley, Elmagrhi, and Ntim 2021; Berrone, Gelabert, and Fosfuri 2009).

However, integration of CO₂ emissions management is very low for all firms, particularly SMEs (Conway 2015; North 2016); this may mean that achieving substantive legitimacy is difficult for SMEs. Both institutional pressures (external barriers) and organizational characteristics (internal barriers) hinder SMEs from adopting environmental management practices. Internal organizational barriers, such as lack of resource availability, are the barriers most cited by studies (Dasanayaka *et al.* 2022). A lack of government support is one of the most important external barriers (Rizos *et al.* 2016).

In this context, BMs afford firms greater flexibility and competitive advantages (Bashir and Verma 2019) and are a good choice for incorporating environmental topics (Bocken *et al.* 2014) and gaining environmental legitimacy (Biloslavo *et al.* 2020; Hu, Zhang, and Yan 2020). BMs can be defined as activities and processes that companies develop (Ritala *et al.* 2018) to propose, create, and capture value for their stakeholders (Richardson 2008; Bocken *et al.* 2014; Casadesus Masanell and Richart 2010). BMs are the representations of a realized strategy (Zott, Amit, and Massa 2011; Casadesus Masanell and Richart 2010); that is, BMs can be instrumental in supporting strategy implementation (Cortimiglia, Ghezzi, and Frank 2016) and, therefore, in the implementation of legitimacy strategy. The paper studies how the symbolic and substantive environmental strategies defined by SMEs to achieve environmental legitimacy are translated into the design of the EBM (Figure 1).

The investigation centers on EBMs because they focus on environmental issues that are the most important topics for reducing CO₂ emissions and have a lower

environmental impact than traditional BMs (FORA 2010; Beltramello, Haie-Fayle, and Pilat 2013). Nevertheless, the current degree of integration of carbon management in BMs has not been investigated (Renukappa *et al.* 2013), especially in SMEs (Conway 2015).

2.1. Relationships among business model components

2.1.1. Environmental value proposition

An environmental value proposition should reflect the environmental needs of a firm's stakeholders (Stubbs and Cocklin 2008), including its managers. SMEs have a close relationship with their external stakeholders because they are more deeply embedded in their communities compared with big businesses (Besser 2012). SMEs act responsibly because their legitimacy with customers, suppliers, and their local community is at stake in a far more direct and personal way than it is for major corporations (Fuller and Tian 2006). With respect to internal stakeholders, SMEs are often managed by their owners (Seidel *et al.* 2009), who have more autonomy to manage their firms in line with their values, beliefs, and education (North and Nurse 2014; Seidel *et al.* 2009) and, in many cases, are more concerned about environmental topics than traditional papers suggested (Williams and Schaefer 2013; Revell, Stokes, and Chen 2009; Conway 2015). Therefore, the low carbon emission behavior of SMEs' owner-managers is affected by social factors, the values and beliefs of the owner-managers, and their expectations of results (Cai *et al.* 2022). Moreover, employees are among the stakeholders that have the most influence on SMEs' environmental policies (Nejati, Amran, and Ahmad 2014); in fact, employees constitute one of the most important assets of SMEs, the owners/managers often have very close contact with their employees (Fitjar 2011).

These aspects may influence the way that SME owners define their environmental value proposition when offering products, services, and processes. Different stakeholder pressures and their understanding will drive SMEs to seek different types of legitimacy (Berrone, Gelabert, and Fosfuri 2009; Hyatt and Berente 2017) and to define different environmental value propositions. Some SMEs will conform to sector regulations to gain symbolic legitimacy; others will adopt environmental strategies that enable them to reduce the environmental effect of their actions beyond legal exigencies to achieve substantive legitimacy (Parker, Redmond, and Simpson 2009); and some will combine both symbolic and substantive actions to attain environmental legitimacy (Crossley, Elmagrhi, and Ntim 2021; Berrone, Gelabert, and Fosfuri 2009).

