

Research

Collectivism-based organizational culture, green empowerment, environmental self-identity and workplace green behavior: the stimulus-organism-response perspective

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Abstract

Drawing on the stimulus-organism-response theory, the present study aims to investigate the mediating role of environmental self-identity on the relationship of collectivism-organizational culture and green empowerment with employee's workplace green behavior. By adopting procedural remedy and purposive sampling approach, data was collected from 207 administrative employees in higher education institutions of China. Response rate in this study is 41.40%. The authors employed partial least square -structural equation modelling to validate the proposed hypotheses. The current empirical findings confirmed the direct effect of collectivism-organizational culture and green empowerment on employee's environmental self-identity. It is also proven that environmental self-identity significantly and positively influence employee's workplace green behavior. This study concludes with significant positive indirect impact of collectivism-organizational culture and green empowerment on the employees WGB through environmental self-identity. This study enriches the literature on sustainable development by examining the integrated relationship of collectivism-organizational culture, green empowerment, self-identity and green behavior. The limitations and implications have been elaborated at the end of research.

Keywords Sustainability · Organizational culture · Empowerment · Mechanism · Higher education · Time-lagged · Asia

Abbreviations

HEIs	Higher Education Institutions
SOR	Stimulus-organism-response
SR	Stimulus response
WGB	Workplace green behavior
COC	Collectivism-based organizational culture
ESI	Environmental self-identity
GE	Green empowerment

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1 Introduction

It has been reported by the National Aeronautics and Space Administration that the average temperature on our motherland has increased up to 16.87 °C [1, 2]. At the international forum, high carbon emission and carbon neutrality has become a topic of discussion. The world sustainability is seriously in danger in view of high air pollution, increased carbon emission, land deterioration and contaminated potable water [3]. In term of greenhouse gas emission, the country-wise report has ranked China at top followed by United states of America [4]. China is responsible for its 31% contribution to the world greenhouse gas emission. In China, the higher education institutions are ranked at top with their 40% of total energy consumption among public companies [5]. Keeping high energy and water consumptions, increasing air pollution, the practitioners and policy makers are highly focused about transformation of these energy-consumptions driven higher education institutions into green campuses [6] which requires critical role of employees in the shape of their workplace green behavior (WGB). In addition, the United Nations sustainable development goals allocate substantial weightage to the higher education institutions which might play critical role fostering sustainable development at the social, country, and international level [6, 7]. Accordingly, it is of utmost importance to explore the phenomenon of sustainability challenges in the higher education institutions domains. Thus, this study focuses on the promotions of WGB in Chinese higher education institutions.

As human activities are direct source of greenhouse gas emission and global warming index, and all single individuals are responsible for environmental challenges, the practitioners and academicians are highly recommending to ignite employee's workplace green behaviors [8]. In spite of increased awareness related to environmental crisis, workplace green behaviors are not being practices at adequate level [8–10]. The extent studies have also claimed numerous factors such as ethical leadership [11], green climate [12], job satisfaction [13], social ties [14] and pro-environmental attitudes [15] which emerged as strong determinants of employee's workplace green behavior. Nevertheless, there is scarcity of studies related to factors driving employee's workplace green behavior in higher education institutions [16]. To spur employee's workplace green behaviors, the changes in strategic planning initiatives, collaborative efforts, effective organizational structures, organizational culture and efficient decision-making processes are emphasized among university faculty and staff members [17]. Organizational culture is concluded with significant direct and indirect impact on individual behaviors [18]. Managerial practices that match to collectivism, group-oriented principles such as group aims, goal setting participation and decision-making, have been proven to be beneficial in collectivistic cultures in China [19]. Accordingly, collectivism-based organizational culture is merged as highly vital to enhance employee's workplace green behavior because of its emphasis on organizational goals, values, norms and activities [20]. In addition, empowerment is also critical for employees to execute their green activities which results into their green goal accomplishment [21]. Employees' green behavior requires empowerment at one of these four levels i.e., initiation, advancement, integration and commitment. In view of this, green empowerment drives employees' activities and keep them engaged in compliance with firms' operations, development, and continuous management [22]. Following the recommendation of Gu and Liu (2022) and Francoeur et al., (2021), the present study aims to examine the mechanism of collectivism-based organizational culture and green empowerment with employee's workplace green behavior [23, 24].

Although numerous theories such as the norm activation model, the value-belief-norm theory and theory of planned behavior have been applied to investigate the phenomenon of human behavior. Nevertheless, there is scarcity of studies on the application of environmental emotion from human psychology perspective [25]. In this regard, the stimulus-organism-response (SOR) theory refers to a process where external stimuli causes emotional and cognitive states variations which results into reaction [26, 27]. The SOR theory has been also applied in the context of decision-making abilities and low-carbon travel [25, 28]. The stimulus is external information that has a particular impact on individuals. The organism indicates cognitive and emotional processes generated by external information stimulation. Cognitive state concerns about an individual psychological functions related to information processing to decide. The affective state emphasizes on the feelings or emotional experience of individuals [29, 30]. The response indicates the psychological reactions such as attitudes and/or behavioral reactions [29, 31]. On the same line, employee's green behavior is also a reaction of the body's reception. The SR theory states that sensations and actions are generated by the external environment, without considering personal reactions to the stimulus. Fatoki figured out that people who concerned about the environment were more likely to find personal fulfilment in pro-environmental behavior [32]. As Ajibade and Boateng reported that environmental self-identity was significantly associated with engagement in sustainable behavior [33]. Accordingly, this study employs SOR theory to investigate

mechanism of environmental self-identity on the relationship of collectivism-based organizational culture and green empowerment with employee's workplace green behavior. In current research, collectivism-based organizational culture and green empowerment work as stimulus, environmental self-identity is considered as organism, employees' workplace green behavior is the response. In the process, an employee is supposed to convert the stimuli into meaningful information and cause a change in the cognitive and emotional states, and consequently take behavioral reactions. Hence, this study aims to examine the mediating role of environmental self-identity on the relationship of collectivism-based organizational culture and green empowerment with employee's workplace green behavior.

The present work offers numerous contributions to the theory, organizational culture, psychology and environment management. First, the present study fills the research gap and responds to the calls of Gu and Liu (2022) and Francoeur et al., by exploring the potential mechanism on the relationship of organizational culture and empowerment with employee's workplace green behavior [23, 24]. Second, the current research extends the literature on SOR theory reaction [26, 27] by offering empirical evidence related to collectivism-based organizational culture, green empowerment, environmental self-identity and employee's workplace green behavior. Third, this study enriches the contextual evidences by analyzing the sample data set from employees in Chinese higher education institutions. Fourth, the present research is pioneer in its nature by exploring the role of green empowerment and collectivism-based organizational culture as stimulus and environmental self-identity as organism. Fifth, the extent studies have reported scarcity of research on sustainability aspects of higher education while these institutions are vital to boost green behaviors [5]. Therefore, the current study also offers vital empirical evidence to develop and execute highly relevant policies to ignite such environmentally friendly behaviors within higher education institutions.

