

Número 636

**Pro-Environmental Values and Energy
Practices in Mexican Small and Medium-
Sized Enterprises**

INSIGHTS FROM THE NEW ECOLOGICAL
PARADIGM

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AGOSTO 2024
CENTRO DE INVESTIGACIÓN Y DOCENCIA ECONÓMICAS



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Abstract

This paper aims to contribute to understanding the relationship between environmental attitudes and behaviors with environmental impacts. We achieve this goal by assessing the psychometric validity of the New Ecological Paradigm (NEP) scale in Mexico and exploring correlations between identified factors (attitudes) and real-world behaviors. In contrast to existing literature primarily focused on individuals and households in developed countries, our study investigates how pro-environmental values relate to electricity consumption, energy efficiency, and adoption of environmentally friendly technologies among small- and medium-sized commercial and service businesses in Mexico. We identified four cohesive factors that encapsulate distinct attitudes. Our findings indicate that companies where employees exhibit skepticism towards environmental issues and climate change tend to consume more energy, use less energy-efficient lighting, and have poorer insulation. Additionally, individuals holding stronger beliefs in an impending environmental crisis and human ingenuity are more.

Keywords: NEP scale, Mexico, SMEs, electricity consumption, energy efficiency, green technology adoption.

Resumen

Este artículo tiene como objetivo contribuir a la comprensión de la relación entre las actitudes y los comportamientos ambientales con los impactos ambientales. Logramos este objetivo evaluando la validez psicométrica de la escala del Nuevo Paradigma Ecológico (NEP) en México y explorando las correlaciones entre los factores identificados (actitudes) y los comportamientos del mundo real. A diferencia de la literatura existente centrada principalmente en individuos y hogares en países desarrollados, nuestro estudio investiga cómo los valores proambientales se relacionan con el consumo de electricidad, la eficiencia energética y la adopción de tecnologías amigables con el medio ambiente entre las pequeñas y medianas empresas comerciales y de servicios en México. Identificamos cuatro factores cohesivos que encapsulan

actitudes distintas. Nuestros hallazgos indican que las empresas donde los empleados muestran escepticismo hacia los problemas ambientales y el cambio climático tienden a consumir más energía, usar iluminación menos eficiente energéticamente y tener un aislamiento más deficiente. Además, las personas que creen más firmemente en una crisis ambiental inminente y en el ingenio humano tienen más probabilidades de ser empleadas por empresas que implementan medidas de aislamiento.

Palabras clave: escala NEP, México, SMEs, consumo energético, eficiencia energética, adopción de tecnologías verdes.

Pro-Environmental Values and Energy Practices in Mexican Small and Medium-Sized Enterprises: Insights from the New Ecological Paradigm

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July 4, 2024

Abstract

This paper aims to contribute to understanding the relationship between environmental attitudes and behaviors with environmental impacts. We achieve this goal by assessing the psychometric validity of the New Ecological Paradigm (NEP) scale in Mexico and exploring correlations between identified factors (attitudes) and real-world behaviors. In contrast to existing literature primarily focused on individuals and households in developed countries, our study investigates how pro-environmental values relate to electricity consumption, energy efficiency, and adoption of environmentally friendly technologies among small- and medium-sized commercial and service businesses in Mexico. We identified four cohesive factors that encapsulate distinct attitudes. Our findings indicate that companies where employees exhibit skepticism towards environmental issues and climate change tend to consume more energy, use less energy-efficient lighting, and have poorer insulation. Additionally, individuals holding stronger beliefs in an impending environmental crisis and human ingenuity are more

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Financial support was provided by the Fondo de Sustentabilidad Energética CONACYT-SENER (Project Number 291615) to conduct the non-residential electricity consumption survey used in this paper. The views and opinions expressed in this article are those of the authors and do not necessarily reflect those of the founding institution. We would like to thank Dann Sarmiento, Cynthia Melissa Abdala for their excellent research assistance. All remaining errors are our own.

likely to be employed by companies implementing insulation measures.

Keywords: NEP scale, Mexico, SMEs, electricity consumption, energy efficiency, green technology adoption.