2.1.2. Environmental value creation

The creation of value is the core of any BM (Bocken *et al.* 2014), and the value creation must consider the proposition and capture of value. The value proposition must reduce the company's environmental effects to achieve environmental legitimacy. Therefore, the creation of environmental value should use resources, activities, and processes that reduce environmental effects through decarbonization of their processes and products. Accordingly, implementation of environmental practices helps firms to gain environmental legitimacy (Berrone, Fosfuri, and Gelabert 2017).

We have identified eight voluntary practices that SMEs can adopt to implement their environmental value proposition (Quintás, Martínez-Senra, and Sartal 2018) and

Table 1. Value creation: voluntary practices used by SMEs.

Energy and environmental audits (symbolic)	Johnson and Schaltegger 2016; Johnson 2015; Kalantzis and Revoltella 2019; Fresner <i>et al.</i> 2017
Eco-design (substantive)	Lambrechts <i>et al.</i> 2019; Yang, Roh, and Kang 2020; Dey <i>et al.</i> 2020b; Namagembe, Ryan, and Sridharan 2019
Lifecycle assessment (substantive)	Mudgal <i>et al.</i> 2021; Johnson 2015; Moss, Lambert, and Rennie 2008; Testa <i>et al.</i> 2016; Daddi <i>et al.</i> 2016
Eco-labeling (symbolic)	Johnson 2015; Khan <i>et al.</i> 2019
Best available techniques (substantive)	Dijkmans 2000; Schollenberger, Treitz, and Geldermann 2008
Recycling and/or reuse of waste (symbolic)	Dey <i>et al.</i> 2018; Williams and Schaefer 2013; Revell, Stokes, and Chen 2009; Dey <i>et al.</i> 2020a
Waste to energy (substantive)	Conway 2015; Hussain, Mishra, and Vanacore 2020
Renewable energies (substantive)	Conway 2015; Williams and Schaefer 2013; Asante <i>et al.</i> 2021; Dey <i>et al.</i> 2020a; Rahbauer <i>et al.</i> 2018

gain legitimacy. Table 1 shows these practices and gives some examples of papers that study their utility and use in SMEs. However, not all the practices are very effective at reducing CO₂ emissions. Eco-labels, environmental audits and waste recycling can be considered symbolic practices. Eco-labels have mainly marketing impacts that affect consumers' purchase behaviors (Song, Qin, and Qin 2020). Environmental audits can enable improvements in processes and environmental impacts (Johnstone and Hallberg 2020), but many investigations have confirmed that most firms use them in a symbolic way without achieving a significant reduction in their environmental impacts (Heras-Saizarbitoria *et al.* 2020; Testa, Iraldo, and Daddi 2018; Vélchez 2017). Waste recycling is the most common practice for sustainable end-of-life management; it creates economic value and requires less infrastructure than other practices such as remanufacturing (Dey *et al.* 2020a). However, its implementation is not very effective environmentally, especially in SMEs (Dey *et al.* 2018). The implementation of the remaining practices (best available techniques, waste to energy, eco-design, lifecycle assessment (LCA) and renewable energies) yields significant reductions in firms' environmental impact (Zailani *et al.* 2012; Berrone, Gelabert, and Fosfuri 2009; Bianchi *et al.* 2022); therefore, they are considered substantive environmental practices.

In the selection and implementation of these environmental practices in SMEs, internal factors such as personal values, attitudes, and intentions and external factors derived from various stakeholders and institutional pressures are very important (Yacob, Wong, and Khor 2019). Their selection and implementation is controlled, ultimately, by the environmental value proposition. Consequently, SMEs with a value proposition more committed to the environment will create more environmental value by implementing more environmental practices, and the kind of legitimacy sought (substantive or symbolic) will influence the types of environmental practices implemented.

We suggest the following hypotheses:

H₁: The environmental value proposition has a positive effect on environmental value creation.

H_{1a}: If the SMEs' owner-managers design their BMs to achieve substantive environmental legitimacy, the environmental value proposition will have a strong positive effect on environmental value creation, and this component will be shaped by substantive environmental practices (LCA, eco-design, best available techniques, waste to energy, and/or renewable energies).

H_{1b}: If the SMEs' owner-managers design their BMs to achieve symbolic environmental legitimacy, the environmental value proposition can have a strong positive effect on environmental value creation, but this component will be shaped by symbolic environmental practices (eco-labels, environmental audits, and/or recycling).

