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Article

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Entrepreneurial values and circular economy adoption: A cross-lagged SEM-based machine learning study

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ABSTRACT

Objective: The objective of the article is to provide an entrepreneurial value-based perspective that can either drive or derail circular economy (CE) adoption and related strategies. The study argued that fundamental shifts toward CE adoption require a more profound value-based change.

Research Design & Methods: Existing studies have analysed several self-transcending values in advancing circular economy (CE). However, an adequate investigation is yet to occur on self-advancing values that can obstruct CE adoption and practice in an entrepreneurial context. Embedded within a norm activation model (NAM) and informed by value-belief-norm theory (VBN), the study builds on cross-lagged data (n=477) to explain the clash between dominant self-advancing entrepreneurial values and CE strategies.

Findings: The SEM-based machine-learning test results predicted that entrepreneurial hedonic and egoistic values complemented by hedonic and egoistic consumption reciprocally drive linearity rather than circularity within entrepreneurship. However, awareness of the consequences of adverse CE business models on society and the environment moderates the effect of self-enhancing values on CE strategies.

Implications & Recommendations: Policy instruments and macro-level societal intervention in creating, enhancing, and balancing self-transcendence values with self-advancing values can improve CE adoption across the entrepreneurial architecture.

Contribution & Value Added: The study is one of the first to demonstrate entrepreneurial value-oriented barriers to circularity, derailing CE diffusion to the broader entrepreneurial landscape. It suggests measures to enhance CE adoption among entrepreneurs.

Article type:	research article
Keywords:	circular economy; entrepreneurial values; sustainability; hedonic; egoistic; Structural equation modelling
JEL codes:	C12, C33, C45, C53

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INTRODUCTION

The circular economy (CE) is emerging as a guiding principle for industrial and environmental policies (Corvellec *et al*., 2021; Völker *et al*., 2020). It is defined as 'a regenerative system in which resource input, waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops thanks to long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling' (Geissdoerfer *et al*., 2017, p. 759). The CE strategies involve two broad dimensions. The first relates to slowing and closing resource loops and slowing down the flow of resources and waste and making them assets for re-production. The second CE strategy involves improving the economy, environment, and society by redesigning processes and outputs through planning, resourcing, procurement, production, and reprocessing (Kirchherr *et al*., 2023). Researchers have extensively studied the role of self-transcending values, such as biospheric and altruistic values, in embracing CE

strategies (Gomes *et al*., 2022; Inigo & Blok, 2019) but have not paid adequate attention to the self-advancing values that can obstruct CE adoption. Schwartz (1992, p. 21) defined values as 'desirable trans-situational goals varying in importance, which serve as a guiding principle in the life of a person or social entity.' Deep-rooted changes in various stakeholders' industrial and business practices will only be successful once they are value-driven.

One of the significant stakeholders in the production and economic activity without which CE may not see its complete market evolution is entrepreneurs (Panait *et al*., 2022). Entrepreneurial venturing is a critical driver of economic and social growth, and hence entrepreneurs must transition to sustainable development, embracing circularity values to bolster circular economy efforts (Salvioni *et al*., 2022; Rovanto & Finne, 2023). Entrepreneurs powered by innovation can develop circular business models, creating a framework of circular entrepreneurship (Panait *et al*., 2022). Therefore, circularity within entrepreneurship is possible when more significant economic and societal norms of a production-consumption-reuse mindset are infused with personal entrepreneurial values (Foroozanfar *et al.,* 2022).

Contrastingly, economically driven entrepreneurial values associated with entrepreneurial venturing can also derail the aspirations of a circular economy. Entrepreneurs struggle to find the motivation to abandon well-functioning value chains over waste-focused and cost-enhancing supply chain systems (Katinka *et al*., 2023; Johansson & Krook, 2021). The opportunity exploitation mindset can lead to the depletion of natural resources, accumulation of industrial wastes, and environmental harm. These entrepreneurial values inspired by exploitative and economically oriented business models struggle to align with environmental wellness diffused from broader societal values (Rovanto & Finne, 2023; Salvioni *et al*., 2022; Inigo & Blok, 2019). Entrepreneurial business models have traditionally evolved through neo-classical and conventional economics, exploiting the efficiency of markets and, therefore, the values associated with a free-market capitalist economy continue to guide entrepreneurial values (Corvellec, 2020). Krajnc *et al*. (2022) argued that the end users are also critical in creating demand for sustainable production, but generally, they lack systematic thinking of reason, evaluation, and connection to create new solutions for CE as they are unaware of or lack training. There is little support from consumers as the existing research does not conclusively determine that consumer values have shifted towards circular offerings, and they are willing to engage in altruistic buying behaviour (Ali & Choe, 2022). Hence, entrepreneurial business models would not become fully circular until end-users accept circularity values, influencing entrepreneurial values.

Circular business models characterized by responsible production, consumption, and waste management enjoy less credibility than financially viable ones. A financially viable business model is validated with initial sales of goods and services, while circular business models gain credibility after recirculated products can generate equally attractive revenues for investors (Linder & Williander, 2017). As a result, the circularity strategies contradict economic supply and demand paradigms creating obstacles in fostering CE values (Johansson & Krook, 2021). Further, circular business models have entry barriers due to technical expertise, technological access, high capital investment, higher costs of production, lack of appropriate regulatory frameworks, and weak institutional support, all of which create obstacles to entrepreneurial venturing and put circularity on the back burner. Hence, to integrate the value of circularity with entrepreneurial business models, not only should the process be practical, it should become a value-driven decision, which may require some sacrifices for economic gains (Brandão *et al*., 2021). We found no research analyses the entrepreneurial value perspective as an enabler or obstacle to circular entrepreneurship. Addressing this research gap, this study highlights how economically driven entrepreneurial values, particularly in resource-constrained and resource-intensive industries, collide with circularity principles. The study discussed how possible trade-offs favouring sustainability over profitability can be addressed, by fostering circularity values and improving the awareness of the negative consequences of purely economic gains.

Several industries and sectors are typically characterized to obstruct the adoption and integration of circularity principles. For example, the production systems in heavy industries require high temperatures and fossil fuel combustion, impacting carbon emissions (Sutherland, 2020). Low-carbon heating methods are expensive and entrepreneurs generally are reluctant to adopt such costly innovative approaches. Similarly, in the linear path, several agricultural production resources, such as fertilizers,

pesticides, surface water, and soil, cannot be reused, putting pressure on the world's resources (Basso *et al*., 2021). Therefore, this study points towards several linear and economic-compulsion-driven businesses that hinder the integration of circularity principles in their business models. Accordingly, the analysis required purposive sampling through which samples were selected from industries and sectors that needed to highlight the economic compulsions of entrepreneurs in select industries.

Theoretical Background

We posited that weak theoretical anchoring of value-driven circularity in an entrepreneurial context has obstructed CE's conceptual development. Tian and Liu (2022) found that most of the theoretical developments and integrations on CE have taken place in the context of larger organizations. Zioło *et al*. (2023) reported that the contradictions related to environmental and financial performance have not been resolved and the findings remain inconclusive. The current theories underpinning circular values, such as corporate social responsibility, stakeholder theory, corporate sustainability, and green economics, have not matured to integrate entrepreneurial values (Chang *et al*., 2017). One of the most widely cited social-psychological frameworks to study circularity behaviours, namely the norm activation model (NAM), initially developed by Schwartz (1977), can help explain the complexities associated with CE values in an entrepreneurial context. The NAM determines the antecedents of human intentions and selfless behaviour toward the well-being of society and the environment (Savari *et al*., 2023). According to the NAM, personal norm (PN) towards pro-societal and pro-environmental human behaviours are activated as a result of awareness of consequences (AC), which leads to the acknowledgement of responsibility (AR) (Staats & Wilke, 2007). However, NAM presents a linear relationship between awareness of consequences, ascribed responsibility, and personal norms leading to behavioural intentions. Further, The NAM model focuses on AC related to environmental benefits but does not consider awareness of the consequences towards CE adoption risks and a negative evaluation as a result of AC (He & Zhan, 2018). For example, in an entrepreneurial context, AC about the higher costs of adopting CE practices and associated risks can reciprocally and negatively influence PN, leading to unacceptability of responsibilities. Heller and Vatn (2019) argued that in such situations external economic consideration dominates over internal value norms.

Therefore, there is an under-theorization of how self-enhancing values obstruct CE adoption and practices. Most of the psychological, social, and behavioural theories underrate the financial criteria in environmental adoption decision-making (Tian & Liu, 2022). The study posited that in an entrepreneurial context where most small firms struggle to survive, externally oriented economic consequences of CE adoption drive internally-driven PN, which decreases the chances of accepting CE responsibilities. However, AC characterized by a cognitive and emotional inclination towards circular values can mitigate the lopsided behaviour to prioritize economic values over CE values (Rees *et al*., 2015).

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The extant literature is yet to be enriched with the knowledge and research on sustainable and circular entrepreneurial business models that effectively integrate CE principles in entirety rather than a few activities of its operations (Henry *et al*., 2020). The individual norms in the NAM are treated uniformly without shedding light on the variance of individual values supporting or negating environmental behaviours across cultures and business contexts (Oh & Ki, 2023; Cheng *et al*., 2022). The value perspective is critical in understanding these variances, which can explain whether pro-environmental behaviours can withstand the pressures of unsupportive values. To explain these variances, Stern (1999) extended NAM to the value-belief-norm theory (VBN). The VBN theory, found credible in various cultures, brings three aspects to light: egoism, altruism, and ecological value in pro-environmental behaviours. Testing self-enhancement values, such as egoism and hedonic values, can be ideal for examining motivations and behaviours related to the complex environmental, economic, and social dimensions associated with CE (Temesgen *et al*., 2021).

