BEHAVIORAL FACTORS, SDG AWARENESS AND SUSTAINABLE POLICIES IN ACADEMIA

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Abstract. *Behavioral factors, SDG awareness and sustainable policies in academia.* Successful implementation of sustainable activities in academic institutions requires an understanding of individual and organizational behavior as psychological factors can undermine technical solutions. We extend the Theory of Planned Behavior (TPB) by incorporating SDG awareness to investigate how psychological factors influence the sustained activities of academic unit heads in European countries. The model is estimated using Partial Least Squares-Structural Equation Modeling (PLS-SEM). The results support the use of behavioral models to explain the decision-making process at the academic level. In particular, subjective norms, perceived behavioral control, and SDG awareness play an important role in shaping sustainable activities in science. In contrast, moral attitudes do not influence academic decisions.

1. Introduction

Sustainability is a pressing issue in society, and higher education institutions (HEIs) have a crucial role to play in ensuring sustainable development. HEIs are uniquely positioned to transform people and society, shaping labor skills essential for the future low-carbon economy (Murga-Menoyo, 2014). Universities have embraced sustainability principles by redesigning curricula, greening campuses, and building local, regional, and international networks to influence student behavior (Adams et al., 2018). However, progress has been criticized for being technologically opportunistic and lacking coordination, leadership, and coherence (Ramos et al., 2015; ISCN Secretariat, 2014; Butt et al., 2014; Martin et al., 2013). The potential role of universities in achieving sustainable development has yet to be fully explored and exploited (Chankseliani & McCowan, 2020). To address this gap, this study implemented the Theory of Planned Behavior (TPB) by adding the role of SDG awareness to classical variables of moral attitude, subjective norms, and perceived behavioral control.

The study aims to understand whether academic environmental awareness and cognitive components play a significant role in behavior and whether it effectively

achieves improvements. The TPB is a widely used theory to explain human behavior (Ajzen, 1985). Previous studies have used TPB to predict human intention and behavior related to sustainability in higher education institutions (Davis et al., 2008; Wu & Wu, 2008; Chen et al., 2010; Thoo et al., 2021). However, previous studies mainly looked at a sample of students or non-academic staff to predict outcomes at the individual level. This study contributes to this gap by implementing the TPB by adding the role of SDG awareness to the classical variables of moral attitude, subjective norms, and perceived behavioral control. This method allows us to isolate the effect of awareness of the SDGs in academia and to understand better the impact on intention and positive behavior in a sustainable policy. In conclusion, this study highlights the importance of understanding the role of psychological and behavioral factors in promoting sustainable policies in academic institutions. The results indicate that SDG awareness plays a significant role in achieving positive behavior.

The rest of this paper proceeds as follows. Section 2 presents the theoretical framework, introduces the positive behavior analyzed, and formulates the research hypotheses accordingly. Section 3 illustrates the specified PLS-SEM model and describes how the constructs are measured, data collected, and hypotheses tested. Section 4 presents the results. Section 5 discusses the main results and their implications.

2. Background

The topic of management decisions related to sustainable activities at the university level is a recent area of research, and the factors driving "green" academic policies are still under discussion and analysis (Ghasemy et al., 2020). Previous literature on this subject has demonstrated that management decision-making processes are complex, influenced by various factors (Matthews et al., 1994). Higher education institutions face additional external forces that affect management decisions due to their crucial role in promoting sustainable development through teaching, research, operations, and knowledge transfer activities (Muller-Christ et al., 2014). Therefore, finding a single framework to explain this behavior is challenging. Khan et al. (2020) suggests studying the pro-environmental behavior of organizations in a context where the Theory of Planned Behavior (TPB) proposed by Ajzen (1991) holds. According to TPB (Ajzen, 1991), attitudes, subjective norms, and perceived behavioral control can predict the intention to perform a particular behavior (Mondéjar-Jiménez et al., 2016). The central assumption of this model is that intention strongly influences behavioral performance. TPB is an extension of the Reasoned Action Theory (TRA) of Fishbein and Ajzen (1975) and Ajzen and Fishbein (1980) and is a prominent framework in studies predicting outcomes at the

managerial level (Papagiannakis & Lioukas, 2012; Sánchez-Medina et al., 2014). Additionally, this theory is also useful for studying academic management intentions and behaviors regarding environmental issues (Khan et al., 2020).

Our paper defines positive behavior as sustainable activities implemented by the academic unit that lead to significant behavioral changes at the academic level. By adding this variable, we disentangle the effect of the university policy by focusing on the specific awareness of the SDGs, thus capturing the specific effect. Given the complexity of the management decision-making process, this study proposes the following hypotheses:

RH1: The moral attitude, social norms, and perceived control behavior of decision-makers positively influence both academic unit intentions and positive behavior toward sustainable activities.