2.1.3. Environmental value capture

Value proposition and creation do not secure a BM's success if the company does not capture value (Richardson 2008) or appropriate value (Ghezzi, Cortimiglia, and Frank 2015; Sorescu *et al.* 2011). Traditionally, value capture has been measured using the elements of cost and revenue structure (Teece 2010; Osterwalder, Pigneur, and Tucci 2005), but some researchers affirm that a BM should go beyond purely commercial value logics (Laasch 2018; Ocasio and Radoynovska 2016; Randles and Laasch 2016). An example is the environmental BM literature that measures value capture by means of other forms of non-monetary value capture (Morioka *et al.* 2017; Bocken *et al.* 2014) and includes environmental and social value in their value capture (Yang *et al.* 2017).

The search for environmental legitimacy has a positive effect on environmental performance (Baah, Agyabeng-Mensah *et al.* 2021) through the implantation of environmental practices (Baah, Opoku-Agyeman *et al.* 2021). Conventional literature considers that environmental practices contribute to the reduction of CO₂ emissions (Johnson and Schaltegger 2016), and much research analyses the barriers and facilitators for the adoption of these practices on the assumption that they reduce emissions or energy consumption (Revell, Stokes, and Chen 2009). Nevertheless, studies that quantify these aspects are scarce, and some of them find weak evidence that the implemented environmental initiatives usually reduce CO₂ emissions (Doda *et al.* 2016). Moreover, the type and the means of implementation of environmental practices (symbolic or substantive) will have greater or lesser effects on environmental performance.

The SMEs that create environmental value to achieve substantive legitimacy meet or exceed basic compliance with laws and regulations, offer transparency concerning their activities, and are a reference in their industry with respect to environmental issues (Hyatt and Berente 2017; Bowen *et al.* 2009). Furthermore, substantive environmental strategies can bring about sustained change in an organization, which leads to better environmental performance (Hyatt and Berente 2017; Yin and Schmeidler 2009), especially if firms are internally motivated instead of merely responding to external pressures (Heras-Saizarbitoria, Arana, and Boiral 2016).

On the other hand, the organizations that create environmental value to achieve symbolic environmental strategies work to promote an appearance of a commitment to the natural environment and to gain legitimacy (Hyatt and Berente 2017). They often carry out impressive management practices aimed at implementing symbolic or ceremonial environmental practices (Bansal and Clelland 2004). Symbolic strategies might lead to substantive commitments, but they also might keep an organization from pursuing a more substantive strategy (Boiral 2007; Liston-Heyes and Vazquez Brust 2016; González-Benito and González-Benito 2006). In some cases, firms with a symbolic

strategy seek only to appear compliant even if they still fail to comply with institutional norms; that is, there may be a decoupling of their promises, policies, and commitments from their actions (Hyatt and Berente 2017).

Therefore, the creation of environmental value will, or will not, translate into a significant reduction in CO₂ emissions depending on the type of environmental legitimacy (substantive or symbolic) that the firm is seeking.

We postulate the following hypotheses:

H₂: Environmental value creation has a positive effect on environmental value capture.

H_{2a}: If SMEs' owner-managers design their BMs to achieve substantive environmental legitimacy, environmental value creation will have a strong positive effect on environmental value capture (CO₂ emissions).

H_{2b}: If SMEs' owner-managers design their BMs to achieve symbolic legitimacy, their environmental value creation will have a weak positive effect on environmental value capture (CO₂ emissions).

3. Data and methodology

3.1. Data collection

Our database compiles information from 695 SMEs in 2016. This information was provided by the GIS survey (CZFFV 2017) and is the latest data available to the authors from one of the most important surveys of innovation in the northwest of Spain. The GIS survey is an annual online questionnaire coordinated by the Galician Innovation Agency (GAIN).

To set the aptness of the sample size, we conducted a priori and post-hoc power analyses using the G*Power tool (Faul *et al.* 2009). We used G*Power version 3.1.9.2 to calculate with statistical power an R² deviation from zero to 99% (above the minimum statistical power of 80% suggested by Cohen [1988]) and eight predictors. The a priori analysis was satisfactory, since our sample is larger (695 cases) than the G*Power result (262 cases).

