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Profiling coffee consumers: an instrument based on values and attitudes for Spanish-speaking countries in Latin America with a sustainability perspective

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ABSTRACT

Despite the growing interest in sustainability in the coffee value chain, studies that identify consumers with sustainable values and attitudes are limited, particularly in Latin America. This study developed and validated an instrument in Spanish to cluster coffee consumers based on their sustainable attitudes and values towards coffee consumption. The instrument consists of 18 items grouped into five constructs: green, ethical, experience, price, and attachment. The validity and reliability of the instrument were verified through Principal Component Analysis and Confirmatory Factor Analysis with consumers from Latin America and Colombia. Thus, this instrument can be used to identify local market segments in producer countries.

Key words: Coffee consumer profile; clustering; market research; market segment; confirmatory factor analysis.

1 INTRODUCTION

Although interest in sustainable development in production chains has increased, specific studies on the behavior of sustainable coffee consumers in Latin America, one of the main coffee-producing regions in the world, are still scarce. Sustainable consumers can be identified, classified, and analyzed through market segmentation (Mitchell; Wilson, 1998). In this context, similarity in behavioral characteristics or traits, such as sustainable values in coffee consumption, offers insights into the formation of individual beliefs that directly impact attitude toward behavior (Schwartz, 2012), which drive and energize the value chain. Values and attitudes are the components of the Theory of Planned Behavior (TPB) (Ajzen, 1985), which, together with subjective norms and perceived control, help to understand and predict the rational decision-making process of sustainable consumers (Haider; Shannon; Moschis, 2022).

Market segmentation with an emphasis on sustainable consumption has been founded on psychographic, demographic, and behavioral criteria based on sustainable values (Maciejewski; Mokrysz; Wróblewski, 2019), socioeconomic and demographic characteristics (Duran et al., 2023; Feil et al., 2020; Grubor; Djokic, 2016; Valenciano-Salazar; André; Soliño, 2021) attitudes (Thøgersen et al., 2015), motivations (Yadav; Pathak, 2016), perceptions (Lee; Yun, 2015), lifestyles (Thøgersen, 2017), behaviors (Chekima et al., 2017; Feil et al., 2020), and motives for choosing organic coffee (Cho, 2014), among others. Research on sustainable coffee consumer segmentation is limited in Latin America, particularly in Spanish-speaking countries. Guzmán et al. (2021) segmented through levels of consumer awareness. However, specifically in coffee, research in the region has used segmentation criteria without a sustainability perspective. Sanmiguel, Barahona and Pérez-Villarreal (2015) used coffee processing as a segmentation criterion, and Barbosa et al. (2015) used motivational factors to influence the attitude of coffee consumers. In this context, the main difficulty lies in the absence of segmentation instruments that contribute to predicting sustainable coffee consumer behavior in Latin America, particularly regarding their values and attitudes in consumption focused on more socially or environmentally sustainable coffee production practices.

Given that some coffee consumers in Latin America may have preferences for sustainable attributes in coffee, it is fundamental to understand the values and attitudes that guide their sustainable consumer behavior. Identifying an instrument adapted to the context to recognize this market segment is a crucial prerequisite to improving the dynamization of the sustainable coffee value chain from the consumer's perspective. Therefore, the general objective of this research was to develop an instrument for segmenting coffee consumers in Latin America with a sustainability perspective. The specific objectives were 1) To develop an instrument to profile coffee consumers and 2) To validate the Instrument. Furthermore, the developed survey instrument and an example of its application are provided as supplementary materials.

1.1 Literature review and conceptual framework

Psychometric theory guides the theoretical framework of this study. Psychometric theory studies behavior and describes

how psychological measurements (e.g., values or attitudes) are related to observable variables defined as constructs, which are assigned quantitative values through instruments or tests (Nunnally; Bernstein, 1994; Raykov; Marcoulides, 2011). No instruments allow the measurement and observation of the constructs directly. Therefore, questionnaires are widely used as survey instruments to collect data in the social sciences to measure psychological measures, also known as constructs (Taherdøost, 2016). Constructs, also called latent variables, help classify and describe individual behaviors, reduce complexity, and allow understanding of the common characteristics of behaviors (Raykov; Marcoulides, 2011).

All survey instruments that aim to understand measures associated with psychological measures must go through a validation process that ensures that measurement error is kept to a minimum, as well as model-fit measurements (Kimberlin; Winterstein, 2008). The validation process refers to the validity and reliability of the survey instrument, meaning that it measures what it is designed to measure (validity) and that it can be interpreted consistently across different scenarios (reliability) (Field, 2013). Model-fit measurement refers to the existing relationship between measured items and latent constructs (Hair et al., 2019). This means that in this study, in which authors aim to assess the values and attitudes toward coffee consumption, the proposed survey instrument allows the identification of constructs that have a relationship with each other and consistently measures values and attitudes toward coffee consumption.