A critical question is whether entrepreneurial values coupled with business and context-driven imperatives influence CE adoption or hinder embracing CE strategies. In cases, where it encourages CE

adoption, the dominant values of the larger social and economic equality goal motivate personal and societal norms and acceptance of CE ideals (Mansilla-Obando *et al*., 2022). However, the extant literature and policy instruments throw very little light on how entrepreneurial businesses that struggle with resource requirements can embrace risks associated with CE adoption (Kębłowski *et al*., 2020). Explaining this dilemma, Niskanen *et al*. (2020) argued that resource-constrained entrepreneurs will likely embrace CE when they gain more control over resources and benefit from waste which becomes a resource in CE. Further, Khan *et al*. (2021) argued that CE-compliant entrepreneurial businesses benefit from re-branding, positioning themselves from dirty waste-producing firms to clean resource-producing ventures. This new environmental value position and innovation built around environmental improvement across the value chain, is reflected in the entrepreneurial business models (Dantas *et al*., 2022). The vital inquiry into whether entrepreneurship will be an enabler or hurdle for CE lies in the ability of CE to propose clear pathways for equity and social inclusion, shits in norms, lifestyles, culture, personal, social, and organizational values (Bianchini *et al.,* 2022; Salesa *et al*., 2022; Rovanto & Finne, 2023). According to Gomes *et al*. (2022), four values that determine personal norms and, ultimately, values related to circular entrepreneurship are biospheric, altruistic, egoistic, and hedonic. Biospheric values relate to care for nature and the environment, while altruistic values drive concern for human welfare. In contrast, egoistic values reflect care about power and wealth, and hedonic values characterize comfort and pleasure (Van der Werff & Steg, 2022).

Vuorio *et al*. (2018) found that hedonic values negatively relate to environmentally pertinent attitudes and behaviours. Hedonic values shape entrepreneurial behaviour and, ultimately, entrepreneurial business models (Ettis, 2022; Hendrik & de Jong, 2020). We found that due to dominant hedonic values, entrepreneurs are more likely to create business models that require minimum efforts and maximize benefits due to venturing risks and resource constraints. It is linked to entrepreneurial motivation of control and achievement traditionally associated with linear business models. Hedonic values also shape opportunism and profit-maximization behaviours related to supply, production design, and consumption (Yulistyawati *et al*., 2020).

Another probable reason entrepreneurs prefer linear business models is that they create hedonic experiences of feelings and emotions for customers, which improve the affective component in consumer purchase decisions. Hedonic consumption relates to pleasure, joy, and an emotional experience of satisfaction and superiority (Wei *et al*., 2023). Consumer purchase decisions become stronger when utilitarian values support hedonic values. According to Tarka *et al*. (2022), consumers feel a sense of positive energy when engaging in hedonic consumption. Hedonic values are like a double-edged sword, entrepreneurs will exploit that opportunity if consumers demand hedonic and affective-oriented consumption and will derail circular entrepreneurship goals. In their study, Andersch *et al*. (2019) found gaps in consumers' attitudes toward ethical products and actual buying behaviour. The connection between hedonic production and consumption is further explained by Yasir *et al*. (2021), who argued that entrepreneurs with robust hedonic goals would not engage in circularity behaviours until they see a personal gain, which seems highly unlikely in the face of business models aimed at gratifying consumption of their goods or services (Andersch *et al*., 2019; Prakash *et al*., 2019). Based on the discussion in the literature, we formulated the following research hypotheses.

H1: Dominant entrepreneurial hedonic values negatively influence the adoption of CE strategies.

H2: Hedonic values will significantly and negatively impact the adoption of CE strategies when demand for hedonic consumption is high.

Egoism can be defined as a motivational state targeting personal benefit as the ultimate goal (Batson *et al*., 1987). Unlike social entrepreneurs, commercial entrepreneurs are driven by personal gain (Ruskin *et al*., 2016). Furthermore, the essential motivation of entrepreneurial venturing and risk-taking is to maximize profit and exploit opportunities, which led Kirby *et al*. (2022) to conclude that entrepreneurs have not met the challenges of sustainable production and consumption. Egoistic values among entrepreneurs relate to costs and benefits, power or achievement, seeking self-rewards, and avoiding unpleasant emotions (Bouman *et al*., 2018).

Research evidence shows that egoistic values also drive consumption practices. Consumers are likely to purchase CE-inspired products when they see tangible benefits, such as food products that create health benefits (Wei *et al*., 2022; Septiani *et al*., 2020). Kumar and Pandey (2023) explained that egoistic consumption is evident primarily in health and food-related sectors, and more research is needed to support the value's effect across different sectors. Singh *et al*. (2023) found that consumers focus on egoistic product attributes first, analyzing if self-serving motives are fulfilled, followed by altruistic behaviour. Therefore, dominant egoistic values will dominate consumer purchase decisions over weaker altruistic values. As a result, egoistic purchase motives will drive entrepreneurial business models as they seek to maximize the opportunity. Thus, we formulated the following research hypotheses.

H3: Dominant entrepreneurial egoist values negatively influence the adoption of CE strategies.

H4: Egoistic values will have a significant negative impact on the adoption of CE strategies when the demand for egoistic consumption is high.

The effect of the dominant entrepreneurial hedonic and egoist values can be balanced with biospheric and altruistic values by increasing the awareness of the consequences of self-advancement behaviours (Gkargkavouzi *et al*., 2019). The awareness of consequences, a central construct in the VBN theory, actuates personal norms since entrepreneurs become aware of the negative consequences of their venturing activities (Savari *et al*., 2023). Previous studies have found that AC has been negatively correlated with self-enhancement value orientations because individuals pay attention to the information congruent with their value orientation (Hansla *et al*., 2008). Therefore, the dominant value orientation of self-advancement will likely remain the same despite being exposed to AC. Bouman *et al*. (2018) argued that information that enhances the awareness of consequences, particularly enhancing an emotional affiliation towards pro-environmental behaviours can moderate the effects of entrepreneurial values on adverse CE behaviours (Rees *et al*., 2015). This moderation may be more effective when demonstrating the personal benefits of altruistic or biospheric venturing or purchase decisions. Since a direct causal effect between AC and a change in value orientation may not be possible, the study posits that AC can only moderate the effect of self-enhancing values on CE strategies. Thus, we formulated the following hypothesis.

H5: Awareness of consequences moderates the relationship between self-enhancing values and the adoption of circular economy strategies.

RESEARCH METHODOLOGY

This deductive study is epistemologically constructed on a positivist philosophy and an objectivist ontology since the objective was to examine a statistically significant relationship between entrepreneurially dominant values and CE strategies (Bhasin, 2020). Therefore, we collected the data was collected through a self-reporting questionnaire with minimum probing. We designed all items in the questionnaire based on a Likert-style 5-point scale, which we administered online.

Sample Selection

The study's sampling frame were entrepreneurs in three countries, namely India, Oman, and the United Arab Emirates. We drew the list of entrepreneurs from the Chambers of Commerce and Industries in these countries. The study utilized purposeful sampling in selecting participants for the study. The inclusion criteria included only those entrepreneurs who ticked an initial question on the top of the questionnaire, which read: I agree that I give preference to my venture's profitability strategies over circularity strategies. We collected the data at two different time intervals with a gap of six months between November 2022 (T1) (n=477) and May 2023 (T2) (n=475). We collected the second wave of data from the same sample to check the robustness of the values and participants' resolve in their values. The data collection involved an experimental treatment as the participants were sent additional information on the benefits of CE and the adverse effects of the linear business models on society and the environment.

Measures

The study assessed the entrepreneurial hedonic values through the Hedonic and Eudemonics Motives for Activities (HEMA) scale developed by Huta and Ryan (2010) and further refined by Asano *et al*. (2018) and Braaten *et al*. (2019). Similarly, the study applied the hedonic consumer value (HCV) scale developed by Tarka (2015) and further modified by Picot-Coupey *et al*. (2021) to examine entrepreneurial compulsion in designing consumer products and services with hedonic treatment at the expense of CE values. Further, the study adopted the egoistic value scale for entrepreneurs and consumers through portrait value questionnaire (PVQ) (Schwartz, 2014) and Wang *et al.* (2018). Finally, we measured AC through the awareness of consequences scale developed by Hansla *et al*. (2008) and Osburg *et al*. (2019). The literature indicated that CE is substantially broad in scope, and several indicators are used to measure CE strategies (Iacovidou *et al*., 2017). We measured the CE strategies through two broad approaches: *sensu stricto,* which involved slowing down and closing the lop strategies, and *sensu latu*, focusing on procurement, production, and reprocessing strategies broadly influencing the economy, society, and the environment (Moraga *et al*., 2019).

Analytical Procedure and Data Analysis

We analysed the longitudinal data using cross-lagged path models testing the causal, reversed, causal and reciprocal effects between the entrepreneurial values and CE strategies. We tested four competing models to examine the temporal relationship between entrepreneurial value types and CE-related decisions (Figure 1).