1 Introduction

In the late 1960s and early 1970s, social psychologists hypothesized that the dominant social paradigm was evolving to reflect greater environmental concern. However, these concerns were not uniformly dispersed across countries and populations. While protests and demonstrations were prevalent among young people in the wealthiest nations, they were often muted in developing countries (Dunlap et al., 2000). In these regions, expressions of environmental concern were often led by individuals who directly observed the negative effects of specific industrial projects (Ajzenman et al., 2023)

Nowadays, environmental studies are more relevant than ever, but equally crucial are the environmental actions or behaviors that can have a significant impact (Steg and Vlek, 2009; Lades et al., 2021). To quantify such actions or behaviors, it is important to use instruments specifically designed to measure such behaviors and constructs. Furthermore, studies across different contexts are necessary to understand how demographic, economic, and behavioral changes across populations affect the validity of these measurement scales. Additionally, examining the psychometric properties of these scales across diverse populations is essential for ensuring valid interpretations of collected data.

The New Environmental Paradigm (NEP) Scale, developed at the end of the 1970s by Dunlap and Van Liere (1978), aimed to explore the correlation between stated attitudes and environmental behavior. The original scale consisted of twelve Likert-scale items designed to assess an individual's values and attitudes (1978). Initially, these items appeared to represent a single construct. However, concerns regarding the scale's validity and dimensionality have been raised in the literature (Nooney et al., 2003). Various authors have explored whether the NEP should be used as a single scale, a set of independent scales, or a collection of correlated sub-scales in practical applications. Criticisms regarding the scale's internal validity include inconsistencies in individual responses, weak correlations between scales and actual behavior, and outdated language used in the instrument's statements (Pienaar et al., 2013; Xiao et al., 2019).

In response to the criticism, Dunlap et al. (2000) proposed a revised NEP containing fifteen Likert-scale items where respondents are asked to rate the strength of their agreement with each statement. Even though the authors found four factors or dimensions in their collected data, they suggested treating the revised NEP scale as a single score or one predominant factor. However, they propose that the number of factors or dimensions to be considered in the scale should be made on a case-by-case basis after the pertinent analyses have been performed (Dunlap et al., 2000). Even after the revised NEP scale was introduced in the literature, several scholars have questioned the new scale's internal validity (Amburgey

and Thoman, 2012) and predictive value (Cordano et al., 2003).

Despite its critics and controversies, the original and revised NEP scales have been used in hundreds of studies in developed and developing countries. The revised NEP scale continues to be one of the most widely used instruments by scholars aiming to capture environmental attitudes in different studies worldwide.

In this article, we use the revised NEP scale (simply referred to as NEP) to understand the relationship between environmental attitudes and behaviors with environmental impacts. Specifically, we first assess the psychometric validity of the NEP scale in Mexico and then explore certain correlations between identified factors (attitudes) and real-world behaviors. It is worth noting that both versions of the NEP scale have been previously studied in the Mexican population. These studies have identified two dimensions (Sánchez-Domínguez et al., 2021), three dimensions (Bechtel et al., 2006; Corral-Verdugo and Armendáriz, 2000), and four dimensions (Salgado Beltrán, 2019). They used either a convenient sample of citizens from Sonora, a northern Mexican state (Corral-Verdugo and Armendáriz, 2000; Salgado Beltrán, 2019), or of undergraduate students from the north (Bechtel et al., 2006) or southeast (Sánchez-Domínguez et al., 2021) of Mexico. However, in the present study, we aim to understand the environmental attitudes of employees of small- and medium-sized commercial and service businesses in Mexico, a population that has not been studied before. Furthermore, the attitudes and actions taken by a firm's employees could reduce electricity consumption and emissions in significant ways, making this a key population to analyze.

Many authors have integrated the NEP into their studies to comprehend better the correlation between NEP values, factors, or environmental attitudes of the subjects studied and their actions (Cordano et al., 2003). More generally, researchers are often interested in unraveling the correlation between environmental attitudes measured by many different scales and behaviors with environmental implications. In this quest, Cordano et al. (2003) remarks that individual factors or dimensions of the NEP can be used to create coherent factors that reflect environmental concern. In their article, Cordano and coauthors construct scales from either the original or revised versions of the NEP and examine the predictive validity. They conclude that researchers should be more relaxed in assuming the superiority of the revised or original form of the NEP, concluding that there is a potential to create new scales drawn from the full body of research by Dunlap, Van Liere, and coauthors. Furthermore, Cordano calls for those interested in the psychometric characteristics of these scales to join forces with other social sciences to improve their understanding of the validity of these scales and to describe and change behavior to preserve the natural environment.