2 Theoretical background

To comprehend the intricacy of human behaviors [34], the stimulus-organism-response (SOR) theory was employed in previous studies such as low-carbon travel [25] and decision-making abilities [35]. According to the SOR model in psychology, the "O" representing the organism has an active and mediating effect. The organism, considered as the second component of the S-O-R paradigm, pertains to individuals' internal cognitive and affective states that exist between the outside stimuli and personal reaction [36]. The SOR theory can be utilized to explain how individuals conduct behavioral reactions to the external environment stimuli [37]. The SOR theory highlights the influence of an outside environmental stimulus over personal psychology. The stimulus is external information that has a particular impact on individuals. The organism indicates cognitive and emotional processes generated by external information stimulation. The response is individuals' action produced as a result of a succession of sensory and psychological actions [25].

Most research utilize the SOR theory to investigate consumer behavior, which is generally shown as a process in which consumers are subjected by external stimuli, causing personal cognitive and emotional variations and reactions [38]. Employees' green behavior, on the other hand, is also a significant consequence of the body's reception. Therefore, this study extends the SOR theory to the research on employees' workplace green behavior. The present study employs environmental self-identity as the mediator and construct the model of the effect of green empowerment, COC on EWGB. While the cognitive state in the process of thought regarding an information-processing view of an individual's psychological functions, the affective state reflects the experience of feeling or emotion such as excitement, pleasure, and arousal. The response, the final outcome or final action toward or reaction of individuals, pertains to psychological reactions such as attitudes and/or behavioral reactions [29]. In the present study, green empowerment and COC are considered as stimulus, employees' environmental self-identity is considered as organism, EWGB is the response. In the process, an employee is supposed to convert the stimuli into meaningful information and cause a change in the cognitive and emotional states, and consequently take behavioral reactions.

3 Hypotheses development

3.1 Collectivism-based organizational culture and environmental self-identity

A person's beliefs and behaviors can be impacted by organizational or personal identities. Previous research have found that when the prominent foundation for self-concept is a particular social identity, individuals' activities will turn to organization-based and directed by that kind of organizations [25]. If organizational culture is not in the prominent

position, people's sentiments and activities would keep in conformity with their individual and distinctive traits instead of organizational culture [38]. Consequently, people prefer to participating in certain activities if those are consistent with organizational principles and culture, especially when the identity is a prominent foundation for personal concept.

Collectivism-based organizational culture refers to the culture where organizations aims to encompass all of an organization's values, norms and activities [38]. According to previous studies, leaders in organizations with collectivism culture are more likely to create the collective identity in organizations. People who closely associate with their organizations will be influenced by organizational culture. In a similar vein, while individuals' recognition can be significant changed within a context, their authentication as either egoist or exocentric indicates the possibility for them to display behaviors that align with either individualistic or collectivistic values in the majority of contexts [31, 39].

Environmental self-identity refers to the extent an individual regards himself as a person who cares about environment and are willing to exhibit pro-environmental behavior [40]. Employees environmental self-identity can be improved by organizational culture, because employees are more likely to have a sense of belonging when they find that their expectations corresponds to their organizational culture [39]. Therefore, organizational culture helps staffs to create an environmental perception congruent with their organizations through conveying organizational environmental standards and beliefs. Based on the above argument, hypothesis is organized as follows:

Hypothesis 1 Collectivism-based Organizational Culture positively affects environmental self-identity in the workplace.

3.2 Green empowerment and environmental self-identity

Empowerment ensures that employees experience higher pleasant and greater sense of control. Green empowerment concerns actions towards the operation, development, and ongoing management of organizations in order to make employees engage in green behavior [41, 42]. By offering insights related to environmental pursuits, green empowerment enhances employees organizational commitment [43]. While experiencing empowerment, employees view themselves as crucial element of their organizations [44]. In return, they exhibit higher responsibility towards organizations and demonstrate higher ownership toward their employers. Higher empowerment ignite utmost efforts from employees in order to accomplish their organizational goals. While having the privilege of empowerment, employees might perceive the compliance of organizational activities with their fundamental beliefs, which in results enhances their satisfaction with organizations [45]. Hence, following hypothesis is developed.

Hypothesis 2 Green empowerment positively affects environmental self-identity in the workplace.

3.3 Environmental self-identity and workplace green behavior

The impact of environment development subjects, such as environmental leadership, consciousness, accountability, concern, activities, and management, has been the primary topic towards research of sustainable development. This interest has increased because several scholars have attempted to identity the indicators and the impediments about activities for the environment development [46]. Numerous research have examined self-social intentions and identity [47], belief systems [48], value-directions [49, 50], external context and targets [51], and ethical perspectives [52] as prominent elements to evoke and promote environmental actions in the individual and organizational levels.

Environmental psychology research have figured out that the identity can be considered as an indicator of personal motivations and behaviors for environmental development [53]. Environmental self-identity is conceptualized and examined in several ways. Some research depended on the self-concept theory and the self-perception theory [40], and other research depended on theories of identity [54]. There is the requirement to evaluate the system in which environmental self-identity is connected to environmentally friendly activities [55].

Self-identity can be used to distinguish oneself from the others while complying with the principles, views and activities of the organizations in which one lives [56]. Mannetti et al. figured out that personal recycling self-identity can impact their recycling activity intentions [56], and Sparks and Shepherd reported that consumers' self-identity as "green" ones can indicate their inclination to buy foods that are certified organic [57]. Similarly, individuals' energy-saving identity can clarify their willing to conserve energy [40]. Environmental self-identity has been figured out that it was linked to a series of environmental activities, such as conserving energy [53, 58], waste reduction, eco-shopping [53], recycling, refusing to take airplanes to the traveling spot [47], utilizing green energy, selecting items more sustainable, and making better use of papers [59, 60].

Employees with a strong environmental self-identity are more likely to have a favorable attitude relevant to the organization's sustainable ideals and eager to accomplish their tasks through the more sustainable way in order to achieve more sustainable profits for their organizations [59]. On the same line, individuals demonstrate behaviors that have significant impact on environmental sustainability of an organization (i.e., reserving office supplies, and communicating environmental sustainability information among employees) in the work environment, are known as workplace green behavior [61, 62]. In summary, studies showed that environmental self-identity may provoke people's sustainable inspirations and promote them to participate in environmentally friendly activities. Thus, the following hypothesis can be proposed:

Hypothesis 3 Environmental self-identity positively affects employees' workplace green behavior.

3.4 The mediating role of environmental self-identity

Managers utilize organizational culture to transmit their essential beliefs and unwritten norms so that they can supervise and form their subordinates' actions. Ketprapakorn and Kantabutra (2019) figured out that members could be remained guided if organizational culture is profoundly authentic and widely presented [62]. According to previous research, employees consider their organizations concern more about their influences towards the environment that they will have the tendency to take part in ecologically beneficial activities in the workplace [63–65].