RH2: The awareness of the SDGs of decision-makers positively influences academic unit positive behavior toward sustainability by mediating intentions.

3. Data and methods

The DECODE Sustainability project provides data on how academics perceive sustainability initiatives at their academic units. A Europe-wide sample distribution is utilized, with 50% of respondents from Northern European countries, 27% from Southern Europe, and 23% from Eastern Europe. Questions are asked to cover the economic, social, and environmental dimensions of sustainable development affected by SDGs as described by the UN. Environmental dimension is the most prevalent, followed by social and economic dimensions. Most of respondents are Deans or Directors/Heads of Academic Units (82%). A preliminary cleaning of the dataset was conducted, with 58.72% (495) of the questionnaires completed by answering all questions. The questions most helpful in constructing the latent variables predicted by the theory of planned behavior were identified based on the literature (Mondèjar-Jiménez et al., 2016), resulting in a final dataset of 104 observations. The number of observations guarantees a powerful application of PLS-SEM. The geographical distribution of the responses reflects the distribution of the full set of respondents. We cannot control for the field of study, and it could of course be an in-depth for future analysis. The analytical framework that is best suited for studying theory development in this context is SEM modeling with the PLS path approach (Monecke & Leisch, 2012; Rigdon, 2012). SEM models consist of two main parts: the measurement (inner) model and the structural (outer) model. The structural model describes constructs and links between them, while the measurement model specifies the relationship between constructs and indicators (manifest variables) (Keith, 2006; Kline, 2011). SEM combines regression and

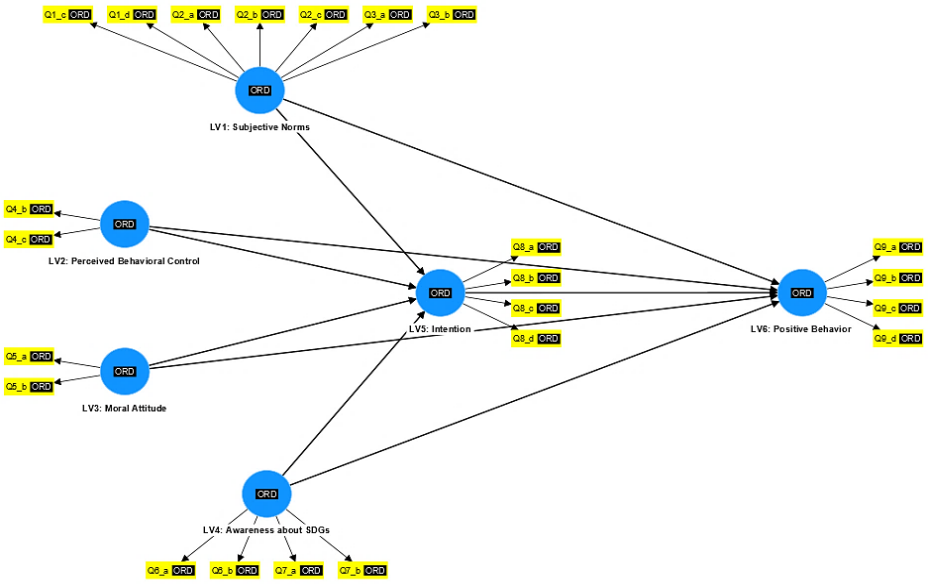
factor analysis, making it useful in examining latent unobserved and observed variables. It combines path and factor analytic techniques in one predictive model (Keith, 2006). PLS-SEM can be considered a variance-based approach to SEM and is useful for predicting and explaining target constructs (Mateos-Aparicio, 2011). PLS-SEM models have two attractive key advantages in behavioral and socio-economic studies: a) they work efficiently with small sample sizes and complex networks; b) they relax assumptions about the underlying data concerning classical regression methods (Cassel, Hackl, Westlund, 1999). According to operational rules discussed in the literature, the sample size should be equal to the greater of ten times the number of formative indicators that represent the single construct in the structural model (Barclay, Higgins, & Thompson, 1995).