In the United States, Attari, DeKay, Davidson, and Bruine de Bruin (2010) found that respondents to their survey with stronger pro-environmental attitudes had more accurate

perceptions of their consumption and the actions that lead to better energy efficiency. The relationship between environmental attitude and energy consumption has been shown in different contexts and using different scales. [Enzler, Diekmann, and Liebe \(2019\)](#) recently studied the correlation between the “Consideration of Future Consequences Scale” and household electricity consumption. They found that 723 German-speaking residents of Switzerland showed an inverse correlation between environmental concern and household electricity consumption. In their study, an increase in the environmental concern variables was associated with decreased electricity consumption by 11.8%. It is important to emphasize that comparing these results across different societies, such as Mexico and Switzerland, and in different contexts, such as firms versus households, would be extremely challenging.

The relationship between a household’s environmental attitude and its actions and the subsequent environmental impact has been documented in various articles. Despite the difficulty in documenting this relationship ([Frederiks, Stenner, and Hobman, 2015](#)), several studies confirm its existence ([Sapci and Considine, 2014](#); [Saari et al., 2021](#); [Lades et al., 2021](#)). However, it is acknowledged that the magnitude of this relationship is sometimes smaller compared to those based on socioeconomic factors ([Martinsson et al., 2011](#)) or is considered weak ([Paço and Lavrador, 2017](#)). While an extensive body of literature analyzes this relationship at the household level, more research is needed to understand the generalizability of previously observed correlations between scales that capture environmental concern and behavior.

We depart from most studies that implemented the NEP scale in two ways. First, we conducted a study in Aguascalientes, Mexico. Aguascalientes, a central state in Mexico with approximately 1.5 million inhabitants, is known for its capital city of the same name. While one of the smallest and least populated states, Aguascalientes is historically significant as a former railroad hub. Currently, the Aguascalientes Metropolitan Area’s strong and dynamic industrial background makes it an ideal context to study the environmental attitudes of small and medium enterprises (SMEs), which constitute the backbone of the Mexican industrial sector. Thus, we contribute to the understanding of generalizability by conducting the study outside the United States or Europe and sampling from a population of SMEs in Mexico that has yet to be broadly studied.

Electricity consumption in Mexico generates considerable emissions because, over the last decade, more than 70% of power has consistently come from fossil fuels. The industrial sector accounted for 66% of total electricity consumption, while the commercial sector consumed 6%. In this context, a firm’s attitudes and actions are crucial in reducing electricity consumption and emissions. However, there is a need to delve deeper into understanding these attitudes and actions. Several reasons contribute to this knowledge gap. Firstly, obtaining

similar information from households is usually easier than gathering data from firms through interviews. Secondly, even when captured, it is more complex to interpret the significance of this relationship. Even if a relationship exists, it remains to be seen whether the recorded environmental attitudes of an individual within a firm could drive the entire firm’s energy consumption. This article presents a unique dataset that allows us to explore this often unobserved relationship.

In summary, this article pursues two primary objectives given the significance of aggregated SMEs’ electricity consumption on emissions. First, we seek to evaluate the psychometric characteristics of the NEP in a Mexican population that has yet to be studied before to create the most pertinent factors that convey the environmental attitudes of the firm’s respondents. Secondly, we delve into the relationship between these factors and the firm’s actions that could impact emissions, including electricity consumption, the adoption of green technologies, and energy efficiency upgrades. In contrast to previous literature, our article does not aim to establish a causal link between environmental attitudes and behaviors. Instead, our primary focus is examining how these attitudes correlate with the actual energy consumption, energy efficiency, and technology adoption of environmentally friendly technologies, such as solar panels or solar water heaters, of SMEs in Mexico. Specifically, we aim to determine whether individuals with higher pro-environmental values are more likely to exhibit energy-efficient practices, embrace green technology, and consume less energy.

2 Data

The main data source for this paper is responses that participants of the Non-Residential Electricity Consumption Survey for the Aguascalientes Metropolitan Area (ENCENRE-2019) provided to us during the months between May 9, 2019, and October 9, 2019. The ENCENRE-2019 was conducted as part of a study directed by the Center for Research and Teaching in Economics (Centro de Investigación y Docencia Económicas, 2019) and gathered data from 812 small and medium-sized commercial and service private firms ¹. The broader study of which the survey was an important instrument aimed to provide information on the relationship between a firm’s characteristics related to economic activity, electricity consumption, energy conservation practices, the stock of energy-related equipment, environmental issues, and other related topics.² The vast majority of the establishments

¹The survey was part of a broader study funded by the Mexican Ministry of Energy (SENER) and the Mexican National Science and Technology Council (CONACYT)