Moreover, the post-hoc G*Power calculation for an R² deviation from zero to 99%, a sample of 695 cases, and eight predictors signaled that the statistical power obtained for our sample was 1, which exceeds the value recommended by Cohen (1988). Our sample size is therefore suitable. Table 2 shows the description, source, and frequency of the variables used in the study.

3.2. Construct measures

3.2.1. Environmental value proposition

We differentiate between seeking substantive legitimacy (voluntary) and symbolic legitimacy (legally required) to reduce SMEs' environmental impact (Crossley, Elmagghi, and Ntim 2021). Substantive legitimacy covers everything that goes beyond legal requirements; we asked SMEs about the importance of lowering environmental impact in their innovative activity (Hyatt and Berente 2017). To search for symbolic legitimacy, we constructed a categorical variable that measures the value given by the SMEs for the level of compliance with environmental legal requests in their innovative

Table 2. Name, source, and descriptive statistics of the variables.

Name	Description and values (Source: created from GIS survey)	Descriptive statistics
Environmental value proposition		Frequency N (%)
Symbolic legitimacy	Compliance with environmental legal requirements	
	0	210 (30.2)
	1	125 (18.0)
	2	217 (31.2)
	3	143 (20.6)
Substantive legitimacy	Covers everything that goes beyond legal requirements	
	0	220 (31.7)
	1	140 (20.1)
	2	219 (31.5)
	3	116 (16.7)
Environmental value creation	Adopt any of these environmental practices	Frequency N (%)
Environmental audits	0	494 (71.1)
(symbolic)	1	201 (28.9)
Eco-design	0	674 (97.0)
(substantive)	1	21 (3)
Eco-labeling	0	668 (96.1)
(symbolic)	1	27 (3.9)
Lifecycle assessment	0	647 (93.1)
(substantive)	1	48 (6.9)
Best available techniques	0	609 (87.6)
(substantive)	1	86 (12.4)
Recycling of waste	0	364 (52.4)
(symbolic)	1	331 (47.6)
Waste to energy	0	597 (85.9)
(substantive)	1	98 (14.1)
Renewable energy	0	645 (92.8)
(substantive)	1	50 (7.2)
Environmental value capture	The inverse of carbon intensity	Mean:
$CarbonProd = \frac{TotalRevenue}{CO_2Emissions}$		202.41

activity (Hyatt and Berente 2017). For the two variables, the evaluation was ranked on a 3-point Likert scale (1: low importance, 2: medium importance, and 3: high importance).

3.2.2. Environmental value creation

We asked SMEs about the adoption of eight symbolic and substantive environmental practices (Quintás, Martínez-Senra, and Sartal 2018): (1) ecological design, (2) LCA, (3) energy and environmental audits, (4) eco-labeling, (5) valorization of sub-products and waste, (6) best available techniques, (7) use of waste to generate power, and (8) use of renewable energies. Table 1 gives examples of their use in SMEs and whether they can be used as symbolic or substantive environmental practices.

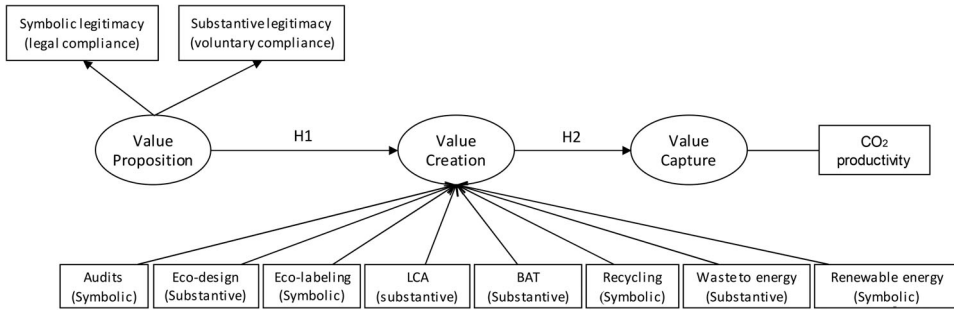


Figure 2. Proposed model.