Researchers must be concerned with four validity measures to ensure that survey instruments are valid and reliable. Face validity is "the degree to which it appears to be related to a specific construct" (Taherdøost, 2016). Content validity refers to the "evidence that the content of a [survey instrument] corresponds to the content of the construct it was designed to cover" (Field, 2013). Construct validity refers to how the survey instrument operationalized the psychological measures under study through convergent and discriminant validity. Convergent validity refers to how constructs that should be related theoretically are related, while discriminant validity refers to how constructs that should not be related theoretically are not related. Finally, criterion validity refers to the usefulness of the measures to predict performance or behavior in another situation (Taherdøost, 2016). In this study, as the authors focused on developing the psychometric measures of attitudes and values toward coffee consumption, the analytical process presented in this paper showcases measurement model fit, construct validity, and reliability.

Validity and reliability are the key indicators of an instrument's quality. In consumer behavior research, attitudes and values as variables of interest are abstract concepts. Therefore, there is a need to develop quality psychometric measures that are valid and reliable, allowing researchers and the industry to understand coffee consumers better. There is a wide variety of instruments aimed to gauge understanding of other psychological measures that have followed validation through Confirmatory Factor Analysis (CFA), a well-known method for measuring models (i.e. research in critical thinking such as Baker et al. (2021) and Oyugi et al. (2024) are evidence of that).

2 MATERIAL AND METHODS

This quantitative study focused on developing a survey instrument to profile coffee consumers based on their attitudes and behaviors toward coffee consumption. Two samples were used to develop the instrument. The first one, which was used to develop the survey instrument, was an accessible sample to the research team through the listserv of the Zamorano University alumni network and included participants primarily from Guatemala, Honduras, El Salvador, and Ecuador, among other Latin American Spanish speaking countries (N = 355) and the second one, which was used to validate the instrument, was a panel from a representative sample of Colombian coffee consumers (N = 385) available through the consumer panel of the market research company Offerwise. Hence, the first sample was a convenience sample, while the second was a representative sample with a margin of measurement error of five percent. Both samples completed an online survey instrument distributed via email, WhatsApp, and text message. The survey was designed to be both desktop and mobile-friendly.

2.1 Survey instrument development

The survey instrument consists of 18 statements, and the participants were asked to determine their level of agreement with each statement regarding their attitudes and values about coffee consumption (1 = strongly disagree to 5 = strongly agree). The information for constructing the statements builds upon the work from Maciejewski, Mokrysz and Wróblewski (2019), where the authors developed and validated an instrument to obtain market segments for coffee consumers in Poland. The instrument developed by Maciejewski, Mokrysz and Wróblewski (2019) included 30 statements that participants must answer on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). For this study, the statements were translated from English to Spanish and adjusted to the Latin American context.

A Principal Components Analysis (PCA) was conducted on the convenience sample to reduce the number of statements used in the survey instrument and to re-evaluate and identify the constructs associated with attitudes and values regarding coffee consumption. Then, a Confirmatory Factor Analysis (CFA) was conducted on the representative sample of Colombian coffee consumers to evaluate the validity and reliability of the reduced survey instrument and the identified constructs. The validation of the survey instrument followed the approach of Baker et al. (2021) to present the findings.

2.2 Principal Component Analysis (PCA).

The PCA is a statistical procedure used to reduce the dimension of a set of possibly correlated variables into a set of linearly uncorrelated variables called principal components so that the interpretation is faster and simpler (Mahesh, 2020). The principal components are some linear combinations of the original variables, which maximally explain the variance of all variables. The method approximates the original data using a few principal components (Greenacre et al., 2022). The number of components was based on Eigenvalues above 1, with varimax orthogonal rotation and a decomposition based on the covariance matrix.

After conducting the PCA with the convenience sample the dimensionality of the survey instrument was reduced from the 30 statements in Maciejewski (2018) to 18 statements grouped within five previously established theoretical constructs (green, ethical, price, experience, and attachment), which were used with the second sample for the corresponding diagnostic measurements of the Confirmatory Factor Analysis (CFA).

2.3 Confirmatory Factor Analysis

The psychometric theory was tested using a CFA to identify how the measured constructs logically and systematically represent the constructs included in a theoretical model (Hair et al., 2019; Milfont; Fischer, 2010). The CFA was conducted using the representative sample of Colombian coffee consumers. This enabled the authors to assess the fit of the model. Thus, confirming or rejecting the pre-specified constructs.

2.3.1 Diagnostic measurements

To assess the fit of the measurement model, the Comparative Fit Index (CFI), the Tucker-Lewis index (TLI), and the Root Mean Squared Error of Approximation (RMSEA) were included (Table 1). The CFI assesses the model fit by the discrepancy between the sample data and the hypothesized measurement model (Hu; Bentler, 1999). The TLI compares the fit per degree of freedom of the proposed and null models (Tucker; Lewis, 1973). The RMSEA is independent of the sample size (Browne; Cudeck, 1992). Moreover, it represents the mean of the residuals between the correlation observed in the sample and the estimated model expected for the population (Hair et al., 2019).

2.3.2 Convergent validation

This refers to the fact that the items linked to the same latent construct must converge or share a considerable proportion of variance in common. Standard Factor Loadings (SFT) and Average Variance Extracted (AVE) are used to estimate it (Hair et al., 2019). High factor loadings signal that the items associated with a particular latent construct converge or share a common variance expressed by standardized loading estimates (Hair et al., 2019). The AVE is calculated as the average variance extracted for items loading on a construct and serves as a summary indicator of convergence (Hair et al., 2019).