Moreover, people might possess an intense feeling of becoming an ecological person no matter whether they are affiliated with an environmental organization. However, group members will be impacted by their group's principles, and probably tend to impact more groups they are part of [66]. Van der Werff et al. reported that any organization with which you are affiliated can impact the degree to which you regard yourself as an ecological activist and hence impact your ecologically friendly action [59].

The procedure of acquiring ecologically beneficial actions necessitates constant studying with organizational members' motivation under the assistance of organizational support to encourage them pursuing common environmental goals. Employees' motivation relevant to organizational culture and guidance might be inspired so as to boost employees' outcomes and contentment, and to generate a dedicated attitude towards tasks and responsibilities [67]. Employees who are more inspired have the tendency to concentrate their efforts on their organizational demands because of their organizational culture built in their organizations [68]. Bandura found that an individual tended to utilize knowledge and skills learned from his or her group or community to improve the surroundings [69]. Employees can perceive intrinsic contentment through participating in environmental behaviors when they are involved in positive organizational climate [70].

Human behavior is driven by targets, and individuals are typically inspired by the demand to accomplish multiple aims [71, 72]. Employees are probably to participate more in ecologically beneficial activities if they consider that their organizations are engaging in sustainable development program [73]. In a similar vein, Su and Swanson figured out that pro-environmental behaviors of hotel employees could be influenced by the implementation of commercial social obligation [74]. According to above findings, under the culture's influence, employees are more likely to perform green behaviors in order to reach organizational goals since collectivism-based organizational culture working as the stimulus guide employees to follow organizational goals higher than their individuals.

Hypothesis 4 Environmental self-identity mediates the relationship between collectivism-based organizational culture and employees' workplace green behavior.

Green empowerment facilitates employees by offering them opportunities to take part in organizational decision making and solving issues related to environmental management. Green empowered employees are highly inspired and inclined to perform organizational tasks in an environmentally friendly way [69]. Green empowerment also encourages employees to initiate environmentally friendly activities and processes to ensure better environmental management [75]. Employee empowerment could boost staffs' incentive to engage in activities relevant to their tasks and responsibilities [76]. In view of SOR theory, green empowerment emerges as stimulus, green empowerment is likely to enrich the employee's identity as a environmentalist, which works as organism, in results employees are highly oriented to execute pro-environmental behavior as a response. Therefore, above discussion establishes following hypothesis.

Hypothesis 5 Environmental self-identity mediates the relationship between green empowerment and employees' workplace green behavior.

4 Research methodology

4.1 Context, sample and data collection

In China, mostly top universities are located in big top tier-I cities such as Beijing, Shanghai, Shenzhen, and Guangzhou. Mostly international students also pursue their higher education in these cities as well. As authors have limited time, and financial resources to collect data from administrative employees in China, local academicians were sought to gain their support from HEIs in these four cities. The current study focused on data collection from mid-level administrative staff in HEIs. So, study population is mid-level administrative staff in HEIs. Nevertheless, there is absence of sampling frame, authors adopted purposive non-probability approach as the sampling strategy to collect data from administrative employees. The study sought ethical clearance from Universiti Sains Malaysia, School of Management to collect data from employees. The school verbally cleared the researcher to collect data from employees in HEIs. In addition, informed consent was taken from all participants in this study. The G*Power application was run to estimate the minimum sample size which is mandated to offer robust findings [67]. The 77 responses emerged as minimum sample size to deliver reliable and valid empirical results.

Adhering to ethical guidelines for research involving human, all participants in this study are adults, and no persons under the age of 16 are included. Before taking part, the informed consent were offered to them. Participants were guaranteed of their right to depart from the research at any time with no penalty, and the study's purpose and process were all explained in detail to the participants. Participant privacy was protected via anonymity and confidentiality, and all data gathered was utilized only for this study.

During data collection process, authors ensured the volunteer participation of employees. It was also clarified that this data will be solely used for research purpose and would not be shared with third parties. Following the recommendations related to common method bias, authors adopted procedural remedy as a strategy and collected data from potential respondents at two points in time with 1-month time-lagged. As average response rate in social science is 35.70% with ± 18.80 standard deviation [68], survey link was initially shared with 500 administrative employees of universities at time- (I) At this time, they were requested to assess all predictors i.e., COC, GE, and ESI. Potential participants were asked to share their arbitrary job code in order to match their responses at two phases. At the end of phase I, there were 231 responses. After 1-month, the participants of phase I were approached again and sought their attention to rate WGB at time (II) Finally, authors received 211 responses at second stage. After matching, there were 209 responses for further analysis. After removal of two redundant responses, 207 responses were available for further analysis. Ultimately, the response rate in current study is 41.40%.

4.2 Measure

In current research, measurement items of all five continuous variables were adopted from past studies. As higher Likert scales are associated with lower data quality and higher cognitive burden, the five-point Likert scale was employed here [75]. Five-point Likert scale extended from strongly agree [5] to strongly disagree [1].

The employees were requested to rate COC on the basis of six-items scales, which was adopted from the Baker and Yacef's study [76]. Previous studies reported higher reliability ($\alpha = 0.88$) of this scale [77]. The GE was rated using three-items scale, which was adapted from Daily et al., (2012) and Spreitzer, (1995)'s study [74, 78]. Al-Zawahreh et al., concluded with acceptable reliability ($\alpha = 0.93$) of this scale [79]. Responded evaluated their ESI using three-items scale adopted from Fielding et al., (2008)'s study [65]. Van der Werff et al. concluded with its high reliability ($\alpha = 0.86$) [59]. The present study adopted seven-items scale of WGB [12], which emerged as highly reliable ($\alpha = 0.90$) in the Yuan and Li's study [80].

The extent research concluded about significant association of specific demographic variables such as employees age, gender, education and experience with their green behaviors [81, 82]. Therefore, this study investigated them as control variables. In this research, demographic information represents the characteristics of the population. The information would be gathered according to respondents' age, gender, tenure experience, and education.

4.3 Analytical strategy

As current research framework comprises of multiple independent variables (COC and GE), mediator (ESI), and dependent variable (WGB), this study is complex in its nature. The present work focuses on the prediction of WGB in the presence of multiple predictors i.e., COC, GE, and ESI. So, it requires multivariate analysis. Accordingly, partial least squares – structural equation modelling (PLS-SEM) is recommended to be employed to test the proposed hypotheses [83, 84]. PLS-SEM is conducted to evaluate measurement model prior to structural model analysis [85]. Furthermore, two index combination strategy was employed to investigate the model fit of proposed five-factor model.