In recent years, the Partial Least Squares-Structural Equation Modeling (PLS-SEM) approach has gained increasing popularity in various disciplines, including psychology, sociology, education, and economics (Khine, 2013). PLS-SEM has been successfully applied to various fields such as strategic management (Hair et al., 2012a), marketing (Hair et al., 2012b), tourism (do Valle & Assaker, 2016), human resource management (Ringle et al., 2018), and hospitality (Ali et al., 2018). In the area of higher education research, there has been an increase in the number of publications using PLS-SEM since 2015, indicating the growing theoretical contributions and rigorous models (Ghasemy et al., 2020). Previous studies have applied SEM models to study leadership and policy application in academic areas (Ronald & Rosser, 2000). There have also been examples of PLS-SEM applications for policy evaluation, such as the study by Ibrahim and Al-Matari (2022). Table 1 presents a list of the Latent Variables (LVs) in the structural model and their corresponding indicators in the measurement model. The latent variables are classified into two groups: endogenous and exogenous factors, based on whether they have any predecessors in the model. Figure 1 illustrates the structural model used in this study and the relationships between the latent variables. This model includes two endogenous variables, Intention and Positive Behavior, which are discussed in detail in the subsequent sections. As a result of this study, two models have been proposed:

$$LV_6 = \beta_1 2LV_1 + \beta_2 2LV_2 + \beta_3 2LV_3 + \beta_4 2LV_4 + \beta_1 6LV_5 + z_2 \quad (1)$$

where LV_g are the latent variables $g \in 1, \ldots, 6$, β_{gn} are the generic coefficients,and z_g denotes the error terms assumed to be centred around zero, i.e. $E(z_g) = 0$. Figure 1 shows the complete inner and outer components of the model, which correspond to the RHs that have been specified in the previous section. We use SmartPLS 4 software to evaluate the model.

Figure 1 – *The specified inner and outer models.*



4. Results

In this section, a two-stage analysis is performed to examine the results of the PLS-SEM model. To evaluate the measurement models, we first estimate the indicators and construct reliability as well as the convergent and discriminant validity of the constructs. In a second step, we evaluated the structural model for its ability to predict endogenous constructs based on its goodness-of-fit, cross-validated redundancy, and path coefficients.

4.1. Measurement model

We evaluate reflective measurement model considering reliability and validity (Table 2). In this kind of model latent constructs cause the measured variables and the error results in an inability to fully explain these measures. Following Hair et al. (2011), item reliability is determined by considering standardized outer loadings, which are greater or slightly less than 0.70. Nevertheless, indicator loadings between 0.40 and 0.70 are also acceptable if the average variance extracted (AVE) of the construct is higher than 0.50 (Hair et al., 2012b; Kahn et al., 2020). We have found that all indicator loadings are between 0.650 and 0.871 (see Table 2). However, two indicators for subjective norms and one for the construct of perceived behavioral

control are eliminated since we found that the AVE was less than 0.5. Thus, after deleting the three indicators mentioned above, our study fulfills the criteria of indicator reliability and convergent validity. To assess convergent validity, we refer to the AVE, defined as the overall mean of the squared loadings of the indicators associated with the construct. Our study found that AVE values are equal to or greater than 0.50 (between 0.50 and 0.67). To evaluate internal consistency, we use composite reliability (CR). According to previous literature, CR values should ideally be higher than 0.70 (Ali et al., 2018; Hair et al., 2011). As a result, we can conclude that the composite reliability of the six constructs is also satisfied, as these values range from 0.774 to 0.878. Therefore, we can conclude that this study fulfils internal and convergent consistency criteria. To determine discriminant validity, we used the Fornell-Larcker criterion (Fornell & Larcker, 1981). It compares the correlation between the latent variable and the square root of the AVE values (Chin, 2010). Moreover, the square root of the AVE of each construct is more significant than its strongest correlation with any other construct, as shown in Table 2. As a final step, we evaluated the impact of multicollinearity by looking at constructs and indicators' variance inflation factor (VIF). Following Hair et al. 2019, the VIF values of all constructs should not exceed 3.0 to be considered valid. The estimate of VIF for each construct and indicator in our study ranges between 1,138 and 2,378 points. Based on the criteria referenced above, we can conclude that the measurement model chosen for our study matches our research goals. Therefore, we can move on to the evaluation of the structural model.

4.2. Structural model

Validation tests performed in the previous section ensure the goodness of the estimated model. In this section, the significance of the emerging relationships will be analyzed. Standard errors have been computed by bootstrapping with 5000 sub-samples (with replacement). It protects against geographical effects and various types of confounding due to selection bias. We consider a relationship statistically significant at 1% level (p-value < 0.01). In this sense LV4 (Awareness about SDGs) emerges as the most significant variable with or without the mediation of LV5 (Intention). The mediating effect is significant 0.318 (0.001) and it implies an improvement of R-square from 20.6% to 45.5% of the information explained. The detailed analysis of direct, indirect, and total effects (Table 4) reveals that LV1 (Subjective Norms) and LV3 (Moral Attitude) have a significant total effect but neither the direct nor the indirect effect individually are significantly highlighting the significant role of Intention. In general, 4 out of 5 relationships have a significant role in the model.