3.2.3. Environmental value capture

There are no specific standard guidelines for product, corporate, or national carbon footprint accounting (Ahmad, Wong, and Rajoo 2019). We employ the inverse of carbon intensity (*Carbon Prod*) (Quintás, Martínez-Senra, and Sartal 2018). Researchers and institutions use similar measures (Equation (1)) for analyzing the potential reduction of CO₂ emissions at the sector level (Goh *et al.* 2018):

$$\text{CarbonProd} = \frac{\text{TotalRevenue}}{\text{CO}_2\text{Emissions}} \quad (1)$$

where *Total Revenue* is the total sales revenue of the SMEs in 2016 and *CO₂ Emissions* is the CO₂ emitted from their electricity consumption, applying an average price for 2016 of 0.10262 €/kWh according to the System Operator Information System (<https://www.esios.ree.es/es>) and an emission factor (electrical mix) for the same year of 308 g CO₂/kWh according to the Guide for Calculating Greenhouse Gas published by the Catalan Office for Climate Change (Oficina Catalana del Canvi Climàtic 2019). This emission factor expresses the CO₂ emissions associated with the consumed electricity generation.

We use this measure because an increase in electricity consumption directly affects CO₂ emissions (Gao and Zhang 2014), and climate change is affected by this increase (Shao *et al.* 2014; IPCC 2007). Moreover, electricity generation is the largest emissions driver. CO₂ emitted from heating and the generation of electricity represents 41% of the world's total CO₂ emissions (IEA 2019), and emissions from electricity generation increased 45% between 2000 and 2015 (IEA 2017). Another relevant reason for choosing this measure is that most SMEs are concerned about reducing their electricity consumption because they are affected by increases in electricity prices (Bradford and Fraser 2008).

Considering the importance of CO₂ emissions from energy consumption for climate change, the cost of electricity consumption, and the absence of indicators of total CO₂ emissions for SMEs, we consider that calculating CO₂ emissions from electricity consumption is good enough for the objectives of this research.

3.3. The model: estimation with PLS-SEM

The model in Figure 2 was estimated using partial least-squares structural equation modeling (PLS-SEM) with SmartPLS (v. 3.2.7). PLS-SEM was developed by Wold

Table 3: Reflective construct: reliability and convergent validity.

Factor	Item	Standardized loadings	<i>t</i> value (bootstrapped)	CA	CR	AVE
Value proposition	Symbolic	0.956***	170.436	0.912	0.958	0.919
	Substantive	0.961***	194.426			

Note: CA: Cronbach's alpha; CR: Composite Reliability; AVE: Average Variance Extracted; *** $p < 0.01$.

(1975) for the analysis of high-dimensional data in a low-structure environment. We adopted PLS-SEM in this study for the following reasons (Hair *et al.* 2019):

1. The model presents formative constructs. PLS-SEM should always be the preferred approach in situations with formatively measured constructs, because the multiple indicators-multiple causes (MIMIC) approach in CB-SEM imposes constraints on the model that often contradict the theoretical assumptions (Sarstedt *et al.* 2016).
2. Our variables are non-normal, and PLS-SEM shows a higher robustness in these situations (Sarstedt *et al.* 2016).
3. The research objective is exploratory. In an exploratory investigation, researchers are exploring possible relationships not based on theoretical or causal justification, but rather searching for potential associations that may lead to theory development.
4. PLS is often adopted when researchers have small samples, but it is also an excellent method for larger samples (Our sample has 695 cases and good results on power analysis).
5. PLS can be used with data that present different types of scales (Henseler, Ringle, and Sarstedt 2012).

PLS-SEM follows a two-step process. This process starts with an interactive estimation of latent variable scores. First, the PLS algorithm estimates outer and inner weights depending on how the model is specified (with reflective or formative constructs). Second, the parameters of the structural and measurement models are calculated. The path coefficients (structural coefficients) are calculated using ordinary least squares regressions between latent variables (Chin 2010; do Valle and Assaker 2016).