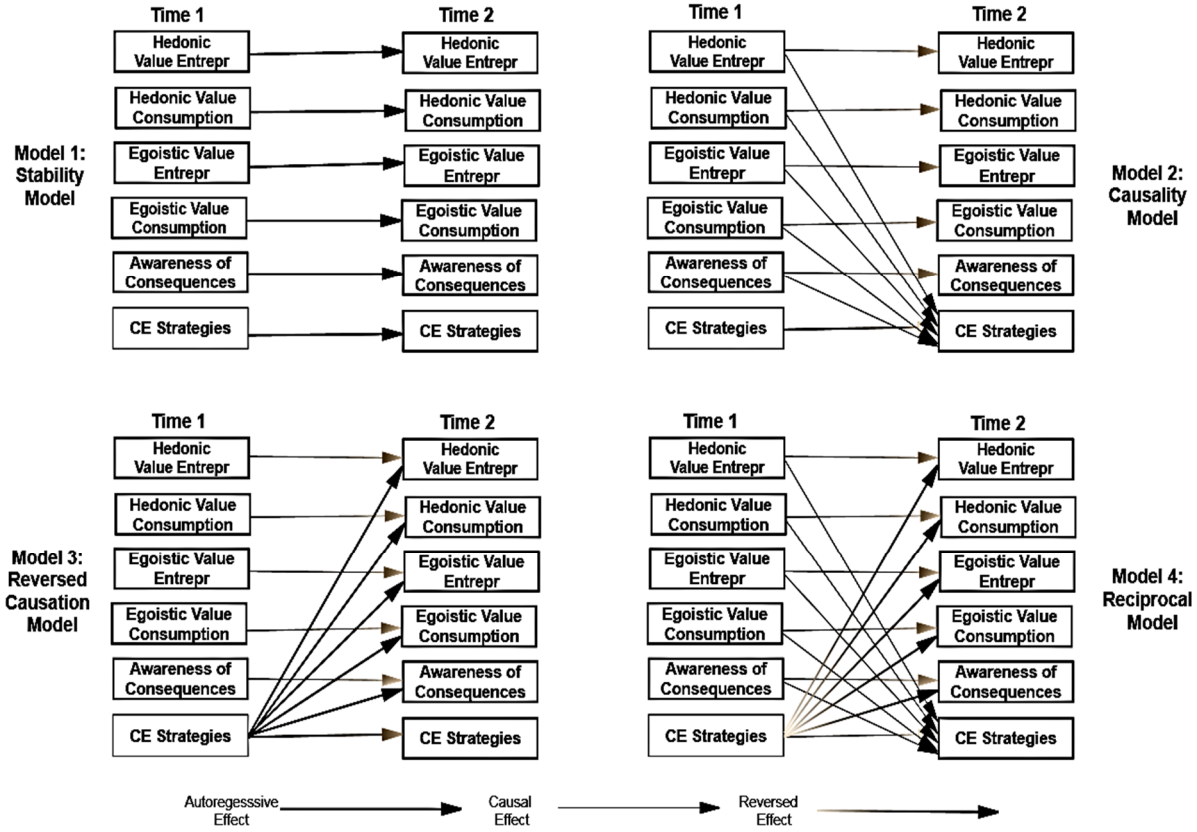

Figure 1. Four competing models

Source: own elaboration of empirical research.

Model 1 examined entrepreneurial value's stability over time. A high autoregressive coefficient would indicate minimized changes over time and reduced estimation bias (Selig & Little, 2012). Model 2 assessed the causal effects between entrepreneurial values and CE strategies. Model 3,

with autoregressive results, tested the reversed causal impact, while model 4 analysed if the entrepreneurial value and CE values reciprocally impacted each other. In this model, we combined the causality and reversed causation effects.

Further, the study performed the structural equation modelling (SEM) tests utilizing IBM SPSS (AMOS version 22) to investigate the theoretical model's fit with the statistical default model. Due to the confirmatory approach, the study employed a co-variance-based SEM to test the hypothesized models, as suggested by Hair *et al*. (2019). Finally, the complete SEM model explored the role of awareness of consequences in moderating the adverse effects of dominant entrepreneurial values on CE strategies.

RESULTS AND DISCUSSION

We checked the data for reliability and internal consistency of measures, and a Cronbach score > 0.7 showed that the data were reliable for further analysis. Next, the study analysed correlations between the variables through Pearson's correlation test. Table 1 shows the correlation matrix indicating that constructs correlated with time 1 and 2 data. Circular economy strategies were significantly and negatively correlated with hedonic and egoistic values of entrepreneurs and consumers (r= -0.587), (r=-0.574), (r= -0.318), and (r= -0.377). However, the CES was positively correlated with awareness of consequences (r= 0.269).

Table 1. Mean, standard deviation, and Pearson correlations matrix

Variable	Time	Mean	Std. Dev	HNVE	HNVC	EGVE	EGVC	AWCS
HNVE	T1	3.916	0.611	–	–	–	–	–
	T2	4.113	0.566	–	–	–	–	–
HNVC	T1	4.063	0.525	0.228**	–	–	–	–
	T2	4.127	0.571	0.294**	–	–	–	–
EGVE	T1	3.987	0.515	0.549***	0.232*	–	–	–
	T2	4.001	0.634	0.517***	0.217*	–	–	–
EGVC	T1	4.061	0.647	0.287**	0.258**	0.429**	–	–
	T2	3.960	6.024	0.299**	0.304**	0397**	–	–
AWCS	T1	4.082	0.599	0.313**	0.357**	0.382**	0.312**	–
	T2	4.043	0.597	0.319**	0.324**	0.391**	0.327**	–
CENS	T1	4.071	0.668	-0.510***	-0.515***	-0.375**	-0.352**	0.267**
	T2	4.022	0.622	-0.587***	-0.574***	-0.318**	-0.377**	0.269**

*Note: N = 477 *Significant at 0.05 level, **Significant at the 0.01 level, ***Significant at 0.001 level. Hedonic value entrepreneurs=HNVE, hedonic value consumers=HNVC, egoist values entrepreneurs= EGVE, egoist values consumers= EGVC, awareness of consequence's = AWCS, and circular economy strategies=TI.*
Source: own study.

We tested for multicollinearity effects considering high correlation values, but no evidence of multicollinearity was found as the variance inflationary factor test (VIF) scores were > 0.2 (Tabachnik & Fidell, 2007). Since the data came from three different research settings, we tested for homogeneity of variance, but Leven's static test showing a score of >0.05 and thus indicated no evidence of heteroscedastic data.

SEM: Measurement and Structural Models

The study used structural equation modelling (SEM) as a robust statistical test to draw conclusions about the hypothesized relationships and test the multivariate causal relationships with direct and indirect effects. Firstly, the study developed a measurement model (MM) to examine the relationship between latent variables and their indicators and validate the theoretical structure, as Fan *et al.* (2016) suggested. The measurement items correlated across time during the test, while the intercepts were equal per the measurement invariance. The measurement items showed satisfactory reliability (Cronbach's α 0.74-0.88), and the factor loadings in the MM were > 0.60 ($p < 0.001$), indicating good convergent validity. Subsequently, the structural model was developed to test the hypothesized relationship over time across the competing SEM models (Tabachnik & Fidell, 2007). The causal model

assumed a multivariate normal distribution utilizing the maximum likelihood method, and the relationship between endogenous and exogenous variables was considered linear. While examining structural model validity, the fit indices were acceptable benchmarked against standards set by Hu and Bentler (1999) ($\chi 2$ (215) = 311.03, $p < 0.01$; CFI = 0.968; TLI = 0.965; RMSEA = 0.040). Table 2 shows the factor scores, alpha, and average variance extracted (AVE). Since the AVE scores on factors were < 0.05, the data indicated a satisfactory level of discriminatory validity.

Table 2. Factor loadings, alpha, and average variance extracted values

Variables and their scale items	Factor Score	Alpha (KMO)	AVE
Hedonic values entrepreneurs		0.72 (0.77)	0.4113
1. I would like to venture into areas that are easier to market	0.72		
2. I want to feel less stressed with my business	0.71		
3. A linear business model gives me better control	0.74		
4. Venturing into areas of my interest gives me pleasure	0.69		
5. High profitability provides me with a sense of achievement	0.71		
Hedonic Values Consumption		0.74 (0.75)	0.4387
1. My target customers strive for new experiences	0.74		
2. Guilt-free consumption is an enjoyable experience for my customers	0.70		
3. My target customers care for themselves	0.74		
4. My target customers seek exciting life	0.75		
5. My target customers strive to achieve success in life	0.68		
Egoistic Values Entrepreneurs		0.75 (0.77)	0.4329
1. I prefer to keep my job rather than enhance environmental wellness	0.73		
2. Values associated with CE can obstruct my wealth creation	0.74		
3. Values associated with CE can threaten my control of the supply chain	0.77		
4. Values associated with CE can threaten my social network	0.75		
Egoistic Values Consumption		0.72 (0.74)	0.4134
1. My target customers will not easily accept eco-friendly products	0.68		
2. My target customers are focused on their well-being	0.73		
3. My target customer's receptiveness to CE values may depend on the information they are exposed to	0.70		
4. My target customers may accept eco-friendly products when they can see tangible benefits for themselves	0.73		
Awareness of Consequences		0.73 (0.72)	0.4994
1. Complete pro-environmental awareness may promote my firm's adopting CE values.	0.74		
2. If I have a feeling of environmental affection, it may lead to my firm adopting CE practices.	0.77		
3. Information related to the awareness of consequences to the biosphere may promote the adoption of CE values.	0.75		
Circular Economy Strategies		0.79 (0.78)	0.4223
1. I am conserving the function of products or services designed through circular business models.	0.78		
2. I extend the product through lifetime through durability, reuse, restoration, refurbishment, and remanufacturing strategies.	0.75		
3. I protect the product's components by reusing, recovering, and repurposing parts.	0.80		
4. I am preserving the materials through recycling and downcycling strategies.	0.81		

Note: Figures in parenthesis are KMO scores.
Source: own study.