²The ENCENRE-2019 dataset, the original questionnaire in Spanish, and additional details regarding the sampling procedure can be accessed at <https://hancevic.weebly.com/original-data-sets.html>. An English version of the questionnaire is available upon request.

were located in one of the three municipalities that comprise the metro area.³

The sample design for ENCENRE-2019 is characterized by being probabilistic. Consequently, the results obtained from the survey can be generalized to the entire population of the study domain. The design, in turn, is stratified according to the number of employed personnel.⁴ The ultimate unit of selection is the business establishment. The selection was based on the official list of economic units of the National Statistical Directory of Economic Units (DENUE) published by the National Institute of Statistics and Geography (INEGI), which offers the identification data, location, economic activity and size of more than 5 million active economic units in the Mexican territory.

This article used the responses to the NEP, whose statements were translated into Spanish. This instrument was located in Section 7 of the survey, which measured respondent’s environmental awareness, attitudes, and beliefs. In addition to the NEP, we asked respondents about effective actions firms could undertake to save energy. Following this, respondents faced the NEP Scale, as proposed by [Dunlap et al. \(2000\)](#). Subsequently, the remaining questions were primarily oriented toward gaining insight into the firm’s energy conservation practices and habits already adopted or planned.

The 15 NEP scale items ([Dunlap et al., 2000](#)) were translated into Spanish for the ENCENRE-2019 application and were assessed using a 5-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The Spanish translation underwent a review by three researchers from the team. Even-numbered items were reverse-coded, following the suggestion of Dunlap and colleagues (2020). The final dataset consisted of 807 complete responses. It is crucial to note that the survey was answered by individuals who stated that they have decision-making authority within the company, such as owners, partners, managers, or administrative staff. This distinction makes the analysis different from previous studies, where respondents were often students or groups created ad hoc.

3 Methods

3.1 Psychometric analysis

The mean and standard deviation of all items were computed as descriptive statistics. Item-rest correlation was considered as a measure of item discrimination. We assessed each item’s

³The Aguascalientes metropolitan area includes the municipalities Aguascalientes, Jesus María, and San Francisco de los Romo. The establishment distribution across these municipalities is 95.4% , 4.2% , and 0.4% , respectively.

⁴The ENCENRE-2019 considers the following 4 strata: 6 to 10 workers, 11 to 30 workers, 31 to 50 workers, and 51 to 100 workers.

quality within the NEP scale via the item-rest correlation index. Items with high discrimination (values greater or equal to 0.50) are retained, items below 0.20 are removed, and items between 0.20 and 0.50 should be analyzed for modifications (Thorndike and Thorndike-Christ, 2010). We computed Cronbach’s alpha and omega index to analyze internal consistency. Cronbach’s alpha is the reliability index typically used in the literature. However, Cronbach’s alpha has several limitations (Dunn et al., 2014; McNeish, 2018; Sijtsma, 2009; Yang and Green, 2011; Zinbarg et al., 2005). Cronbach’s alpha underestimates the reliability of internal consistency when assumptions are violated (Dunn et al., 2014; Sijtsma, 2009; Zinbarg et al., 2005). The omega index is an alternative reliability measure with less restrictive assumptions, making it more suitable to discuss internal consistency (Dunn et al., 2014). We computed Cronbach’s alpha to compare our results with those of others in the literature, but we used the omega index to investigate internal consistency reliability. We also used the Kaiser-Meyer-Olkin (KMO) index and Bartlett’s sphericity test to examine whether the data supported factor analyses. We used several functions in the psych and EFAtools R packages (Revelle, 2019; Steiner and Grieder, 2020) to perform these analyses.

A series of exploratory factor analysis (EFA) techniques were performed to investigate the number of factors that could be identified in the data. We computed and plotted the eigenvalues of the correlation matrix and computed a series of EFA models considering four and five factors using maximum likelihood estimation and promax rotation to consider oblique factors. That is, we assumed the factors under the NEP scale were correlated. As we discussed below, the data supported a four-factor structure.

Once a factorial structure was determined via EFA techniques, we fit a series of confirmatory factor analysis (CFA) models to investigate further and define the dimensionality of the NEP scale for the data in hand. The lavaan R package (Rosseel, 2012) was used to perform all CFA analyses. Diagonally weighted least squares estimation procedures were considered to accommodate for categorical data. Typical guidelines for a satisfactory model-data fit are as follows: root mean square error of approximation (RMSEA) $\leq .06$, standardized root mean square residual (SRMR) $\leq .08$, and comparative fit index (CFI) and Tucker-Lewis index (TLI) $\geq .95$ (Hu and Bentler, 1999). A non-significant chi-square statistic represents an acceptable model. In addition, theoretically, weak factor loadings are defined as those with values of 0.4 or less, but factor loadings of 0.2 or 0.3 are still considered in practice (Briggs and MacCallum, 2003).