4. Results

4.1. Measurement model

The results for convergent validity and reliability are shown in Table 3. Cronbach's alpha for the reflective construct (0.912) exceeded the reference value of 0.70 (Cronbach 1951), and composite reliability (0.958) is greater than the suggested level of 0.6 (Bagozzi and Yi 1988; Purwanto and Sudargini 2021). Moreover, we estimated the AVE (average variance extracted) for our reflective construct, obtaining a value (0.9) higher than 0.50 (Fornell and Larcker 1981; Purwanto and Sudargini 2021). The results on convergent validity reveal that all items of our reflective construct are meaningful ($p < 0.01$), and the size of every single standardized loading is above 0.9 for all items, which is above the suggested minimum of 0.6 (Bagozzi and Yi 1988; Purwanto and Sudargini 2021). Finally, the discriminant validity of all constructs is shown in

Table 4. Measurement model discriminant validity.

Factor	Value proposition	Value creation	Value capture
Value proposition	0.959		
Value creation	0.425 (0.117)		
Value Capture	0.111	0.079	

Note: In brackets: HTMT; diagonal: AVE square root; below the diagonal: latent variable correlation values.

Table 5. Formative construct: outer weight and loading.

Factor	Item	VIF	Outer weight	<i>t</i> value (bootstrapped)	Outer loading	<i>t</i> value (bootstrapped)
Value creation	Environmental audits (symbolic)	1.319	0.483***	5.469	0.777***	14.260
	Eco-design (substantive)	1.492	-0.097	0.973	0.165**	2.117
	Eco-labeling (symbolic)	1.485	-0.012	0.125	0.231***	2.873
	LCA (substantive)	1.312	0.063	0.732	0.354***	4.826
	BAT (substantive)	1.506	0.124	1.285	0.533***	7.355
	Recycling of waste (symbolic)	1.328	0.506***	5.670	0.805***	14.919
	Waste to energy (substantive)	1.237	0.110	1.273	0.473***	6.558
	Renewable energy (substantive)	1.086	0.222**	2.587	0.433***	5.766

Note: VIF: Variance inflation factor; *** $p < 0.01$; ** $p < 0.05$.

Table 4. The shared variance between pairs of constructs is lower than the linked AVE (Fornell and Larcker 1981; Purwanto and Sudargini 2021). The value of the HTMT measure of correlation within the model is 0.117, which is lower than 0.9 (Henseler, Ringle, and Sarstedt 2012). Consequently, we can consider that the proposed model offers appropriate reliability and convergent and discriminant validity.

Table 5 contains the key data for the formative construct. The results show the non-existence of collinearity among the construct indicators, because the variance inflation factor (VIF) for all indicators is lower than 5. We consider the construct indicators to be valid, as their outer weights are significant (environmental audits, recycling of waste, and renewable energy), or their outer loadings are above 0.5 and are significant (best available technique) (Hair *et al.* 2019). Although the outer weights of eco-design, eco-labeling, LCA, and waste to energy are insignificant and the outer loadings are relatively low (0.165, 0.231, 0.354, and 0.473), the items were retained as the outer loading is significant and the indicators are theoretically appropriate to the value creation construct (Hair *et al.* 2016).

4.2. Testing of the hypotheses

The estimation of the structural part of our model is shown in **Table 6**. We used bootstrapping (5,000 re-samples) to propose standard errors and *t* values that allowed for individual sign changes (Hair, Ringle, and Sarstedt 2011). We calculated the power analysis by proposing a statistical power for the R2 deviation from zero to 99%, which

Table 6. Hypothesis testing.

Hypotheses	Standardized beta	<i>t</i> value (bootstrapped)
Value proposition → Value creation	0.425***	14.246
Value creation → Value capture	0.079*	1.897

Note: R2 (Value creation)=0.181; R2 (Value capture)=0.006; Q2 (Value creation)=0.045; Q2 (Value capture)=0.002; SRMR = 0.020; *** $p < 0.01$; * $p < 0.1$.

is above the suggested level of 80% (Cohen 1988; Faul *et al.* 2007). The R2 for the dependent variable of value creation was above the recommended level of 10% (Falk and Miller 1992), and for value capture, it was lower than 10%. We confirmed the predictive relevance of our model with a positive Q2 from blindfolding (Geisser 1974; Stone 1974). Finally, the standardized root mean square residual (SRMR) value for our structural model was lower than 0.08 (0.02), which showed good model fit (Hair *et al.* 2016; Henseler, Hubona, and Ray 2016).