5 Findings

5.1 Demographic analysis

The male participants ($n = 124$, 59.90%) dominate in the current setting. Most participants fall in the age group of 36–45 years old ($n = 95$, 45.89%), followed by those who have their age in the range of 26–35 ($n = 58$, 28.02%) and 46–55 years old ($n = 31$, 14.97%). Only eight participants have their age above 55 years old. Most respondents have a master's as their final degree ($n = 141$, 68.12%) followed by those who have a bachelor's degree ($n = 47$, 22.70%). Eight participants have PhD degrees. In current study, most of the participants ($n = 95$, 45.89%) have their working experience of 6–10 years followed by those who have 11–15 years ($n = 73$, 35.26%). 15 employees have more than 20 years of their working experience. Mostly employees work in Shenzhen ($n = 68$, 32.85%) followed by those who are located in Shanghai ($n = 61$, 29.47%) and Chengdu ($n = 39$, 18.84%). Only 18 employees have their business premises in Beijing. Only 21 participants work in Hangzhou.

5.2 Descriptive analysis

In current study, respondents rated COC, GE, ESI, and WGB based on five-point Likert scale. The present study adopted recommendations of Sekaran and Bougie to interpret the mean values of these continuous variables. The mean values of COC (3.023), GE (3.048), and WGB (3.107) indicate their practices at moderate level. Nevertheless, the descriptive analysis indicates that ESI (2.842) is low among respondents of this study.

5.3 Data screening

The data screening process focuses on the missing values, outliers, common method bias and data normality [86]. As it was mandated to mark each measurement item in the online survey form link, the current dataset is freer of any missing values. As the Z-score analysis unraveled the absence of any case with its z-value below 2.68, there is no univariate outliers. In addition, the Mahalanobis distance test did not demonstrate probability value of any single case lower than 0.001. Hence, there is no multivariate outlier. Furthermore, univariate and multivariate normality were assessed by conducting a Web Power statistical power analysis. The skewness values of COC (0.091), GE (0.028), ESI (0.018), and WGB (−0.129) are found in the ± 3 range. The kurtosis values of COC (−0.910), GE (−1.143), ESI (−1.048), and WGB (−1.211) fall in the range of +3 and −3. In addition, the Mardia's skewness ($\beta = 3.153$, $\rho < 0.05$) is significant but Mardia's kurtosis values ($\beta = 35.826$, $\rho = 0.477 > 0.05$) is non-significant. Hence, it is evident that current dataset possess univariate normality but does not exhibit multivariate normality [87].

Along with procedural remedy, this study also employed statistical tools to examine the presence of common method bias issue. The Harman's single factor test revealed that first factor only counts 38.264% of total variations, which is lower than 50%. Hence, common method bias does not emerge as an issue in current setting. Considering the criticism related to low sensitivity of Harman's one factor test, authors also assessed the correlation matrix procedure. Common method bias emerges as an issue provided correlation among any two latent variables is higher than 0.90 [88]. In current study, the correlation values between all continuous variables i.e., COC, GE, ESI, and WGB are lower than 0.90. Hence, common method bias is not an issue here. As smartPLS software offers two values of model fit i.e., standardized root mean square residual (SRMR) ≤ 0.09 and Normed-fit index (NFI) ≥ 0.95 , the present

Table 1 Loading, reliability, and validity

Construct	Item	Loading	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Collectivism-based organizational culture	COC2	0.686	0.770	0.843	0.520
	COC3	0.820			
	COC4	0.773			
	COC5	0.659			
	COC6	0.653			
	Environmental self-identity (ESI)	ESI1			
	ESI2	0.678			
	ESI3	0.869			
Workplace green behavior (WGB)	WGB1	0.723	0.886	0.912	0.597
	WGB2	0.846			
	WGB3	0.770			
	WGB4	0.881			
	WGB5	0.742			
	WGB6	0.737			
	WGB7	0.691			
Green empowerment (GE)	GE1	0.821	0.733	0.849	0.653
	GE2	0.848			
	GE3	0.753			

Table 2 Discriminant validity

Construct	1	2	3	4
1. COC	0.721			
2. ESI	0.556	0.760		
3. GB	0.501	0.601	0.773	
4. GE	0.717	0.684	0.624	0.808

study adopted two-index combination strategy [89] to examine the distinctiveness of the baseline model (five-factor model). As compared to alternative models, the model fit indices concluded with fit of the five-factor model (COC, GE, ESI, and WGB) on the basis of $SRMR = 0.088 < 0.090$ and $NFI = 0.967 > 0.95$.

5.4 Measurement model analysis

The measurement model analysis exhibited the reliability and validity of the COC, ESI, GE, and WGB. The indicator loadings of all measurement items fall in the range of 0.647 and 0.881, and are above cut-off value i.e., 0.50 (see: Table 1). Therefore, all items possess acceptable indicator of reliability. As the composite reliability (CR) values of COC, ESI, GE, and WGB are found higher than 0.70 (see: Table 1), all of them exhibit acceptable construct reliability. Validity of a reflective construct is categorized into convergent and discriminant validity. A construct has acceptable convergent validity provided its indicators loadings are higher than 0.50 and its average variance extracted (AVE) is higher than 0.50 [84, 90]. In current study, the AVE values of COC (0.520), ESI (0.577), WGB (0.597), and GE (0.653) are higher than 0.50 (see, Table 1). Indicators loadings of measurement items of all these five reflective constructs are higher than 0.50. Hence, all of them possess acceptable convergent validity. In this work, authors employed Fornell-Larcker criterion to examine the discriminant validity. As demonstrated in below Table 2, the square root of AVE of COC, ESI, WGB, and GE is greater than their respective inter-correlation values. Hence, all of them have acceptable discriminant validity as well.

5.5 Structural model analysis

The path analysis unraveled that control variables i.e., employees gender, age, education, and tenure experience do not relate to the employee's WGB. Later on, the continuous variables COC, GE, ESI and TC were added into the framework. The empirical findings demonstrated that both COC ($\beta = 0.172$, $\rho = 0.035 < 0.05$) and GE ($\beta = 0.649$, $\rho < 0.05$) significantly and positively influence ESI (Table 3). ESI significantly and positively affects employees WGB ($\beta = 0.359$, $\rho < 0.05$) (Table 3). Therefore, hypotheses H1, H2 and H3 are supported in current setting.

As the product of the path coefficient from COC to ESI and from ESI to WGB is significant and positive ($\beta = 0.062$, $\rho = 0.027 < 0.05$) (Table 3). It means, ESI significantly mediates the COC-WGB relationship. In addition, the empirical evidence confirms the indirect impact of ESI on the GE-WGB relationship ($\beta = 0.234$, $\rho < 0.05$) (Table 3). Therefore, both mediating hypotheses H4 and H5 are accepted. In order to evaluate the conditional effect of TC, the present study estimated the impact of interaction term (TC*ESI) on WGB ($\beta = 0.116$, $\rho = 0.16 < 0.05$) (Table 3). The path analysis offered the significant positive effect of interaction term on WGB. Hence, moderation hypothesis H6 is supported in current work.

6 Discussion

At a moment, the present study is the pioneer one that investigates the relationship of COC and GE with WGB through ESI. It brings together substantial weightage to claim the acceptance of all five hypotheses. The current study enriches the sustainability literature by employing quantitative approach, offering both theoretical and managerial implications, and driving future research directions as well. The current empirical findings are elaborated as follows.