Initially, we fit a correlated (oblique) four-factor CFA model considering all 15 NEP items. Then, we considered the factor loadings and the item-rest correlation index to decide which items should continue following an iterative process. Items that presented a weak factor loading and an item-rest correlation index below 0.20 were eliminated from the next

modeling round. Again, a correlated four-factor CFA model was estimated considering the items left. The data no longer supported item elimination, so we investigated modification indexes to improve the goodness of fit. We only added residual covariance parameters among the observed variables when suggested by modification indexes greater than eight. This way, the added parameters at the final stage (Kline, 2011) did not modify the final latent structure. Lastly, the correlated four-factor CFA model with the items from the previous stage, plus the added covariance parameters among observed variables, was estimated.

3.2 Correlational analyses

Having obtained improved measures from the NEP scale tailored to the Mexican SME context, we investigated their correlation with real-world behavior. Specifically, we were interested in how the four factors identified in the previous section relate to energy consumption, energy efficiency, and the adoption of green technology. To do this, we used data from ENCENRE-2019 to build a set of control variables. We then fit different regression models that included the four factors as explanatory variables of interest. Descriptive statistics of the variables used in the analysis are presented in tables 5 and 6 in the appendix. For the definitions of these variables, please refer to Table 4 in the appendix.

4 Results

4.1 Psychometric analysis

Descriptive statistics of all items, such as mean and standard deviation, the item-rest correlation, and the KMO index, are presented in Table 1. The internal consistency reliability considering all items available measured by omega was 0.62, suggesting that the NEP scale fairly described the environmental beliefs. And Cronbach's alpha was equal to 0.54. The KMO index ranged from 0.5 to 0.7, and Barlett's sphericity test was statistically significant ($\chi^2(105) = 873.39, p < .001$), which indicated that the data was suitable for applying factor analytic methods to it.

The EFA techniques showed that a four-factor correlated structure was supported by the data ($\chi^2(51) = 129.79, p < .001$). Therefore, we estimated a correlated four-factor CFA model considering all items available, which is reported as *initial CFA* in Table 2. The model fit indexes did not satisfy the desired thresholds, except for the RMSEA. When examining the factor loadings of this initial CFA model, we realized some of them were low. Considering this, we also looked at the item-rest correlation and removed items from the CFA analysis when items presented low values in both indexes. Items 1, 9, and 11 were removed from

Factor 1, and item 6 was removed from *Factor 3*. We estimated the correlated four-factor CFA model considering the items remaining. Results are shown in the mid-column of Table 2. The SRMR index threshold was satisfied, but the rest of the indexes still needed some improvement, so we considered the modification indexes of this last model. We only added residual covariances among the observed variables. These additions preserved the model latent structure, meaning that theoretically the model was not altered (Kline, 2011).

The results of the last model are presented as *final CFA* in Table 2. All model-data fit indexes, including the chi-square test, were satisfied in the final model. The factor loadings of the final CFA model showed adequate values. All estimated correlations between the four factors were statistically significant, ranging from 0.23 to 0.62, except for the correlation between factors 1 and 3. Last, omega had a value of 0.65 when using the final items in the analysis, showing increased internal consistency reliability.

4.1.1 Interpreting the factors

We designate Factor 1 as the ‘*Imminent Environmental Crisis*’ belief. This factor encapsulates the conviction that human activities, marked by the abuse of the environment and interference with nature, will inevitably lead to a catastrophic outcome.

We label Factor 2 as ‘*Denialism*,’ encapsulating the perspective that humans can modify the natural environment to meet their needs. This viewpoint asserts the resilience of the balance of nature against the impacts of modern industrial nations and contends that the perceived ecological crisis is significantly exaggerated.

Factor 3 we called ‘*Equality Between Living Beings*,’ encapsulating the notions that both plants and animals possess the same inherent right to exist as humans and emphasizing the belief that humans were not intended to dominate over the rest of nature. Factor 4 is designated as ‘*Human Ingenuity*,’ embodying the belief that as humans progressively acquire sufficient knowledge about how nature works, they will gain control. This optimism is grounded in the conviction that human ingenuity will be crucial in preventing the Earth from becoming uninhabitable.