Examining and Predicting Causality

The study further constructed the path analysis to quantify the relationships between multiple variables. The causal and mediation effects were tested through four competing cross-legged models assessing possible causal, reverse causal, and reciprocal relationships, as suggested by Hair *et al*. (2019).

The data indicated a good model fit, indicating low measurement errors and demonstrating that the data fitted the theoretical model well. Figure 2 and Table 3 illustrate that the value constructs were stable over time, considering the significant autoregressive effects. Among the competing models, the causality model showed the best model fit (Δχ2 = -42.87, p < 0.001), followed by the reciprocal model (Δχ2 = 24.79, p < 0.01), and the reversed model (Δχ2 = -18.54 (p < 0.05).

Table 3. Model comparison

No.	Model	χ^2	df	CFI	TLI	RMSEA	Model comparison	$\Delta\chi^2$	δ
1	Stability model	24.41	11	0.994	0.0967	0.026	–	–	–
2	Causality model	25.42	8	0.992	0.988	0.044	1 vs 2	-42.87***	3
3	Reversed model	19.83	8	0.983	0.956	0.049	1 vs 3	18.54*	3
4	Reciprocal model	6.18	6	1.000	1.000	0.000	1 vs 4	24.79**	6
–							2 vs 3	-7.31	1
							2 vs 4	8.46	3
							3 vs 4	12.77*	3

Note: N = 477*, *p* < 0.05*, **p* < 0.01*, ***p* < 0.001*.*
Source: own study.

Hypothesis 1, which posited that dominant hedonic values negatively influence CE strategies, was supported by the results (-42.87*, p* < 0.001*) as HNVE* had a significant negative lagging effect on CE strategies. Moreover, HNVE at Time 1 significantly negatively impacted the change of CE strategies from T1 and T2 (Table 4) (*Model 2: γ =* -0.74). Likewise, hypothesis 2 was supported as the effect of hedonic values related to consumption had a lagged impact on CE strategies (*Model 2: γ =* -0.64). Table 4 shows the results.

Table 4. Parameter estimates of the path models

Variables	Model 2: Causality model		Model 5: Moderation model	
	γ	SE	γ	SE
Autoregressive effects				
Hedonic values of entrepreneurs	0.65**	0.04	0.70**	0.03
Hedonic consumption demands	0.61**	0.03	0.76**	0.02
Egoistic values of entrepreneurs	0.77***	0.01	0.69**	0.01
Egoistic consumption demands	0.71***	0.01	0.59**	0.03
Awareness of consequences	0.47**	0.05	0.64**	0.05
Circular economy strategies	0.66**	0.05	0.61**	0.05
Predicting turnover intention (T2)				
Hedonic values of entrepreneurs (T1)	-0.74***	0.02	0.69***	0.04
Hedonic consumption demands (T1)	-0.64**	0.03	0.72***	0.03
Egoistic values of entrepreneurs (T1)	-0.71***	0.02	0.75***	0.02
Egoistic consumption demands (T1)	-0.68***	0.04	0.70***	0.04
Awareness of consequences (T1)	0.42**	0.05	0.42**	0.05
Circular Economy Strategies (T1) Hedonic values x AWCS (T1)	–	–	0.66*** 0.39**	0.04
Hedonic consumption x AWCS (T1)	–	–	0.32**	0.04
Egoistic values x AWCS (T1)	–	–	0.40**	0.03
Egoistic consumption x AWCS (T1)	–	–	0.39**	0.05

Note: N = 475*, *p* < 0.05*, **p* < 0.01*, ***p* < 0.001*.*
Source: own study.

The egoistic values of entrepreneurs and demand for egoistic consumption also negatively impacted CE strategies, and therefore the results supported hypotheses 3 and 4. Egoistic values of entrepreneurs showed a lagged impact on the change of CE strategies over time (*Model* 2*: γ =* -0.71) and demand for

egoistic consumption (*Model* 2*: γ* = -0.68). Finally, awareness of consequences did show a moderate effect on CE strategies. AWCS moderated the adverse effects of hedonic and egoistic values on CE strategies design and implementation as it positively impacted CE strategies (*Model* 2*: γ* = 0.42). The findings imply that the chances of developing CE strategies are high when awareness of consequences is high.

Predicting Moderating Effect

Hypothesis 5 anticipated the differential moderating effect of AWCS on CE strategies (Model 5). The study multiplied the z-standardized variables measures at T1 and added the interaction terms to calculate the HNVE, HNVC, EGVE, and AWCS scores. The results in Table 4 show that AWCS moderated the hedonic and egoistic value's adverse effect on CE strategies. Therefore, hypothesis 5 was supported as the interaction of AWCS was positively related to the change of CE strategies over time-AWCS and hedonic values of entrepreneurs (*Model 5: γ* = 0.39*, p* < 0.01*);* ACWS and hedonic consumption (*Model* 5*: γ* = 0.32*, p* < 0.01*);* AWCS and egoistic value of entrepreneurs (*Model* 5*: γ* = 0.40*, p* < 0.01*).* and AWCS and egoistic consumption (*Model 5: γ* = 0.39*, p* < 0.01*(Table* 4*, Figure* 2*).*

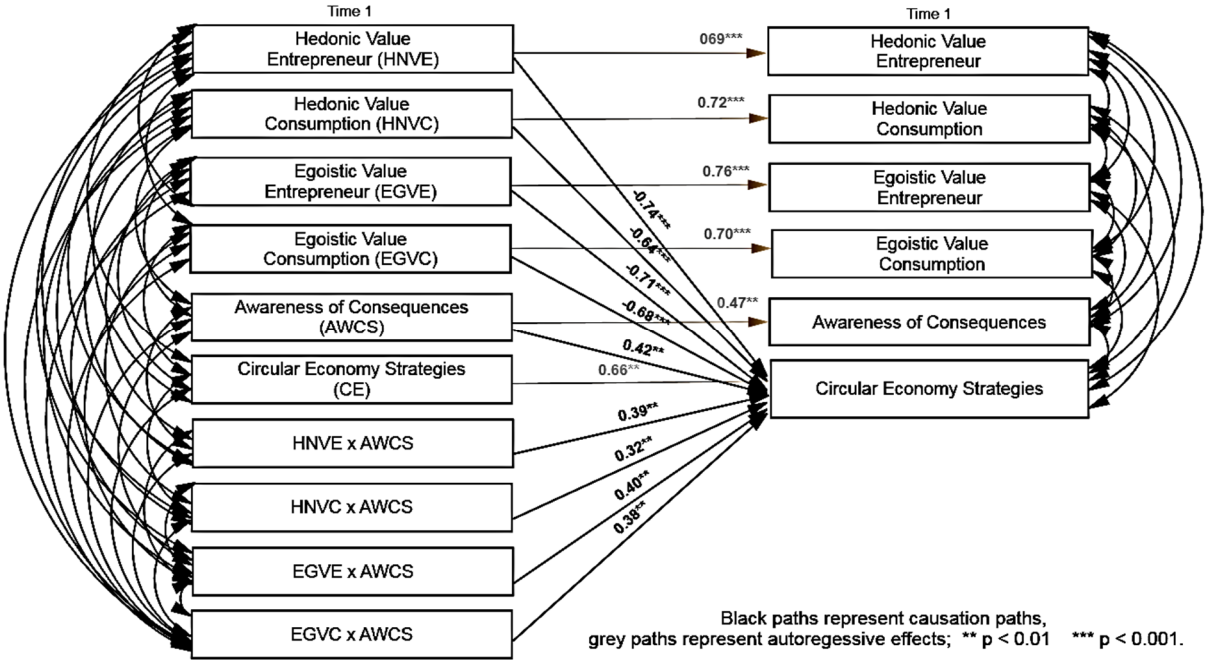

Figure 2. Moderation model
Source: own elaboration of empirical research.

Finally, we tested the complete structural model through the equation $\eta = B\eta + \Gamma\xi + \varsigma$ to examine the combined effect of hedonic and egoistic values on CE strategies.

The results of the complete SEM analysis in Figure 3 show that all the hypotheses are well-supported. The coefficient values of HNVE (0.61, p <.001) HNVC, (0.72 p <.001), EGVE (0.59 p <.001), and EGVC (0.48 p <.001) indicated a significant effect of these entrepreneurial values on CE strategies over time. The fit indices were above the recommended benchmarks (CFI = 0.990; GFI= 0.989, AGFI, 0.972, TLI = 0.988; RMSEA = 0.043).