In current study, hypothesis H1 is supported, which concludes with significant positive impact of COC on employees ESI. This empirical finding is consistent with past studies [91–95]. Socio-cultural forces, which drive beliefs embedded within cultural values, enables individuals to develop their ESI [92]. In the context of Chinese consumers, CR has offered empirical evidence where harmonious human-nature and relational values were found strengthening the ESI. In previous studies, there is ample evidences how ESI absorbs the embedded beliefs in cultural values [92–94]. Harmonious cultural values (collectivism, individualism, nature orientation) extend the explanation of consumers' culturally oriented self-expression and its influence on consumption behavior [95, 96]. Thus, the enduring belief system underpinning these cultural values appears to infuse and guide ESI and sustainable consumption phases [92].

Second hypothesis H2 established the significant positive relationship between GE and employees ESI. The current empirical findings supported the hypothesis H2 and are similar to the ones presented in past studies [97–100]. Green empowerment enables employees to actively take part in decision-making process and extend their perceived meaningfulness of their job [97], which results into their increased investment of energy and time in organizational sustainability [100]. By empowering employees, their understanding related to the organizational goals is increased in parallel to their important role in organization [97, 99]. Green empowerment contributes to the employee's effectiveness and impact by listening to their opinions and allocating power to them [101]. Increased employees' job autonomy and competence at work give rise to the increased perception of meaningfulness at work [102]. Meaningful work enhances employee's affective attachment to their job and organization [98, 99].

Self-identity refers to a person's sense of self. Self-identity is taken as a label that individuals use to describe themselves. Individuals use self-identity as a label to describe themselves [53]. Self-identity has been studied as a predictor of intention and behavior [103]. In this study, the significant positive impact of ESI on employees WGB was also proposed i.e., H3. The path analysis confirmed this relationship. The current empirical findings are contrary to those offered by Wallace

Table 3 Path analysis

Hypotheses	β	S.D	T values	P values	LLCI	ULCI
COC -> ESI	0.172	0.079	2.177	0.035	0.017	0.327
GE -> ESI	0.649	0.075	8.700	0.000	0.504	0.795
ESI -> EGB	0.359	0.057	6.217	0.000	0.246	0.473
COC -> ESI -> EGB	0.062	0.028	2.214	0.027	0.007	0.117
GE -> ESI -> EGB	0.234	0.052	4.458	0.000	0.141	0.344

and Buil, where they claim that self-identity can drive the behavior which is free of the attitude towards conducting that behavior [102]. People can perform a certain behavior regardless of their attitude towards it, as far as behavior is in line with their self-identity [103]. Regarding environmental self-identity, current findings are consistent with those offered by Carfora et al., and Whitmarsh and O'Neill, where they conclude with association of such identities with employee's intention and pro-environmental behavior [52, 104]. With increasing visibility of activities, there is stronger impact of self-identity on employee's green behavior [103, 105]. In addition, environmental self-identity appeared highly crucial in case behaviors is not routinized [55]. Fourth hypothesis H4 and H5 posited that ESI significantly mediates the relationship of COC and GE with employees WGB. The present empirical findings are consistent with those offered by past studies [100, 106]. In the context of China, it has proven that environmental self-identity significantly mediates the relationship of empowering leadership with employee's environmental behavior [107]. Furthermore, Cheong et al., has claimed the positive impact of empowerment on the environmental related employee's outcomes [106]. Lee et al., has also offered evidence in support of positive effect of empowerment on employees' task-related outcomes [108].

6.1 Implications

The present study brings numerous implications to both theory and practice. Theoretically, the current empirical findings, first, enrich the literature by offering quantitative evidence related to the integrated relationship of COC, GE (stimulus), ESI (organism) and employees WGB (response). Second, this study extends the literature on stimulus-organism-response theory by investigating the ESI as a mechanism on the relationship of COC and GE with employees WGB. Third, the current research extends the contextual literature by assessing the higher education phenomena from Chinese perspective. Fourth, by assessing the factors such as COC, GE and ESI related to employees WGB in HEIs, the current study enriches literature on pro-environmental behavior.

Practitioners may employ current findings to boost their employees' WGB. Spurring the green behaviors in the HEIs has substantial importance for effectively establishing the green campuses and coping with environmental challenges. However, as claimed by Iqbal and Piwowar-Sulej, HEIs still fail to effectively promote WGB on their campuses [109]. First, the present study also facilitates educational institutions offering materials to design courses on green behavior and sustainable development. It is of utmost importance to infuse COC and environmental passion aspects into the educational courses to enhance the young generation awareness of sustainable development and thus adds on to their WGB. HR specialists can also include these findings into their sustainability related workshops and seminars. As HR department has emerged a business partner, HR professionals in the HEIs should be familiar with recent advances on the intricacy of stimulants and organisms. Secondly, since COC and green empowerment indirectly influences employees WGB through environmental passion, HR department and supervisors should promote and focus on the environmental passion among their workforce. They can offer support to the employees' environmental passion by providing the various resources required for eco-friendly behaviors as well. In result, as argued by SOR theory, employees will take their utmost efforts to behave environmentally friendly while accomplishing their daily tasks in the HEIs. Third, sustainable development emphasizes on the needs and interests of diverse stakeholders. Under its umbrella, stakeholders including employees in HEIs cope with environmental challenges and adds-on to the international efforts to reduce the climate change impact. Employees in HEIs are mandated to align their behavior with cultural and social norms and values they live in. By fairly treating marginalized communities in their institutions, administrative staff positively affect social equity. Administrative staff can also reduce the social disparity by offering better access of resources to their stakeholders in their work environment. Accordingly, current research also offers utilitarian values in a broader context.

6.2 Limitations

The current study possesses several limitations which horizons future research avenues. First, this study collected data from one source i.e., employees at two-phases. Future studies are advised to use multiple sources i.e., supervisors and employees. Second, present data was collected from administrative staff in HEIs of top tier-I cities. As current empirical evidences cannot be generalized to other parts of the China, there is need to expand the data collection to remote and developing cities in future studies. Third, this study demonstrated evidences in the HEIs context of China. Future studies are recommended to conduct comparative analysis from rest of the world with China. Fourth, regression analysis was conducted to verify the proposed hypotheses. In order to ensure biased-free findings, future studies are recommended to validate them using experimental design. Fifth, the present research elaborates on the mediating role played by ESI on the relationship of COC and GE with employees WGB. There is high possibility of other contextual factors such as job

demands and green climate that will also moderate the impact of CCO and GE on employees WGB. Individual reactions towards formal management practices such as GE and COC may also affect how they perceive their ESI and WGB. Therefore, it is recommended that future research should consider these conditional factors. Last but not least, the national culture substantially drive employees WGB [96]. There is need to conduct comparative studies between developed and developing countries to explore any potential difference related to employees' WGB. Therefore, the policy makers are advised to design the affective culture and relevant empowerment strategies which may ignite employees ESI and their WGB as well.