The findings given in Table 6 show that value proposition positively and significantly influences value creation (H_1 ; $\beta = 0.425$; $p < 0.01$). Value creation positively and significantly influences value capture (H_2 ; $\beta = 0.079$; $p < 0.1$) but with a lower coefficient and less significance than in the previous relationship.

5. Discussion

Our results show the composition of the value proposition as an important strength of SMEs' EBMs. This takes into account, with very large and similar loads, the two ways of attaining environmental legitimacy (legally required or symbolic and voluntary or substantive). This result is consistent with the work of Crossley *et al.* (2021), which states that SMEs employ a mix of substantive and symbolic environmental practices to enhance the sustainability and legitimacy of their operations. However, the rest of the components of the EBMs do not seem to be equally developed and do not enable this environmental value proposition to be adequately achieved and put into practice.

The model shows a good relationship (positive and significant) between the environmental value proposition and environmental value creation, indicating that a greater search for environmental legitimacy means that SMEs will implement more environmental practices (H_1 supported). This result is consistent with the work of Baah *et al.* (2021), which states that SMEs implement environmental practices to respond to regulatory and other stakeholders' pressures.

However, the environmental value creation component has a poor composition in which only three environmental practices have significant weights (environmental audits, recycling of waste, and renewable energy). The two with greater weights (environmental audits and recycling of waste) are symbolic practices, so hypothesis H_{1b} is supported. The only substantive environmental practice is renewable energy, and its weight is much less than that of the symbolic environmental practices, so hypothesis H_{1a} is not supported.

These results are similar to those in the literature on the implementation of environmental practices in which both environmental audits (Johnson 2015) and waste recycling (Revell, Stokes, and Chen 2009; Purwandani and Michaud 2021) have high percentages of implementation, while the use of renewable energy is low. The high

capital investments needed, and a lack of knowledge, contribute to the low level of renewable energy adoption for SMEs (Conway 2015).

The structural model shows that the relationship between environmental value creation and environmental value capture is positive and has low significance, giving weak support to H₂. Moreover, the coefficient is also low; this implies that SMEs capture few reductions in CO₂ emissions, so there is low support for H_{2b} and no support for H_{2a}.

This result may be explained by the fact that SMEs have not widely applied substantive environmental practices that can have a greater impact on reducing CO₂ emissions, such as eco-design or LCA (Van Hemel and Cramer 2002; Moss, Lambert, and Rennie 2008). However, some SMEs may not perceive these practices as capable of improving performance and environmental indicators (Epo and Mafini 2018); moreover, eco-design and LCA are particularly problematic for SMEs because they are too costly (Moss, Lambert, and Rennie 2008; Van Hemel and Cramer 2002), and SMEs are focused on short-term constraints and subsistence rather than long-term goals (Dekoninck *et al.* 2016). SMEs need individual and sustainability competencies and interdisciplinary or interpersonal skills to carry out these environmental practices (Lambrechts *et al.* 2019; Moss, Lambert, and Rennie 2008; Epo and Mafini 2018).

Therefore, the way in which SMEs create environmental value and the weak relationship between environmental value creation and environmental value capture reflect that the search for symbolic legitimacy has more weight than the search for substantive legitimacy in the definition of their EBMs.

6. Conclusions

We have applied legitimacy theory and the BM perspective to analyze how SMEs define their EBMs (value proposition, creation, and capture) and the relationship between their components to achieve environmental legitimacy (symbolic or substantive) and reduce CO₂ emissions. For these purposes, we employed a database of 695 SMEs and the PLS-SEM technique to assess the measurement and structural models.