It is worth noting that the scale for even-numbered questions must be reversed due to the way the questionnaire is formulated. Thus, considering the questions that make up each factor, for Factor 1, a higher value indicates a stronger belief in an imminent environmental crisis. For Factor 2, a higher value indicates lower denialism (more acceptance) of the potential ecological crisis. For Factor 3, a higher value signifies a stronger belief in the equality of living beings. And for Factor 4, a higher value implies a stronger belief in human capabilities ,or ingenuity.

Table 1: Item analysis of the NEP scale

Item	Mean	S.D.	Item-rest correlation	KMO
1. We are approaching the limit of the number of people the earth can support	1.92	1.42	0.15	0.67
2. Humans have the right to modify the natural environment to suit their needs	2.87	1.78	0.19	0.54
3. When humans interfere with nature it often produces disastrous consequences	1.26	0.84	0.20	0.67
4. Human ingenuity will insure that we do not make the earth unlivable	3.58	1.54	0.16	0.60
5. Humans are seriously abusing the environment	1.18	0.75	0.14	0.65
6. The earth has plenty of natural resources if we just learn how to develop them	4.58	0.97	0.09	0.61
7. Plants and animals have as much right as humans to exist	1.11	0.59	0.17	0.49
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations	2.04	1.50	0.35	0.63
9. Despite our special abilities humans are still subject to the laws of nature	1.63	1.30	0.07	0.53
10. The so-called “ecological crisis” facing humankind has been greatly exaggerated	1.97	1.58	0.31	0.65
11. The earth is like a spaceship with very limited room and resources	2.45	1.63	0.12	0.63
12. Humans were meant to rule over the rest of nature	2.37	1.63	0.17	0.51
13. The balance of nature is very delicate and easily upset	1.38	1.01	0.24	0.68
14. Humans will eventually learn enough about how nature works to be able to control it	3.29	1.62	0.31	0.64
15. If things continue on their present course, we will soon experience a major ecological catastrophe	1.23	0.81	0.19	0.72

This table presents the descriptive statistics and the item analysis of the NEP scale. Source: own calculations using ENCENRE–2019.

Table 2: Factor loadings and fit indexes of the correlated four-factor CFA models

Item number	Item	Initial CFA		Interm. CFA		Final CFA	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
<i>Factor 1</i>							
1	We are approaching the limit of the number of people the earth can support	0.34	0.05				
3	When humans interfere with nature it often produces disastrous consequences	0.62	0.06	0.69	0.06	0.69	0.06
5	Humans are severely abusing the environment	0.61	0.07	0.61	0.07	0.61	0.07
9	Despite our special abilities humans are still subject to the laws of nature	0.25	0.07				
11	The earth is like a spaceship with very limited room and resources	0.34	0.05				
13	The balance of nature is very delicate and easily upset	0.70	0.05	0.66	0.06	0.66	0.06
15	If things continue on their present course, we will soon experience a major ecological catastrophe	0.67	0.07	0.64	0.07	0.64	0.07
<i>Factor 2</i>							
2	Humans have the right to modify the natural environment to suit their needs	0.42	0.05	0.46	0.05	0.39	0.05
8	The balance of nature is strong enough to cope with the impacts of modern industrial nations	0.75	0.05	0.75	0.05	0.80	0.06
10	The so-called “ecological crisis” facing humankind has been greatly exaggerated	0.57	0.05	0.54	0.05	0.55	0.05
<i>Factor 3</i>							
7	Plants and animals have as much right as humans to exist	0.74	0.11	0.66	0.10	0.72	0.11
12	Humans were meant to rule over the rest of nature	0.61	0.08	0.68	0.09	0.62	0.08
<i>Factor 4</i>							
4	Human ingenuity will ensure that we do not make the earth unlivable	0.39	0.05	0.36	0.05	0.42	0.05
6	The earth has plenty of natural resources if we just learn how	0.22	0.06				
14	Humans will eventually learn enough about how nature works to be able to control it	0.83	0.08	0.88	0.10	0.75	0.08
Fit Indexes of the Correlated Four-Factor CFA Models							
Chi-square test		269.84 (df=84), 102.78 (df=38), 42.80 (df=34),					
		p=0.00		p=0.00		p=0.143	
RMSEA		0.05		0.05		0.02	
SRMR		0.09		0.08		0.06	
CFI		0.85		0.93		0.99	
TLI		0.81		0.90		0.99	

This table presents the results of the CFA models. Source: own calculations using ENCENRE-2019.