Robustness and machine learning tests: Generalization

The study conducted machine learning cross-validation tests to predict the accuracy of the SEM results. The performance analysis test showed the predictive accuracy of entrepreneurial value's effect on CE strategies. We utilized the T1 data (n=477) as the training dataset, and for the validation dataset, T2 data (n=475) as suggested by Rashidi *et al*. (2023). Then, we subsequently conducted sensitivity and specificity tests, and analysed the resultant receiver operator characteristic (ROC) and area under the curve (AUC) graphs (Gareth, 2013). We examined the predictive distribution models' s through the

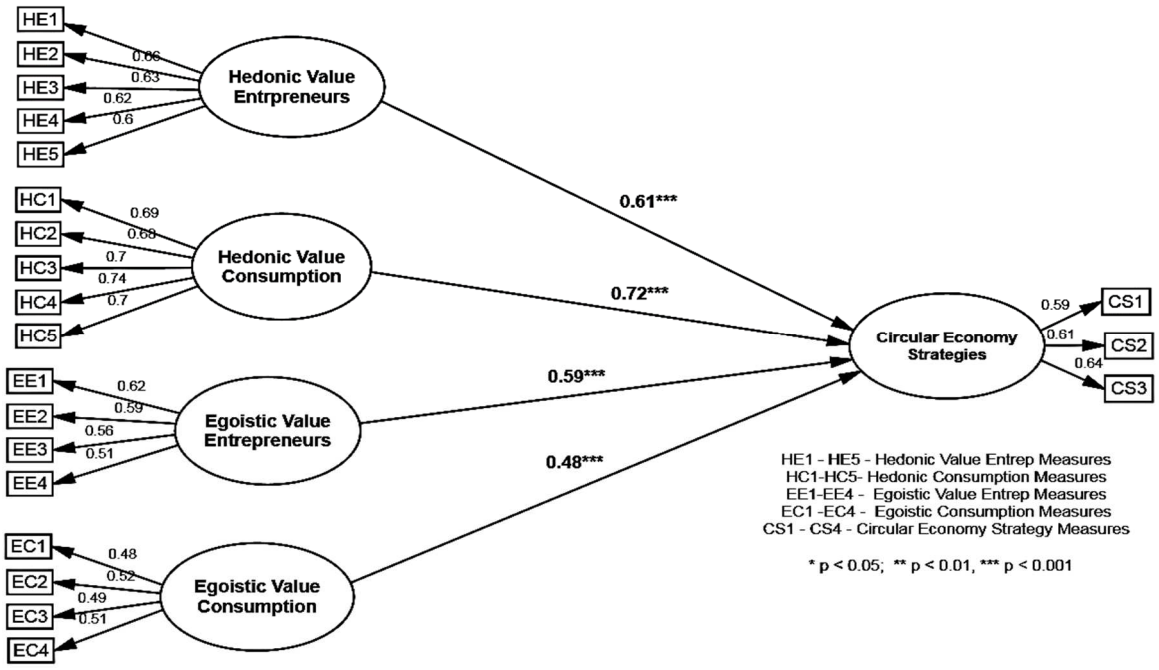

Figure 3. Default SEM model
Source: own elaboration of empirical research.

ROC. The positive rate (sensitivity) on the y-axis showed the sample's correct classification, while the x-axis indicating the false positive rate (1-specificity), showed incorrect classifications, if any. The F1 score (PRE score range 1.0 to 0.0 from excellent to poor) and recall (REC score range 1.0 to 0.0 from excellent to poor) balanced precision and recall. We utilized the following equation to calculate F1.

$$F1 = 2 \cdot (\mathrm{PRE} \cdot \mathrm{REC})/(\mathrm{PRE} + \mathrm{REC}) \quad (1)$$

Figure 4 and Table 5 demonstrate the SEM model's predictive accuracy in showing entrepreneurial value's effect on CE strategies. The model's accuracy in predicting each of the CE strategies was valid (HE-CE *0.967* algorithm-gradient boosting classifier, Figure 4a), HC-CE (*0.976* algorithm-decision tree classifier, Figure 4b), EE-CE (*0.931* algorithm-decision tree classifier. Figure 4c) and EC-CE (*0.928* algorithm-decision tree classifier, Figure 4d). Overall, the model accurately predicts entrepreneurial value's impact on CE strategies as the thresholds are appropriate (Tran *et al*., 2020) (Figure 4e).

Table 5. Parameter estimates of values-CE strategies model

Decision tree classifier	CE Strategies	
	Macro-precision	Cross-validation
Macro-precision	0.993	0.967
Accuracy	0.976	0.976
Macro-recall	0.971	0.931
Weighted precision	0.976	0.928
Macro F_1 Measure	0.981	0.971
Weighted F_1 Measure	0975	0.990
Weighted recall	0.976	0.989

Note: AUC range = 0 to 1. A model with predictions that are 100% wrong will have an AUC of 0.0, and a model with predictions that are 100% correct will have an AUC of 1.0.
Source: own study of empirical research.

Table 5 shows that cross-validation scores support F1 micro-precision scores and that the training and test datasets are coherent.

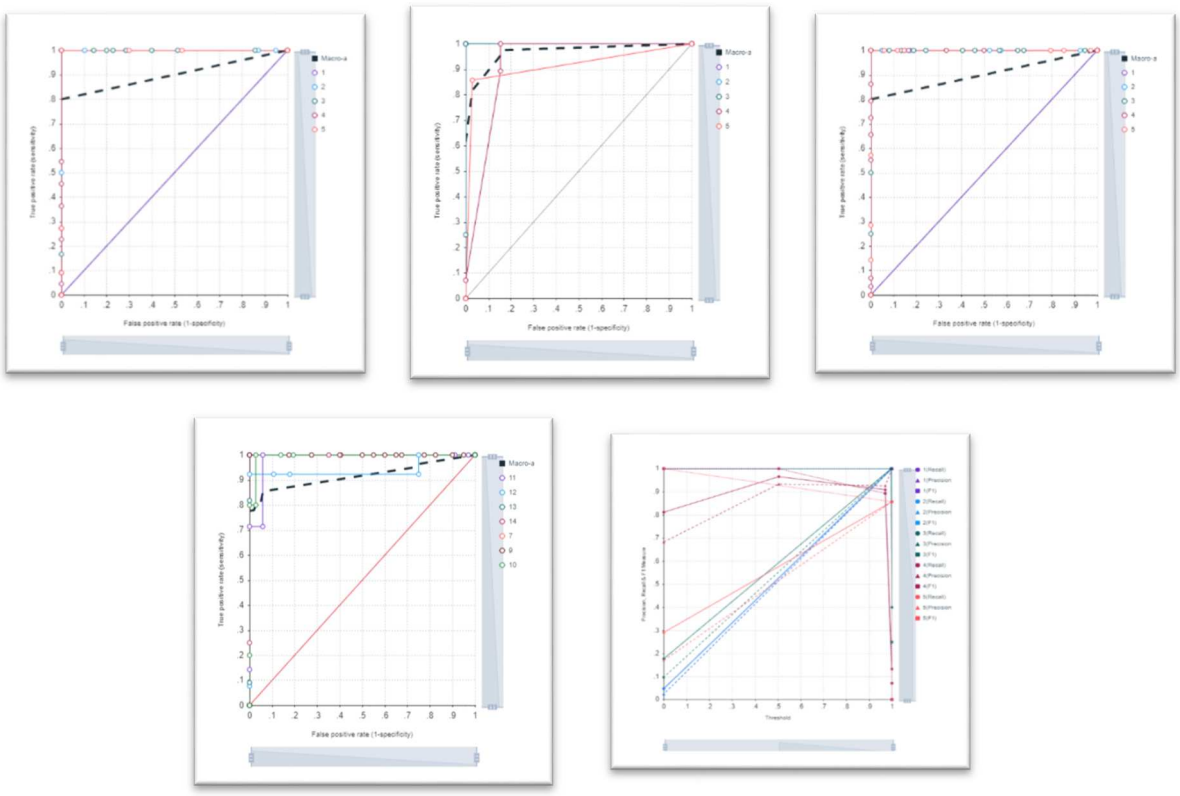

Figure 4. (a-e): ROC and AUC graphs predicting the probability of the impact of each entrepreneurial value on CE strategies
Source: own elaboration of empirical research.

Discussion and Implications

The study contributes to understanding of the deep-rooted entrepreneurial values that obstruct implementing CE strategies in an entrepreneurial context. The study argued that to disrupt and overturn well-established linear business practices in favour of CE strategies requires fundamental shifts in value and belief systems. Entrepreneurs struggle to find the motivation to abandon well-functioning value chains over waste-focused and cost-enhancing supply chain systems (Katinka *et al*., 2023; Johansson & Krook, 2021). Therefore, the study combined insights from NAM and VBN theories to illuminate the value- perspective and illustrate how values are critical to the adoption of CE strategies. Further, the study utilizing the goal framing theory related to hedonic and egoistic values demonstrates how these values influence the personal norms of entrepreneurs and consumers (Ryff, 2019). The study found that entrepreneurial values inspired by the free-market capitalist economy, which promotes hedonic and egoist consumption, conflict with CE values obstructing the adoption of CE strategies. The study reinforces the findings of Ettis *et al*. (2022), who posited that hedonic values are a significant motivation for entrepreneurial venturing. Arshi *et al*. (2022) pointed out that entrepreneurial venturing is an opportunity-driven behaviour, and venturing is a risky and complicated endeavour. Therefore, entrepreneurs seek to keep it straightforward, minimize risks, have better control and feel less stressed (Arshi *et al*., 2021). In the face of tension between self-enhancing entrepreneurial values and the adoption of CE strategies, the entrepreneurial values bolstered by opportunity exploitation and financial gains are often the winner, with broader CE practices becoming a casualty. Therefore, when hedonic and egoistic values dominate certain entrepreneurs, they will likely derail CE dissemination and growth. However, the study found that situational activators towards economic values are more dominant in certain industries such as heavy industries, agricultural, and petroleum sectors. Therefore, in less-demanding industries other entrepreneurial values, such as altruism and biospheric values, support the adoption of CE values and strategies (Gomes *et al*., 2022).

Hedonic and egoistic values are not restricted to the entrepreneurs alone but infiltrate the business model they design and implement. The primary reason for the dominance of these hedonic and egoistic values in business models is primarily attributed to hedonic and egoistic demand and consumption patterns (Wei *et al*., 2023; Yasir *et al*., 2021). Entrepreneurial hedonic values are complemented by demands for hedonic consumption, which completes the circularity of hedonic orientation, ultimately obstructing pro-environmental values from emerging or becoming dominant. Egoistically oriented consumers seek self-gain benefits through egoistic consumption by not accepting premiums for eco-friendly products (Helmi *et al*., 2023). These consumers face a psychological conflict between hedonic, egoistic, altruistic, and biospheric consumption. The entrepreneurs utilize this opportunity, further driving hedonic and egoistic consumption. However, new CE models are emerging that embed economic gains without violating CE principles and attract consumers with diverse values.