Author contributions Each of the two coauthors contributed to the text and editing the text. Xing Shuya led writing the introduction, methods, analysis, literature review, discussion, and conclusion. Siti Rohaida Mohamed Zainal led reviewing and supervision. All authors have read and agreed to publish the manuscript.

Data availability Data is provided within the manuscript.

Declarations

Ethics approval and consent to participate Authors confirms that the study was approved (or granted exemption) by the Research Ethic committee of Universiti Sains Malaysia and certified that the study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Authors confirmed that informed consent was obtained from all participants.

Competing interests The authors declare no competing interests.

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References

1. Iqbal Q, Piwowar-Sulej K. Organizational citizenship behavior for the environment decoded: sustainable leaders, green organizational climate and person-organization fit. *Balt J Manag.* 2023;18(3):300–16.
2. Schmidt KM, Ockenfels A. Focusing climate negotiations on a uniform common commitment can promote cooperation. *Proc Natl Acad Sci.* 2021;118(11):e2013070118.
3. Bulut U. Environmental sustainability in Turkey: an environmental Kuznets curve estimation for ecological footprint. *Int J Sustain Dev World Ecol.* 2021;28(3):227–37.
4. Zhang H, Du L, Jiang Z. Loyalty to organizations or loyalty to supervisors? Research on differential leadership and employee loyalty behavior: a perspective of insiders and outsiders. *Front Psychol.* 2022;13.
5. Sima M, Grigorescu I, Bălteanu D. An overview of campus greening initiatives at universities in Romania. *Int J Sustain High Educ.* 2019;20(3):410–22.
6. Elfert M. Lifelong learning in sustainable development goal 4: what does it mean for UNESCO's rights-based approach to adult learning and education? *Int Rev Educ.* 2019;65(4):537–56.
7. Zulfiqar S, Khan Z, Huo C. Uncovering the effect of responsible leadership on employee creative behaviour: from the perspective of knowledge-based pathway. *Kybernetes.* 2022;52(11):5503–29.
8. Bashirun SN, Samudin NMR, Zolkapli NM, Badrolhisam NI. Fostering organizational citizenship behavior for the environment in promoting employee green behavior at the workplace. *Int J Bus Manag.* 2019;3(1):18–24.
9. Wang X, Zhou K, Liu W. Value congruence: a study of green transformational leadership and employee green behavior. *Front Psychol.* 2018;9:1946.
10. Wei M, Hao S, Ren X. Nonspatial proximity and project team resilience: the role of knowledge sharing and team cohesion. *Discret Dyn Nat Soc.* 2022;2022:8614056.
11. Wood BP, Eid R, Agag G. A multilevel investigation of the link between ethical leadership behaviour and employees green behaviour in the hospitality industry. *Int J Hosp Manag.* 2021;97:102993.
12. Robertson JL, Barling J. Greening organizations through leaders' influence on employees' pro-environmental behaviors. *J Organ Behav.* 2013;34(2):176–94.

13. Tian Q, Robertson JL. How and when does perceived CSR affect employees' engagement in voluntary pro-environmental behavior? *J Bus Ethics*. 2019;155:399–412.
14. Iqbal Q, Piwowar-Sulej K. Frugal innovation embedded in business and political ties: transformational versus sustainable leadership. *Asian Bus Manag*. 2023;22:1–24.
15. Zientara P, Zamojska A. Green organizational climates and employee pro-environmental behaviour in the hotel industry. *J Sustain Tour*. 2018;26(7):1142–59.
16. Aboramadan M, Kundi YM, Farao C. Examining the effects of environmentally-specific servant leadership on green work outcomes among hotel employees: the mediating role of climate for green creativity. *J Hosp Mark Manag*. 2021;30:1–28.
17. Zheng F, Khan NA, Khan MWA. Unethical leadership and employee extra-role behavior in information technology sector: a moderated mediation analysis. *Front Psychol*. 2021;12:708016.
18. Anh Vu T, Plimmer G, Berman E, Ha PN. Performance management in the Vietnam public sector: the role of institution, traditional culture and leadership. *Int J Public Adm*. 2022;45(1):49–63.
19. Reiche BS, Lee Y, Quintanilla J. Cultural perspectives on comparative HRM. *Handbook of research on comparative human resource management*. Edward Elgar Publishing; 2018. pp. 48–64.
20. Kim H, Nam T. Consequences of submissive loyalty corporations: an empirical analysis of Korean female employees perception. *Korean J Policy Stud*. 2019;34(2):51–74.
21. Tariq S, Sangmi M-D. Microfinance and women's economic empowerment: an experimental evidence. *Abhigyan*. 2020;38(3):10–9.
22. Amrutha VN, Geetha SN. A systematic review on green human resource management: implications for social sustainability. *J Clean Prod*. 2020;247:119131.
23. Gu F, Liu J. Environmentally specific servant leadership and employee workplace green behavior: moderated mediation model of green role modeling and employees' perceived CSR. *Sustainability*. 2022;14(19):11965.
24. Francoeur V, Paillé P, Yuriev A, Boiral O. The measurement of Green Workplace behaviors: a systematic review. *Organ Environ*. 2021;34(1):18–42.
25. Song Y, Zhang L, Zhang M. Research on the impact of public climate policy cognition on low-carbon travel based on SOR theory—evidence from China. *Energy*. 2022;261:125192.
26. Vieira VA. Stimuli–organism–response framework: a meta-analytic review in the store environment. *J Bus Res*. 2013;66(9):1420–6.
27. Kumar S, Murphy M, Talwar S, Kaur P, Dhir A. What drives brand love and purchase intentions toward the local food distribution system? A study of social media-based REKO (fair consumption) groups. *J Retail Consum Serv*. 2021;60:102444.
28. Agarwal N, Grottke M, Mishra S, Brem A. A systematic literature review of constraint-based innovations: state of the art and future perspectives. *IEEE Trans Eng Manag*. 2016;64(1):3–15.
29. Koo D-M, Ju S-H. The interactional effects of atmospheric and perceptual curiosity on emotions and online shopping intention. *Comput Hum Behav*. 2010;26(3):377–88.
30. Fang J. Competitiveness analysis for China's biopharmaceutical industry based on porter diamond model. *J Chem Pharm Res*. 2014;6(5):477–85.
31. Thang DCL, Tan BLB. Linking consumer perception to preference of retail stores: an empirical assessment of the multi-attributes of store image. *J Retail Consum Serv*. 2003;10(4):193–200.
32. Fatoki O. Ethical leadership and sustainable performance of small and medium enterprises in South Africa. *J Glob Bus Technol*. 2020;16(1):62–79.
33. Ajibade I, Boateng GO. Predicting why people engage in pro-sustainable behaviors in Portland Oregon: the role of environmental self-identity, personal norm, and socio-demographics. *J Environ Manage*. 2021;289:112538.
34. Ming J, Jianqiu Z, Bilal M, Akram U, Fan M. How social presence influences impulse buying behavior in live streaming commerce? The role of SOR theory. *Int J Web Inf Syst*. 2021;17(4):300–20.
35. Fang Y-H. Beyond the credibility of electronic word of mouth: exploring eWOM adoption on social networking sites from affective and curiosity perspectives. *Int J Electron Commer*. 2014;18(3):67–102.
36. Sultan P, Wong HY, Azam MS. How perceived communication source and food value stimulate purchase intention of organic food: an examination of the stimulus-organism-response (SOR) model. *J Clean Prod*. 2021;312:127807.
37. Kumar S, Hsieh J-K. How social media marketing activities affect brand loyalty? Mediating role of brand experience. *Asia Pac J Mark Logist*. 2024.
38. Cooke FL, Kim S. *Routledge handbook of human resource management in Asia*, vol. 15. Abingdon: Routledge; 2018.
39. Van der Werff E, Steg L, Keizer K. The value of environmental self-identity: the relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour. *J Environ Psychol*. 2013;34:55–63.
40. Amrutha VN, Geetha SN. Linking organizational green training and voluntary workplace green behavior: mediating role of green supporting climate and employees' green satisfaction. *J Clean Prod*. 2021;290:125876.
41. Amrutha VN, Geetha SN. Green employee empowerment for environmental organization citizenship behavior: a moderated parallel mediation model. *Curr Psychol*. 2024;43(6):5685–702.
42. Luu TT. Building employees' organizational citizenship behavior for the environment: the role of environmentally-specific servant leadership and a moderated mediation mechanism. *Int J Contemp Hosp Manag*. 2019;31(1):406–26.
43. Iqbal Q, Ahmad NH, Halim HA. How does sustainable Leadership influence sustainable performance? Empirical evidence from selected ASEAN Countries. *SAGE Open*. 2020;10(4):2158244020969394.
44. Shams K. Developments in the measurement of subjective well-being and poverty: an economic perspective. *J Happiness Stud*. 2016;17(6):2213–36.
45. Kollmuss A, Agyeman J. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environ Educ Res*. 2002;8(3):239–60.
46. Gatersleben B, Murtagh N, Abrahamse W. Values, identity and pro-environmental behaviour. *Contemp Soc Sci*. 2014;9(4):374–92.
47. Schwartz SH. Normative influences on altruism. *Advances in experimental social psychology*. Elsevier; 1977. pp. 221–79.