4.2 Correlational analyses

The results of the estimations are shown in Table 3, where each column represents a different model. The dependent variables are as follows: In column (1), it is the logarithm of consumption in kWh; in column (2), it is a binary variable equal to one if the business has 80 percent or more energy-efficient lights; in column (3), it is a binary variable that takes on the value one if the person claims to know how much is spent on electricity; in column (4), it is the binary variable for having a distributed solar PV system (DPV) installed; in column (5), it is the dichotomous variable for planning to install DPV; in column (6), it is a dichotomous variable for having insulation on walls and/or windows and/or roofs; and finally, in column (7), it is a binary variable equal to one if the business has a solar water heater. First, we are not trying to establish causality; we are simply measuring correlations between the factors and certain variables of interest.

Table 3: Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	log(cons)	EE lights	know exp	has DPV	plans DPV ⁽¹⁾	insulation	solar WH
Factor 1	0.0301 (0.0731)	0.0068 (0.0255)	0.0096 (0.0270)	0.0167 (0.0229)	0.0301 (0.0324)	0.0465* (0.0250)	-0.0102 (0.0103)
Factor 2	-0.1692** (0.0803)	-0.0858*** (0.0294)	-0.0125 (0.0276)	-0.0226 (0.0179)	-0.0318 (0.0334)	-0.0514** (0.0205)	0.0071 (0.0109)
Factor 3	-0.0090 (0.1047)	0.0195 (0.0386)	0.0517 (0.0326)	0.0246 (0.0308)	-0.0441 (0.0415)	-0.0791*** (0.0305)	0.0151 (0.0154)
Factor 4	0.0752 (0.1134)	0.0264 (0.0405)	-0.0222 (0.0347)	0.0011 (0.0292)	0.0669 (0.0417)	0.0635** (0.0322)	-0.0085 (0.0145)
Observations	577	762	779	779	719	779	779
R^2	0.736	0.086	0.102	0.128	0.121	0.097	0.104

This table presents the regression results. All specifications incorporate the control variables that are listed in the Appendix. The coefficients of control variables are not reported to optimize space. Standard errors are shown in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Note: (1) excludes businesses that have already adopted solar panels.

The first thing that stands out is that, unlike what happens with households, in the case of companies, the correlation between the factors and the studied variables of interest could be stronger. This could be because, in the case of companies, the relationships between the results obtained (such as technology adoption, electricity consumption, etc.) and the respondents' attitudes are less direct. Employee-firm misalignment is not novel and might be attributed to several reasons, including the classic principal-agent problem. However, the

weak correlations found here hold even when excluding non-owners from the sample.⁵ Often, decisions are diluted when implementing organizational policies, regardless of who makes the decision.

Looking at the coefficients in Table 3, Factor 2 (*denialism*) appears to be the most relevant. Factor 2 (*denialism*) is negatively correlated, the expected sign, and statistically significant at conventional values for three regressions. The fact that Factor 2 exhibits a stronger correlation with these outcome variables and that this correlation is negative suggests that companies, where employees are inclined to deny environmental problems and climate change, tend to consume more energy, use less energy-efficient light bulbs, and have less insulation.

The remaining factors (1, 3, and 4) show significance only in the insulation model (column 6). Specifically, individuals with stronger convictions about an impending environmental crisis and a greater belief in human ingenuity are more inclined to be employed by companies that have implemented insulation measures (in walls, windows, and/or roofs). Conversely, those with stronger beliefs in the equality of living beings tend to work for firms that are less likely to adopt insulation. Although the latter result seems contradictory, we do not have a specific conjecture to offer.

5 Concluding comments

We explored the psychometric characteristics and dimensionality of the NEP scale among employees at SMEs in Mexico, an unexplored but crucial population for potentially reducing electricity consumption and emissions. Following the suggestion of its creators (Dunlap et al., 2000), we interpreted and named the dimensions we found in the NEP data. We identified four factors reflecting the environmental attitudes of this population: imminent environmental crisis, denialism, equity between living beings, and human ingenuity. We investigated the relationship between these factors and energy consumption, energy efficiency, and the adoption of green technology.

We found that firms reporting higher scores on the *denialism* factor, which indicates an inclination among employees to deny environmental problems and climate change, tend to consume more energy, use less energy-efficient light bulbs, and have less insulation. This correlation could be attributed to the self-selection of employees with higher denial into these firms. Our sample mostly comprises small and medium firms, and we restricted our survey to respondents with decision-making power over energy consumption. Thus, it is likely that our

⁵We also ran regression models in Table 3 by excluding administrative and operational employees, obtaining similar results. These additional findings are available upon request.

respondents were owners or managers. Therefore, the observed negative correlation between denialism, energy consumption, and other measures that could improve energy efficiency likely implies omission, lack of attention to energy efficiency, or lack of interest.