A fundamental value shift is required to espouse circular values and strategies. This chain of circularity between demand and supply can be weakened through awareness of the consequences of hedonic and egoistic consumption in conjunction with promoting altruistic and biospheric values at the individual and societal levels (Zhang *et al*., 2020; Gkargkavouzi *et al*., 2019). The extant literature did not move beyond the linearity of these relationships in unsupportive environmental behaviours. This study addressed it by examining the reverse and reciprocal relationships and found a reciprocal effect of the adoption of CE strategies on entrepreneurial values. The reason for this is that the adoption of some CE-related activities raises the awareness of entrepreneurs and consumers toward the personal and societal gains associated with CE strategies.

Theoretical contributions

Previous studies utilizing NAM and VBN theories have mainly studied in the context of pro-environmental behaviours (Canlas *et al*., 2022). Contrastingly, this study embedded the NAM and VBN theories to analyse unsupportive environmental behaviours and provide insights into specific values obstructing the adoption of CE values and strategies. The study contributed to the combined NAM and VBN theories by showing that the relationship between awareness of consequences, the ascription of responsibility, and norms and values are only partially linear. It showed a reciprocal relationship between values and environmental behaviours. It identified that awareness of consequences moderated the relationship between values and unsupportive environmental behaviours. The awareness of consequences was mostly posited as having a positive impact on CE adoption. However, the study pointed out that AC towards risks associated with CE adoption may lead to negative evaluation and therefore the awareness component should enthuse knowledge and affection towards CE. The awareness of consequences should create a cognitive and affective stimulant which will have a stronger PN and acceptance of CE responsibilities. The findings imply that these relationships are not straightforward, and the presence or absence of awareness of consequences may not switch environmental behaviours as negative evaluations are possible. Instead, it is a complex relationship and awareness of consequences can either strengthen or weaken the relationship between values and environmental behaviours.

CONCLUSIONS

Drifting from the dominant research focus on the entrepreneurial role in engaging in pro-environmental behaviours and CE, this study focused on value barriers specific to business venturing that derail CE adoption and diffusion, particularly in the entrepreneurial community. The study concluded that hedonic and egoistic values obstruct the adoption of CE strategies at two levels. Firstly, entrepreneurs' hedonic and egoistic orientations hinder the adoption of CE strategies. Secondly, consumers' hedonic and egoistic consumption choices influence entrepreneurs to design linear business models. The compulsion for both the supply can demand linear venturing is driven by traditional entrepreneurial and consumer values. A sound strategy and system to improve the credibility and diffusion of information, creating environmental affection can influence AC which moderates the effect of such values on environmental behaviours and CE. Considering the critical role of values, the integration of financial and CE values in the new and emerging business models can resolve the majority of the dilemmas associated with CE adoption

and attract customers with diverse values. A value-based framework that takes a two-sided view of the integration of financial objectives and CE practices can help in further theory development.

Future Research and Limitations

The extant literature has yet to conclude who creates entrepreneurial and consumer awareness towards CE's benefits to the individual, environment, and society. Trautwein *et al*. (2023) and Legros and Cislaghi (2020) highlighted the importance of social norms that may directly or indirectly create social awareness but could not establish how can it diffuse to various stakeholders. Recent evidence has shown that policy instruments and macro-level efforts to create awareness have produced weak results, especially in an entrepreneurial context, and need further research attention.

Future research should further explore the interactivity of the relationship between NAM and VBN variables instead of treating them in linearity. Researchers can analyse how the information that enhances the awareness of consequences is generated, disseminated, and made more credible. Future research studies can develop recommendations on how to enrich awareness through cognitive and emotional appeal. When both dimensions stimulate personal normal acceptance of responsibility among entrepreneurs can be higher.

The study had a few limitations. The first limitation of the study is that the study could not analyse the exceptional conditions under which hedonic and egoistic values could be instrumental in promoting pro-environmental behaviours and promoting the development of CE. The study's second limitation is that it only included participants with a stronger orientation toward hedonic and egoistic values more prevalent in certain industries, thereby limiting the insights into possible nuanced inclinations and sporadic activities they might have had toward CE.

REFERENCES

Al Mamun, A., Hayat, N., Mohiuddin, M., Salameh, A.A., Ali, M.H., & Zainol, N.R. (2022). Modeling the significance of value-belief-norm theory in predicting workplace energy conservation behavior. *Frontiers in Energy Research, 10*, 940595. https://doi.org/10.3389/fenrg.2022.940595

Ali, M.I.M., & Choe, P. (2022). Independent User Circular Behaviors and Their Motivators and Barriers: A Review. *Sustainability*, *14*, 13319. https://doi.org/10.3390/su142013319

Andersch, H., Arnold, C., Seemann, A.K., & Lindenmeier, J. (2019). Understanding ethical purchasing behavior: Validation of an enhanced stage model of ethical behavior. *Journal of Retailing and Consumer Services*, *48*, 50-59. https://doi.org/10.1016/j.jretconser.2019.02.004

Arshi, T.A., Ambrin, A., Rao, V., Morande, S., & Gul, K. (2022). A Machine Learning Assisted Study Exploring Hormonal Influences on Entrepreneurial Opportunity Behaviour. *The Journal of Entrepreneurship, 31*(3), 575-602. https://doi.org/10.1177/09713557221136273

Arshi, T.A., Islam, S., & Gunupudi, N. (2021). Predicting the effect of entrepreneurial stressors and the resultant strain on entrepreneurial behavior: an SEM-based machine-learning approach. *International Journal of Entrepreneurial Behavior & Research*, *27*(7), 1819-1848. https://doi.org/10.1108/IJEBR-08-2020-0529

Asano, R., Tsukamoto, S., Igarashi, T., & Huta, V. (2018). Psychometric properties of hedonic and eudaimonic orientations measures in Japan: the HEMA scale. *Current Psychology*, *40*(1), https://doi.org/10.1007/s12144-018-9954-z

Basso, B., Jones, J.W., Antle, J., Martinez-Feria, R.A., & Verma, B. (2021). Enabling circularity in grain production systems with novel technologies and policies. *Agricultural Systems*, *193*, 103244, https://doi.org/10.1016/j.agsy.2021.103244

Batson, C.D., Dyck, J.L., Brandt, J.R., Batson, J.G., Powell, A.L., McMaster, M.R., & Griffitt, C. (1988). Five studies testing two new egoistic alternatives to the empathy-altruism hypothesis. *Journal of Personality and Social Psychology*, *55*(1), 52-77. https://doi.org/10.1037/0022-3514.55.1.52

Bouman, T., Steg, L., & Kiers, H.A.L. (2018). Measuring Values in Environmental Research: A Test of an Environmental Portrait Value Questionnaire. *Frontiers in Psychology*, *23*(9), 564. https://doi.org/10.3389/fpsyg.2018.00564

Bianchini, A., Guarnieri, P., & Rossi, J.A. (2022). Framework to Assess Social Indicators in a Circular Economy Perspective. *Sustainability*, *14*, 7970. https://doi.org/10.3390/su14137970

Brandão, A.S., Gonçalves, A., & Santos, José M.R.C.A. (2021). Circular bioeconomy strategies: From scientific research to commercially viable products. *Journal of Cleaner Production*, *295*, 126407, https://doi.org/10.1016/j.jclepro.2021.126407

Braaten, A., Huta, V., Tyrany, L., & Thompson, A. (2019). Hedonic and eudaimonic motives toward university studies: how they relate to each other and to well-being derived from school. *Journal of Positive Psychology and Well-being, 3*, 179-196.

Canlas, I.P., Karpudewan, M., & Mohamed Ali Khan, N.S. (2022). More Than Twenty Years of Value-Belief-Norm Theory of Environmentalism: What Has Been and Yet to Be Done?. *Interdisciplinary Journal of Environmental and Science Education*, *18*(2), e2269. https://doi.org/10.21601/ijese/11801

Chang, R-D., Zuo, J., Zhao, Z-Y., Zillante, G., Gan, X-L., & Soebarto, V. (2017). Evolving theories of sustainability and firms: History, future directions and implications for renewable energy research. *Renewable and Sustainable Energy Reviews*, *72*, 48-56. https://doi.org/10.1016/j.rser.2017.01.029

Corvellec, H., Stowell, A.F., & Johansson, N. (2022). Critiques of the circular economy. *Journal of Industrial Ecology*, *26*, 421-432. https://doi.org/10.1111/jiec.13187

Dantas, R.M., Ilyas, A., Martins, J.M., & Rita, J.X. (2022). Circular Entrepreneurship in Emerging Markets through the Lens of Sustainability. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(4), 211. https://doi.org/10.3390/joitmc8040211

Damaneh, H.E. *et al.* (2023). Integrating the norm activation model and theory of planned behavior to investigate farmer pro-environmental behavioral intention. *Science Reports, 13*, 5584 https://doi.org/10.1038/s41598-023-32831-x

Ettis, S.A. (2022). How do personal values help to build Generation Y's entrepreneurial intentions? The role of gender differences. *Gender in Management*, *37*(1), 108-125. https://doi.org/10.1108/GM-02-2021-0035

Fan, Y., Chen, J., & Shirkey, G. *et al.* (2016). Applications of structural equation modeling (SEM) in ecological studies: an updated review. *Ecological Process*, *5*(19), https://doi.org/10.1186/s13717-016-0063-3

Foroozanfar, M.H., Imanipour, N., & Sajadi, S.M. (2022). Integrating circular economy strategies and business models: a systematic literature review *Journal of Entrepreneurship in Emerging Economies*, *14*(5), 678-700. https://doi.org/10.1108/JEEE-10-2021-0411

Gareth, J., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An Introduction to Statistical Learning: With Applications in Research*. New York: Springer, and New York, NY.