48. Van Riper CJ, Kyle GT. Understanding the internal processes of behavioral engagement in a national park: a latent variable path analysis of the value-belief-norm theory. *J Environ Psychol.* 2014;38:288–97.
49. van Riper CJ, Lum C, Kyle GT, Wallen KE, Absher J, Landon AC. Values, motivations, and intentions to engage in proenvironmental behavior. *Environ Behav.* 2020;52(4):437–62.
50. Steg L, Bolderdijk JW, Keizer K, Perlaviciute G. An integrated framework for encouraging pro-environmental behaviour: the role of values, situational factors and goals. *J Environ Psychol.* 2014;38:104–15.
51. Zaikauskaitė L, Butler G, Helmi NFS, Robinson CL, Treglown L, Tsvirikos D, et al. Hunt–Vitell’s general theory of marketing ethics predicts attitude-behaviour gap in pro-environmental domain. *Front Psychol.* 2022;13:732661.
52. Whitmarsh L, O’Neill S. Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *J Environ Psychol.* 2010;30(3):305–14.
53. Walton TN, Jones RE. Ecological identity: the development and assessment of a measurement scale. *Environ Behav.* 2018;50(6):657–89.
54. Lalot F, Quiamzade A, Falomir-Pichastor JM, Gollwitzer PM. When does self-identity predict intention to act green? A self-completion account relying on past behaviour and majority-minority support for pro-environmental values. *J Environ Psychol.* 2019;61:79–92.
55. Amniattalab A, Ansari R. The effect of strategic foresight on competitive advantage with the mediating role of organisational ambidexterity. *Int J Innov Manag.* 2016;20(3):1–18.
56. Mannetti L, Pierro A, Livi S. Recycling. Planned and self-expressive behaviour. *J Environ Psychol.* 2004;24(2):227–36.
57. Sparks P, Shepherd R. Self-identity and the theory of planned behavior: assessing the role of identification with green consumerism. *Soc Psychol Q.* 1992;55:388–99.
58. Thøgersen J. Frugal or green? Basic drivers of energy saving in European households. *J Clean Prod.* 2018;197:1521–30. <https://doi.org/10.1016/j.jclepro.2018.06.282>.
59. Van der Werff E, Steg L, Keizer K. It is a moral issue: the relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. *Glob Environ Chang.* 2021;23(5):1258–65.
60. Zhu G, Zhou Y, Zhou F, Wu M, Zhan X, Si Y, et al. Proactive personality measurement using item response theory and social media text mining. *Front Psychol.* 2021;12:705005.
61. Kim A, Kim Y, Han K. A cross level investigation on the linkage between job satisfaction and voluntary workplace green behavior. *J Bus Ethics.* 2019;159:1199–214.
62. Ketprapakorn N, Kantabutra S. Culture development for sustainable SMEs: toward a behavioral theory. *Sustainability.* 2019;11(9):2629.
63. Ruepert AM, Keizer K, Steg L. The relationship between corporate environmental responsibility, employees’ biospheric values and pro-environmental behaviour at work. *J Environ Psychol.* 2017;54:65–78.
64. Saha R, Shashi, Cerchione R, Singh R, Dahiya R. Effect of ethical leadership and corporate social responsibility on firm performance: a systematic review. *Corp Soc Responsib Environ Manag.* 2020;27(2):409–29.
65. Fielding KS, McDonald R, Louis WR. Theory of planned behaviour, identity and intentions to engage in environmental activism. *J Environ Psychol.* 2008;28(4):318–26.
66. Aladwan K, Bhanugopan R, D’Netto B. The effects of human resource management practices on employees’ organisational commitment. *Int J Organ Anal.* 2015;23(3):472–92.
67. Zaki NABM, Norazman I. The relationship between employee motivation towards green HRM mediates by green employee empowerment: a systematic review and conceptual analysis. *J Res Psychol.* 2019;1(2):6–9.
68. Bandura A. Toward a psychology of human agency. *Perspect Psychol Sci.* 2006;1(2):164–80.
69. Otaye-Ebede L, Shaffakat S, Foster S. A multilevel model examining the relationships between workplace spirituality, ethical climate and outcomes: a social cognitive theory perspective. *J Bus Ethics.* 2020;166(3):611–26.
70. Donmez-Turan A, Kiliçlar IE. The analysis of pro-environmental behaviour based on ecological worldviews, environmental training/knowledge and goal frames. *J Clean Prod.* 2021;279:123518.
71. Raineri N, Paillé P. Linking corporate policy and supervisory support with environmental citizenship behaviors: the role of Employee Environmental beliefs and Commitment. *J Bus Ethics.* 2016;137(1):129–48.
72. Su L, Swanson SR. Perceived corporate social responsibility’s impact on the well-being and supportive green behaviors of hotel employees: the mediating role of the employee-corporate relationship. *Tour Manag.* 2019;72:437–50.
73. Gu X, Baig IA, Shoab M, Zhang S. Examining the natural resources-ecological degradation nexus: the role of energy innovation and human capital in BRICST nations. *Resour Policy.* 2024;90:104782.
74. Spreitzer GM. Psychological empowerment in the workplace: dimensions, measurement, and validation. *Acad Manag J.* 1995;38(5):1442–65.
75. Robinson MA. Using multi-item psychometric scales for research and practice in human resource management. *Hum Resour Manage.* 2018;57(3):739–50.
76. Baker RSJD, Yacef K. The state of educational data mining in 2009: a review and future visions. *J Educ data Min.* 2009;1(1):3–17.
77. Triguero S, Peña B, Matos F. The effect of collectivism-based organizational culture on employee commitment in public organisations: the effect of collectivism-based. *Socio-economic Plan Sci.* 2022;83:101335.
78. Daily BF, Bishop JW, Massoud JA. The role of training and empowerment in environmental performance: a study of the Mexican maquiladora industry. *Int J Oper Prod Manag.* 2012;32(5):631–47.
79. Al-Zawahreh A, Khasawneh S, Al-Jaradat M. Green management practices in higher education: the status of sustainable leadership. *Tert Educ Manag.* 2019;25(1):53–63.
80. Yuan B, Li J. Understanding the impact of environmentally specific servant leadership on employees’ pro-environmental behaviors in the workplace: based on the proactive motivation model. *Int J Environ Res Public Health.* 2022;20(1):567.
81. Kim A, Kim Y, Han K, Jackson SE, Ployhart RE. Multilevel influences on Voluntary Workplace Green Behavior: individual differences, leader behavior, and coworker advocacy. *J Manage.* 2017;43(5):1335–58.
82. Ringle CM, Sarstedt M, Mitchell R, Gudergan SP. Partial least squares structural equation modeling in HRM research. *Int J Hum Resour Manag.* 2020;31(12):1617–43.