Regarding the psychometric characteristics of the NEP scale, a four-factor structure was previously found in a Mexican population of a northern state consuming organic products (Salgado Beltrán, 2019). Low to moderate indexes of internal reliability have consistently been found in the NEP literature for Mexico (Corral-Verdugo and Armendáriz, 2000; Salgado Beltrán, 2019; Sánchez-Domínguez et al., 2021). Our results align with previous literature. However, higher reliability indexes would be desirable to achieve more consistent measures of environmental beliefs in the Mexican population.

Our study has several limitations. On the one hand, survey respondents might not have been the ones whose main actions had environmental implications. For example, while the manager or owner might have incentives to reduce energy consumption, actual energy consumption might be mostly determined by business requirements, sales, hours of operation, and employee behavior. On the other hand, the fact that our survey was temporarily separated from those actions with environmental implications adds external validity. Respondents might have been unaware of the studied relationship, creating a better environment to express their true environmental concerns and actions.

Future research might explore whether interventions that modify environmental awareness or concerns affect subsequent actions not captured during the survey. They might also want to manipulate how close in time the interventions are to increase environmental awareness and actions with environmental implications.

In conclusion, this study shows that respondents at firms located in Aguascalientes, Mexico, who exhibited worse energy consumption, insulation, and adoption of energy-efficient light bulbs are characterized by a higher degree of denialism of the effects of human behavior on climate, according to the NEP scale.

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Appendix

Table 4: Variable definition

Name	Definition
01	Residential, regular tariff
DAC	Residential, high demand tariff
GDMTH	High-demand, medium-voltage, hourly tariff
GDMTO	High-demand, medium-voltage, regular tariff
PDBT	Low-demand, low-voltage tariff
Consumption	Electricity consumption in kWh
Efficient lights	The business has 80% or more efficient lights
Knows expenditure	Individual declares that she knows how much is spent on electricity
DPV installed	The business has distributed solar PV system installed
DPV planned	The business is planning to install a distributed solar PV system
Insulation	The business has insulation on the walls and/or roof and/or windows
Solar WH	The business has solar water heater
Contracted load	Contracted load in KW
Workers	Number of workers in the business
Open weekends	The business is open during weekends, either the whole time or part of it
Owner	The business premises belong to the company
AC unit	The business has air-conditioning system(s)
Refrigerators	The business has refrigerator(s)
Water pump	The business has water pump(s)
Air extractor	The business has air extractor(s)
TV	The business has TV set(s)
Server	The business has computer server(s)
Voltage regulator	The business has voltage regulator(s)
Light sensor	The business has light sensor(s)
Temp setting	There is a policy to set the air conditioning temperature in the establishment

Table 5: Electricity consumption by tariff category (kWh)

Tariff	Mean	Std. Dev.	Freq.
01	2,916.9	(3,000.8)	55
DAC	7,344.5	(4,695.2)	23
GDMTH	340,497.4	(241,152.2)	18
GDMTO	138,443.9	(169,774.6)	89
PDBT	11,858.7	(19,433.2)	594
Total	33,150	(93,296.6)	779

This table presents the electricity consumption by tariff category (in kWh).

Table 6: Summary Statistics

	Mean	Std. Dev.	Count
Efficient lights	0.833	(0.373)	762
Knows expenditure	0.842	(0.365)	779
DPV installed	0.076	(0.265)	779
DPV planned	0.181	(0.385)	719
Insulation	0.108	(0.310)	779
Solar WH	0.031	(0.173)	779
Contracted load	390.1	(1175.7)	584
Workers	14.7	(33.0)	779
Open weekends	0.629	(0.483)	779
Owner	0.322	(0.468)	779
AC unit	0.350	(0.477)	779
Refrigerators	0.707	(0.455)	779
Water pump	0.522	(0.500)	779
Air extractor	0.081	(0.273)	779
TV	0.447	(0.497)	779
Computer server	0.366	(0.482)	779
Voltage regulator	0.389	(0.488)	779
Light sensor	0.237	(0.426)	779
Temp setting	0.113	(0.317)	779
Observations	779		

This table presents the summary statistics of the main variables used in our analysis.

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