Genovese A., & Pansera, M. (2020). The circular economy at a crossroads: Technocratic eco-modernism or convivial technology for social revolution?. *Capitalism Nature Socialism*, 1-19. https://doi.org/10.1080/10455752.2020.1763414

Geissdoerfer, M., Savaget, P., Bocken, N.M.P., & Hultink, E.J. (2017). The circular economy: A new sustainability paradigm?. *Journal of Cleaner Production*, *143*, 757-768. https://doi.org/10.1016/j.jclepro.2016.12.048

Gkargkavouzi, A., Halkos, G., & Matsiori, S. (2019). Environmental behavior in a private-sphere context: Integrating theories of planned behavior and value belief norm, self-identity and habit. *Resources, Conservation and Recycling, 148*, 145-156. https://doi.org/10.1016/j.resconrec.2019.01.039

Gomes, G.M., Moreira, N., Bouman, T., Ometto, A.R., & Van der Werff, E. (2022). Towards Circular Economy for More Sustainable Apparel Consumption: Testing the Value-Belief-Norm Theory in Brazil and The Netherlands. *Sustainability* 2022, *14*, 618. https://doi.org/10.3390/su14020618

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2019). *Multivariate data analysis* (8th ed.). Boston: Cengage.

Hansla, A., Gamble, A., Juliusson, A., & Garling, T. (2008). The relationships between awareness of consequences, environmental concern, and value orientations. *Journal of Environmental Psychology, 28,* 1-9. https://doi.org/10.1016/j.jenvp.2007.08.004

Helmi, A., Marty, Y., Umi Kaltum, O., & Faisal, Y. (2023). The influence of hedonic values and extraversion on online impulse buying: Empirical evidence from Indonesia. *Innovative Marketing*, *19*(1), 48-58. https://doi.org/10.21511/im.19(1).2023.05

Heller, Marit, H., & Vatn, A. (2017). The divisive and disruptive effect of a weight-based waste fee. *Ecological Economics*, *131*(C), 275-285. https://doi.org/10.1016/j.ecolecon.2016.09.002

He, X., & Zhan, W. (2018). How to activate moral norm to adopt electric vehicles in China? An empirical study based on extended norm activation theory. *Journal of Cleaner Production*, *172*, 3546-3556, https://doi.org/10.1016/j.jclepro.2017.05.088

Hendrik, N., & de Jong, G. (2020). The impact of values and future orientation on intention formation within sustainable entrepreneurship. *Journal of Cleaner Production*, 266, 122052.

Henry, M., Bauwens, T., Hekkert, M., & Kirchherr, J. (2020). A typology of circular startups: An Analysis of 128 circular business models. *Journal of Cleaner Production*, *245*, 118528, https://doi.org/10.1016/j.jclepro.2019.118528

Hu, L.T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Huta, V., & Ryan, R.M. (2010). Pursuing pleasure or virtue: the differential and overlapping well-being benefits of hedonic and eudaimonic motives. *Journal of Happiness Studies*, *11*, 735-762. https://doi.10.1007/s10902-009-9171-4

Inigo, E.A., & Blok, V. (2019). Strengthening the socio-ethical foundations of the circular economy: Lessons from responsible research and innovation. *Journal of Cleaner Production*, *233*, 280-291. https://doi.org/10.1016/j.jclepro.2019.06.053

Johansson, N., & Krook, J. (2021). How to handle the policy conflict between resource circulation and hazardous substances in the use of waste?. *Journal of Industrial Ecology*, *25*(4), 994-1008. https://doi.org/10.1111/jiec.13103

Katinka, J.P., Bommel, Q.K.V., Erkelens, A.M., & Wempe, J. (2023). People at the heart of circularity: A mixed methods study about trade-offs, synergies, and strategies related to circular and social organizing. *Journal of Cleaner Production*, *387*, (135780), https://doi.10.1016/j.jclepro.2022.135780

Kirchherr, J., Yang, N.H.F., Schulze-Spüntrup, F., Heerink, M.J., & Hartley, K. (2023). Conceptualizing the Circular Economy (Revisited): An Analysis of 221 Definitions, *Resources, Conservation and Recycling*, *194*, https://doi.org/10.1016/j.resconrec.2023.107001

Krajnc, D., Kovačič, D., Žunec, E., Brglez, K., Kovačič, & Lukman, R. (2022). Youth Awareness and Attitudes towards a Circular Economy to Achieve the Green Deal Goals. *Sustainability*, *14*, 12050. https://doi.org/10.3390/su141912050

Kumar, A., & Pandey, M. (2023). Social Media and Impact of Altruistic Motivation, Egoistic Motivation, Subjective Norms, and EWOM toward Green Consumption Behavior: An Empirical Investigation. *Sustainability*, *15*, 4222. https://doi.org/10.3390/su15054222

Kębłowski, W., Lambert, D., & Bassens, D. (2020). Circular economy and the city: An urban political economy agenda. *Culture and Organization*, *26*(2), 142-158. https://doi.org/10.1080/14759551.2020.1718148

Khan, O., Daddi, T., & Iraldo, F. (2021). Sensing, seizing, and reconfiguring: Key capabilities and organizational routines for circular economy implementation. *Journal of Cleaner Production*, *287*, 125565. https://doi.org/10.1016/j.jclepro.2020.125565

Kirby, D.A., El-Kaffass, I., & Healey-Benson, F. (2022). Harmonious entrepreneurship: evolution from wealth creation to sustainable development. *Journal of Management History*, *28*(4), 514-529. https://doi.org/10.1108/JMH-11-2021-0060

Legros, S., & Cislaghi, B. (2020). Mapping the Social-Norms Literature: An Overview of Reviews. *Perspectives on Psychological Science*, *15*(1), 62-80. https://doi.org/10.1177/1745691619866455

Linder, M., & Williander, M. (2017). Circular Business Model Innovation: Inherent Uncertainties. *Business Strategy and Environment*, *26*(2), 182-196. https://doi.org/10.1002/bse.1906

Mansilla-Obando, K., Jeldes-Delgado, F., & Guiñez-Cabrera, N. (2022). Circular Economy Strategies with Social Implications: Findings from a Case Study. *Sustainability*, *14*, 13658. https://doi.org/10.3390/su142013658

Mavropoulos, A., & Nilsen, A.W. (2020). *Industry 4.0 and circular economy: Towards a wasteless future or a wasteful planet?* Hoboken, NJ: Wiley.

Moraga, G., Huysveld, S., Mathieux, F., Blengini, G.A., Karel, L.A., Acker, V., Meester, S.D., & Dewulf, J. (2019). Circular economy indicators: What do they measure?. *Resources, Conservation, and Recycling*, *146*, 452-461.

Niskanen, J., Anshelm, J., & Mclaren, D. (2020). Local conflicts and national consensus: The strange case of circular economy in Sweden. *Journal of Cleaner Production*, *261*, 121117. https://doi.org/10.1016/j.jclepro.2020.121117

Oh, J., & Ki, E-J. (2023). Extending norm activation theory to understand publics' support for environmentally responsible organizations. *Corporate Communications: An International Journal*, *28*(3), 381-399. https://doi.org/10.1108/CCIJ-03-2022-0024

Osburg, V.-S. A. P., Y. V. *et al.* (2019). The influence of contrasting values on consumer receptiveness to ethical information and ethical choices. *Journal of Business Research*, *104*. 366-379

Panait, M., Hysa, E., Raimi, L., Kruja, A., & Rodriguez, A. (2022). Guest editorial: Circular economy and entrepreneurship in emerging economies: opportunities and challenges. *Journal of Entrepreneurship in Emerging Economies*, *14*(5), 673-677. https://doi.org/10.1108/JEEE-10-2022-487

Prakash, G., Choudhary, S., Kumar, A., Garza-Reyes, J.A., Khan, S.A., & Panda, T.K. (2019). Do altruistic and egoistic values influence consumers' attitudes and purchase intentions toward eco-friendly packaged products?. *An empirical investigation, Journal of Retailing and Consumer Services, 50*, 163-169. https://doi.org/10.1016/j.jretconser.2019.05.011

Picot-Coupey, K., Krey, N., Huré, E., & Ackermann, C-L. (2021). Still work and/or fun? Corroboration of the hedonic and utilitarian shopping value scale. *Journal of Business Research*, *126*, 578-590. https://doi.org/10.1016/j.jbusres.2019.12.018

Rashidi, H.H., Albahra, S., Robertson, S., Tran, N., & Hu, B. (2023). Common statistical concepts in the supervised Machine Learning arena. *Frontiers in Oncology*, 13, https://doi.org/10.3389/fonc.2023.1130229

Rees, C.S., Breen, L.J., Cusack, L., & Hegney, D. (2015). Understanding individual resilience in the workplace: the international collaboration of workforce resilience model. *Frontiers in Psychology*, *6*, https://doi.org/10.3389/fpsyg.2015.00073

Rovanto, S., & Finne, M. (2023). What Motivates Entrepreneurs into Circular Economy Action? Evidence from Japan and Finland. *Journal of Business Ethics, 184*. 71-91. https://doi.org/10.1007/s10551-022-05122-0

Ruskin, J., Seymour R.G., & Webster, C.M. (2016). Why create value for others? An exploration of social entrepreneurial motives*. Journal of Small Business Management, 54*, 1015-1037.