Table 1 – *Latent variables and manifest variables.*

LV1: Subjective Norms	Q1. Which professional development opportunities does your academic unit offer to its educators: a) Didactical/pedagogical skills-buildings b) Content knowledge on sustainability or SDG topic c) Opportunities to engage in multidisciplinary teaching teams d) Support for sustainability-related program management
	Q2. Which professional development opportunities does your academic unit offer to its educators: a) Multidisciplinary research skills & methodologies b) Content knowledge on sustainability or SDG topic c) Opportunities to engage in multidisciplinary teaching teams
	Q3. Which professional development opportunities does your academic unit offer to its academic staff: a) Community or service-learning methods for educators b) Citizen science research methods for researchers
LV2: Perceived Behavioral control	Q4. The sustainable strategy of our academic unit is influenced by: a) Our institution's sustainability strategy b) National or regional strategies c) SDGs & the UN's 2030 agenda
LV3: Moral Attitude	Q5. What are the key obstacles that stand in the way of your academic staff to undertake sustainability initiatives? a) Lack of knowledge about sustainability related topics b) Lack of competencies
LV4: Awareness about SDGs	Q6. Academic staff in our unit are: a) Well-aware of our unit's sustainable ambitions b) Participating in our unit's sustainability related decision making
	Q7. Students at our academic unit are: c) Well-aware of our unit's sustainable ambitions d) Participating in our unit's sustainability related decision making

Table 1 – *Latent variables and manifest variables (continued).*

LV5: Intention	Q8. Attention to sustainability or SDGs is likely to increase in the next five years in our academic unit's: a) Teaching b) Research c) Social engagement d) Operation and administration
LV6: Positive behavior	Q9. Over the last three years our academic unit has made good progress towards embedding sustainability in the following activities: a) Teaching b) Research c) Social engagement d) Operation and administration

Table 2 – *Reflective model: reliability measurements.*

Construct	Composite Reliability	AVE
LV 1 Subjective Norms	0.877	0.505
LV 2: Perceived Bheavioral Control	0.803	0.671
LV 3: Moral Attitudes	0.774	0.634
LV 4: Awareness about SDGs	0.861	0.608
LV 5: Intention	0.878	0.643
LV 6: Positive Bheavior	0.803	0.506

Table 3 – *Estimated direct, indirect, and total effects. Notes: Significance level: *** p-value<0.01; ** p-value<0.05; * p-value<0.10.*

	Direct Effect		Indirect Effect		Total Effect	
	Estimate	Sign	Estimate	Sign	Estimate	Sign
LV1 → LV5	0.2				0.2	
LV1 → LV6	0.183		0.064		0.247	***
LV2 → LV5	-0.003				-0.003	
LV2 → LV6	-0.045		-0.001		-0.046	
LV3 → LV5	-0.06				-0.06	
LV3 → LV6	-0.182		-0.019		-0.201	**
LV4 → LV5	0.300	***			0.300	***
LV4 → LV6	0.283		0.096	*	0.379	***
LV5 → LV6	0.318	***			0.318	***

5. Discussion and concluding remarks

This paper applies the theory of planned behavior to analyze the effect of awareness of the SDGs on positive behavior in terms of sustainable academic policies. The estimated structural equation model allows us to isolate the impacts of SDG awareness from other factors (latent variables) that might influence the achievement of a good outcome. In this sense, high awareness is necessary to achieve positive behavior. In contrast, perceived behavioral control is not significant in any of the estimated models. Furthermore, the mediating effect of intention is effective in describing the observed variance in positive behavior: the improvement in the model is about 20%. Although policies and funding programs for research and innovation are prime instruments to support the green transition, behavioral aspects play a significant role in this story. For an environmental policy to be effective, voluntary, or educational components (moral, awareness) are much more effective than coercive components (perceived behavioral control). The policy proposal is quite straightforward: simply funding instruments will be ineffective if there is a lack of environmental awareness and collaboration among academic unit leaders. In our recommendation, policymakers should integrate an investment plan to achieve green transition at the academic level, with an educational program for academic staff and deans. By educating deans and staff, the university can become more aware of their environmental impact and work towards a greener future. Achieving a more sustainable development model at the academic level requires a combination of drastic transformation, not only in terms of hard assets (like technologies and infrastructures) but also in terms of culture and values, behaviors, and practices.

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