6.1. Theoretical implications

From a theoretical point of view, our contribution covers four aspects. First, we apply legitimacy theory to BMs; such works are very scarce. We know of only a few works that show the influence of the search for legitimacy on BM innovation (Wang and Zhou 2021), most of which are case studies (Biloslavo *et al.* 2020; Wu, Zhao, and Zhou 2019; Adiloğlu-Yalçınkaya and Besler 2021; Hu, Zhang, and Yan 2020), but none of them have analyzed how this theory influences the definition of each component of the SMEs' EBMs. Second, in the literature on green BMs and sustainable BMs, we included literature on decarbonization, an important topic which, nevertheless, is not explicit in most of this literature (Abuzeinab *et al.* 2018; Boons and Lüdeke-Freund 2013), with a few exceptions in the energy sector (Wainstein and Bumpus 2016; Bidmon and Knab 2018). Third, we focused on SMEs, which, in general, have been insufficiently studied, except for some case studies showing selection bias toward environmental proactivity (Parrish and Foxon 2006; Hiteva and Sovacool 2017; Rauter, Jonker, and Baumgartner 2017). Fourth, the investigation analyses predictively and quantitatively the relationships between the components of SMEs' EBMs

(environmental value proposition, creation, and capture), which have rarely been investigated (Quintás, Martínez-Sendra, and Sartal 2018).

6.2. Management implications

This analysis can help SMEs' owner-managers improve the design of their EBMs to achieve substantive environmental legitimacy and to contribute to decarbonizing economies. The principal strength of SMEs' EBMs is that their interest in attaining both substantive and symbolic legitimacy leads them to define a broad environmental value proposition that seeks to reduce environmental impact, both voluntarily and in compliance with regulations.

However, the analysis has also revealed that, if they want to achieve substantive environmental legitimacy and contribute to decarbonization, not all environmental practices are equally desirable for reducing emissions. The initiatives that SMEs usually carry out are more symbolic than substantive, and they are not very effective for reducing CO₂ emissions. Recycling waste, the practice most used by SMEs to create environmental value, has difficulties in reducing environmental impacts because firms often define poor recycling programs (Afsar *et al.* 2020), for example, affecting only office materials (Revuelto-Taboada, Canet-Giner, and Balbastre-Benavent 2021), and because of difficulties in recycling some materials (Sharma *et al.* 2021). Environmental audits have been criticized because they have been employed in a symbolic way without bringing improvements in environmental performance (Heras-Saizarbitoria *et al.* 2020; Testa, Iraldo, and Daddi 2018; Vílchez 2017). SME managers should make an effort to reduce the factors that hinder them from using substantive environmental practices, such as financial ratios, lack of information, and limited internal skills (Fresner *et al.* 2017). It would be useful to adapt and adopt substantive environmental practices such as eco-design and LCA, bearing in mind the specific requirements of SMEs (Moss, Lambert, and Rennie 2008) and increase training in environmental skills for managers and workers in SMEs.

6.3. Political implications

Given the difficulties SME managers may encounter in making these changes to EBMs, the support of policymakers in this process can be very useful. The results of this work allow us to make the following recommendations.

The importance of achieving symbolic and substantive environmental legitimacy in the value proposition is an indicator of the usefulness of both awareness campaigns and restrictive regulation policies. Awareness campaigns on the environment and on decarbonization of the economy would affect SME owners-managers' awareness and the demand for greener products and processes from their customers and other stakeholders. Moreover, governments can develop more restrictive environmental regulations adapted to the peculiarities of SMEs, since they often feel that these regulations do not apply to SMEs or that they are difficult to understand (Wilson, Williams, and Kemp 2012).

However, our model has shown that these actions must be accompanied by measures to create and capture environmental value for SMEs to contribute to the transition to a low-carbon economy. Governments should promote the adoption of more effective practices for reducing CO₂ emissions by SMEs. Policies can include financial aid and

training to further the adaptation and adoption of eco-design or LCA, but should also help to develop and implement new practices that are more in line with the needs of SMEs.

6.4. Limitations and future research

This research has certain restrictions that point toward future studies. First, although this work provides stimulating results on how SMEs define the components of EBMs and on how these are related to achievement of environmental legitimacy, the database only includes Galician firms, so the results cannot be generalized to other regions or companies. It would therefore be relevant to enlarge the database to incorporate companies from other places and to study similarities and differences. It would also be interesting to search for differences in the measurement constructs and the structural model for large companies. Finally, as survey data for new years become available, the period of the study can be extended.

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