Ryff, C.D. (2019). Entrepreneurship and Eudaimonic Well-Being: Five Venues for New Science. *Journal of Business Venturing*, *34*(4), 646-663. https://doi.org/10.1016/j.jbusvent.2018.09.003

Salesa, A., León, R., & Moneva, J.M. (2022). Is Business Research Shaping the Circle? Systematic and Bibliometric Review of Circular Economy Research. *Sustainability*, *14*, 8306. https://doi.org/10.3390/su14148306

Salvioni, D.M., Bosetti, L., & Fornasari, T. (2022). Implementing and Monitoring Circular Business Models: An Analysis of Italian SMEs. *Sustainability*, *14*, 270. https://doi.org/10.3390/su14010270

Savari, M., Damaneh, H.E., & Damaneh, H.E. *et al.* (2023). Integrating the norm activation model and theory of planned behavior to investigate farmer pro-environmental behavioral intention. *Science Reports, 13*, 5584. https://doi.org/10.1038/s41598-023-32831-x

Seymour, R.J., Webster, R.G., & Cynthia, M. (2016). Why Create Value for Others? An Exploration of Social Entrepreneurial Motives. *Journal of Small Business Management*, *54*(4), 1015-1037, https://doi.org/10.1111/jsbm.12229

Schwartz, S.H., & Butenko, T. (2014). Values and behavior? Validating the refined value theory in Russia. *European. Journal of Social Psychology, 44*, 799-813. https://doi.org/10.1002/ejsp.2053

Schwartz, S.H. (1992). Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, *25*, 1-65. https://doi.org/10.1016/S0065-2601(08)60281-6

Schwartz, S.H. (1977). Normative Influences on Altruism. In B. Leonard (Ed.) *Advances in Experimental Social Psychology* (vol. 10, pp. 221-279). Academic Press.

Selig, J.P., & Little, T.D. (2012). Autoregressive and cross-lagged panel analysis for longitudinal data. In B. Laursen, T.D. Little, & N.A. Card (Eds.), *Handbook of developmental research methods* (p. 265-278). NY: The Guilford Press.

Septiani, S., Najib, M., & Sumarwan, U. (2020). Egoistic and Altruistic Motives on the Purchasing Behavioral Model of Organic Food in the Indonesian Market, Conference: Proceedings of the 2019 *International Conference on Organizational Innovation*, January. https://doi.org/10.2991/icoi-19.2019.8

Shen, M., & Wang, J. (2022). The Impact of Pro-environmental Awareness Components on Green Consumption Behavior: The Moderation Effect of Consumer Perceived Cost, Policy Incentives, and Face Culture. *Frontiers in Psychology*, *13*, https://doi.org/10.3389/fpsyg.2022.580823

Singh, P., Sahadev, S., Wei, X., & Henninger, C.E. (2023). Modeling the antecedents of consumers' willingness to pay for eco-labeled food products. *International Journal of Consumer Studies*, *47*(4), 1256-1272. https://doi.org/10.1111/ijcs.12900

Staats, H., & Wilke, Henk, A.M. (2007). Situational and Personality Factors as Direct or Personal Norm Mediated Predictors of Pro-environmental Behavior: Questions Derived from Norm-activation Theory. *Basic and Applied Social Psychology*, *29*(4), 323-334. https://doi.10.1080/01973530701665058

Stern, P.C., Dietz, T., Abel, T.D., Guagnano, G., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: the case of environmentalism. *Human Ecology Review, 6*, 81-97. Retrieved from https://www.humanecologyreview.org/pastissues/her62/62sternetal.pdf on July 2, 2023.

Sutherland, B.R. (2020). Sustainably Heating Heavy Industry. *Joule*, *4*(1), 14-16, https://doi.org/10.1016/j.joule.2019.12.020

Tabachnik, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics.* London: Pearson International Education.

Tarka, P., Harnish, R.J., & Babaev, J. (2022). From materialism to hedonistic shopping values and compulsive buying: A mediation model examining gender differences. *Journal of Consumer Behavior*, *21*(4), 786-805. https://doi.org/10.1002/cb.2037

Temesgen, A., Storsletten, V., & Jakobsen, O. (2021). Circular economy – Reducing symptoms or Radical Change? *Philosophy of Management*, *20*(1), 37-56. https://doi.org/10.1007/s40926-019-00112-1

Tian, H., & Liu, X. (2022). Pro-Environmental Behavior Research: Theoretical Progress and Future Directions. *International Journal of Environmental Research and Public Health*, 31, *19*(11), 6721-6721. https://doi.org/10.3390/ijerph19116721

Tran, N.K., Albahra, S., Pham, T., Holmes, J., Greenhalgh, D., Palmieri, T.L. *et al*. (2020). Novel application of an automated-machine learning development tool for predicting burn sepsis: proof of concept. *Science Reports, 10*(1), 12354. https://doi.org/0.1038/s41598-020-69433-w

Trautwein, U., Babazade, J., Trautwein, S., & Lindenmeier, J. (2023). Exploring pro-environmental behavior in Azerbaijan: an extended value-belief-norm approach. *Journal of Islamic Marketing*, *14*(2), 523-543. https://doi.org/10.1108/JIMA-03-2021-0082

Van der Werff, E., & Steg, L. (2022). The psychology of participation and interest in smart energy systems: Comparing the Value-Belief-Norm theory and the value-identity-personal norm model. *Energy Research and Social Science*, *22*, 107-114.

Völker, T., Kovacic, Z., & Strand, R. (2020). Indicator development as a site of collective imagination? The case of European Commission policies on the circular economy. *Culture and Organization*, *26*(2), 103-120. https://doi.org/10.1080/14759551.2019.1699092

Vuorio, A.M., Puumalainen, K., & Fellnhofer, K. (2018). Drivers of entrepreneurial intentions in sustainable entrepreneurship. *International Journal of Entrepreneurial Behavior Research*, *24*, 359-381

Wang, B., Wang, X., Guo, D., Zhang, B., & Wang, Z. (2018). Analysis of Factors Influencing Residents' Habitual Energy-Saving Behaviour Based on NAM and TPB Models: Egoism or Altruism?. *Energy Policy*, *116*, 68-77.

Wei, S., Liu, F., She, S., & Wu, R. (2022). Values, Motives, and Organic Food Consumption in China: A Moderating Role of Perceived Uncertainty. *Frontiers in Psychology*, *13*, https://doi.org/10.3389/fpsyg.2022.736168

Wei, Q., Lv, D., Lin, Y., Zhu, D., Liu, S., & Liu, Y. (2023). Influence of Utilitarian and Hedonic Attributes on Willingness to Pay Green Product Premiums and Neural Mechanisms in China: An ERP Study. *Sustainability*, *15*, 2403. https://doi.org/10.3390/su15032403

Yulistyawati, E.T., Andriani, K., & Sunarti, U. (2020). The influence of utilitarian Value, hedonic Value, Social Value, and perceived risk on customer satisfaction: Survey of e-commerce customers in Indonesia, *Business: Theory and Practice*, Vilnius, *21*(2), 613-622.

Yasir, N., Mahmood, N., Mehmood, H.S., Rashid, O., & Liren, A. (2021). The Integrated Role of Personal Values and Theory of Planned Behavior to Form a Sustainable Entrepreneurial Intention. *Sustainability*, *13*, 9249. https://doi.org/10.3390/su13169249

Zhang, L., Ruiz-Menjivar, J., Luo, B., Liang, Z., & Swisher, M.E. (2020). Predicting climate change mitigation and adaptation behaviors in agricultural production: A comparison of the theory of planned behavior and the value-belief-norm theory. *Journal of Environmental Psychology, 68*, 101408. https://doi.org/10.1016/j.jenvp.2020.101408

Zioło, M., Bąk, I., & Spoz, A. (2023). Theoretical framework of sustainable value creation by companies. What do we know so far?. *Corporate Social Responsibility and Environmental Management*, *30*(5), 2344-2361. https://doi.org/10.1002/csr.2489

Appendix: Sample characteristics

Industry Type	Business Category	Sample Size	Business Age	Business Size (Employees)
Manufacturing	Cement Production	39	20	<200
	Aluminium Production	18	22	<150
	Household Goods	30	15	<150
	Electronics Equipment	29	9	<100
	Machine Tools	28	8	<100
	Auto Parts	36	11	<100
	Electrical Equipment	30	12	<100
Materials	Construction Materials	25	8	<100
	Metals	22	12	<100
	Mining	15	13	<100
	Chemicals	16	12	<100
Agriculture	Fertilizers	22	10	<100
	Seeds	17	14	<100
	Soil	18	15	<50
	Irrigation equipment	15	15	<50
Energy	Petroleum Products	12	20	<50
	Drilling	14	25	<50
	Pipelines	11	23	<40
Real Estate	Construction	12	21	<30
Consumer Goods	Apparel	15	11	<50
	Food	12	8	<30
	Diary	11	5	<50
Services	Gas	9	4	<50
	Entertainment	10	6	<20
	Hospitality	6	8	<20
	Travel	5	10	<20
Total		477		

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The contribution share of authors is equal and amounted to 50% for each of them.
TA – conceptualisation, Methods, Data Analysis- JW – Literature, Discussion, Interpretation, Conclusions.

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Conflict of Interest

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