83. Hair JF, Howard MC, Nitzl C. Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *J Bus Res.* 2020;109:101–10. <https://doi.org/10.1016/j.jbusres.2019.11.069>.
84. Sekaran U, Bougie R. *Research methods for business-a skill building approach*. 7th ed. Chichester: Wiley; 2016.
85. DeCarlo LT. On the meaning and use of kurtosis. *Psychol Methods.* 1997;2(3):292.
86. Mardia KV. Applications of some measures of multivariate skewness and kurtosis in testing normality and robustness studies. *Sankhyā Indian J Stat Ser B.* 1974;115–28.
87. Bagozzi RP, Yi Y. Specification, evaluation, and interpretation of structural equation models. *J Acad Mark Sci.* 2012;40:8–34.
88. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Model Multidiscip J.* 1999;6(1):1–55.
89. Hair JF, Risher JJ, Sarstedt M, Ringle CM. When to use and how to report the results of PLS-SEM. *Eur Bus Rev.* 2019;31(1):2–24.
90. Zhao AL, Dermody J, Koenig-Lewis N, Hanmer-Lloyd S. Cultivating sustainable consumption: the role of harmonious cultural values and pro-environmental self-identity. *J Consum Behav.* 2024;23(2):1014–31.
91. Anheier HK. Cultures, values, and identities: what are the issues? *Glob Perspect.* 2020;1(1):11755.
92. Chwialkowska A, Bhatti WA, Glowik M. The influence of cultural values on pro-environmental behavior. *J Clean Prod.* 2020;268:122305.
93. Czarnecka B, Schivinski B. Individualism/collectivism and perceived consumer effectiveness: the moderating role of global-local identities in a post-transitional European economy. *J Consum Behav.* 2022;21(2):180–96.
94. Oyserman D. Identity-based motivation. *Emerg trends soc Behav Sci An Interdiscip searchable.* 2015;1–11.
95. Zhang Xi, Bartol KM. Linking empowering leadership and employee creativity: THE influence of psychological empowerment, intrinsic motivation, and creative process engagement. *Acad Manag J.* 2010;53(1):107–28.
96. Allan BA, Batz-Barbarich C, Sterling HM, Tay L. Outcomes of meaningful work: a meta-analysis. *J Manag Stud.* 2019;56(3):500–28.
97. Amundsen S, Martinsen ØL. Linking empowering leadership to job satisfaction, work effort, and creativity. *J Leadersh Organ Stud.* 2015;22(3):304–23.
98. Cheng Z, Liu W, Zhou K, Che Y, Han Y. Promoting employees' pro-environmental behaviour through empowering leadership: the roles of psychological ownership, empowerment role identity, and environmental self-identity. *Bus Ethics Environ Responsib.* 2021;30(4):604–18.
99. Amundsen S, Martinsen ØL. Self–other agreement in empowering leadership: relationships with leader effectiveness and subordinates' job satisfaction and turnover intention. *Leadersh Q.* 2014;25(4):784–800.
100. Hackman JR, Oldham GR. Motivation through the design of work: test of a theory. *Organ Behav Hum Perform.* 1976;16(2):250–79.
101. Ajzen I. The theory of planned behavior: frequently asked questions. *Hum Behav Emerg Technol.* 2020;2(4):314–24.
102. Wallace E, Buil I. Antecedents and consequences of conspicuous green behavior on social media: incorporating the virtual self-identity into the theory of planned behavior. *J Bus Res.* 2023;157:113549.
103. Granberg D, Holmberg S. The intention-behavior relationship among US and Swedish voters. *Soc Psychol Q.* 1990;53:44–54.
104. Carfora V, Cavallo C, Caso D, Del Giudice T, De Devitiis B, Viscecchia R, et al. Explaining consumer purchase behavior for organic milk: including trust and green self-identity within the theory of planned behavior. *Food Qual Prefer.* 2019;76:1–9.
105. Brick C, Sherman DK, Kim HS. Green to be seen and brown to keep down: visibility moderates the effect of identity on pro-environmental behavior. *J Environ Psychol.* 2017;51:226–38.
106. Cheong M, Yammarino FJ, Dionne SD, Spain SM, Tsai C-Y. A review of the effectiveness of empowering leadership. *Leadersh Q.* 2019;30(1):34–58.
107. Lee A, Willis S, Tian AW. Empowering leadership: a meta-analytic examination of incremental contribution, mediation, and moderation. *J Organ Behav.* 2018;39(3):306–25.
108. Lee D. The Effect of safety management and sustainable activities on sustainable performance: focusing on suppliers. *Sustainability.* 2018;10(12):4796.
109. Iqbal Q, Hassan S, Akhtar S, Khan S. Employee's green behavior for environmental sustainability: a case of banking sector in Pakistan. *World J Sci Technol Sustain Dev.* 2018;15(2):118–30.

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