2.3.3 Discriminant validity

Discriminant validity, estimated using the Correlation Among Constructs (CAC), implies that a construct must be distinguishable from distinct and unrelated constructs. When high discriminant validity is present, it is evident that the construct is unique and capable of explaining variance not explained by unrelated constructs. Adequate discriminant validity suggests that individual items only represent the corresponding latent construct, thus strengthening the accurate interpretation of the relationship between the construct and its components (Hair et al., 2019).

Table 1: Diagnostic measurements and cut-off values are used to examine the fit of the measurement model.

Measurements		Diagnostic measures and cut-off value
Model adjustment	CFI	CFI > 0.90: Acceptable fit.
	TLI	TLI > 0.90: Acceptable fit.
		TLI > 0.95: Excellent fit.
	RMSEA	RMSEA < 0.80: Acceptable adjustment.
		RMSEA < 0.05: Excellent fit.
Validation of the construct	Convergent validation	FL > 0.50: Acceptable
		AVE > 0.50: Adequate convergent validation
	Discriminant validation	CAC< 0.85: Adequate
Reliability	Composite reliability	CR > 0.60: Suitable
	Cronbach's Alpha (α)	α > 0.80: Adequate

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis index; RMSEA = Root Mean Squared Error of Approximation; FL = Factor Loadings; AVE = the Average Variance Extracted; CAC= Correlation Among Constructs; CR = Composite Reliability; α = Cronbach's alpha. Adapted from Baker et al. (2021).

2.3.4 Reliability

It is used to investigate the measurement's accuracy (Warmbrod, 2014). Cronbach's alpha (α) is widely used to assess an instrument's internal consistency. Composite Reliability (CR) is used to assess the reliability of latent constructs and the overall reliability of the measurement model (Awang, 2015).

3 RESULTS

In this section, we first present the descriptive statistics of the Colombian consumer sample used to validate the instrument and then the results of the diagnostic metrics used to develop and validate the tool. No demographics were collected from the convenience sample; thus, descriptive statistics are not presented (Table 2). As it can be appreciated, the Colombian coffee consumers in our sample were relatively young, consumed more than three cups of coffee per day, and were predominantly female. The most common education attainment was high school, with a similar proportion of associate and bachelor's degrees. Finally, most of the sample had an income of up to three minimum legal salaries, approximately 3,900,000 Colombian pesos.

Table 2: Descriptive statistics of Colombian consumers (N = 385).

Variable	Mean (SD)	N (%)
Age	37.0 (11.6)	
Cups of coffee per day	3.4 (2.0)	
Gender		
Male		133 (34.5)
Female		252 (65.4)
Education		
Primary		15 (3.89)
High school		121 (31.4)
Technical/Associate		112 (29.0)
Bachelor/University		115 (29.8)
Postgraduate		22 (5.7)
Income*		
$0 - $1,300,000		184 (47.7)
$1,300,001 - $3,900,000		127 (32.9)
$3,900,001 – 6,500,000		56 (14.5)
$6,500,001 - $9,100,000		16 (4.2)
More than $9,100,000		2 (0.5)

*Colombian pesos. US$ 1 = 4,197.43 Colombian pesos.

3.1 Confirmatory Factor Analysis results

All diagnostic measurements were above the cut-off value for a valid and reliable instrument (Table 3). Therefore, it was confirmed that the hypothesized survey instrument with 18 statements and five constructs is valid and reliable for creating coffee consumers' market segments in Spanish-speaking countries in Latin America.

The results of the CFA by statement and construct are presented in Table 4. For convenience of the reader, we present the original statements in Spanish and its translation to English in parenthesis. All the FLs met the condition of being >0.50 except for item 13 (0.41). All the AVEs met the condition of being >0.50, except for the experience construct (0.37). All the CCs met the condition of being <0.85 (Table 5). All constructs met the condition of composite reliability >0.6. The constructs ethical (0.79), experience (0.77), and attachment (0.74) obtained values <0.80 for Cronbach's α. However, the overall Cronbach's α of the instrument was 0.87.

4 DISCUSSION

The diversity of coffee consumers worldwide demonstrates the need for structurally validated tools. Instruments for segmenting sustainable coffee consumers have utilized sustainable values (Maciejewski; Mokrysz; Wróblewski, 2019) and organic choice motives (Cho, 2014) as segmentation variables, demonstrating the limited literature development in this area. As an extension of the findings of previous studies, a segmentation instrument for sustainable coffee consumers in Latin America was developed, taking as a basis the items from Maciejewski, Mokrysz and Wróblewsk*i* (2019) and additional information from Samoggia and Riedel (2018) and Deloitte (2023). This study indicated that the instrument is consistent in Spanish for the Latin American context, providing the first evidence of the reliability and validity of the survey instrument. It was confirmed that the measurement model proposed in the present research has five constructs: green, ethical, price, experience, and attachment. Therefore, future cross-cultural research on coffee consumers with a sustainable perspective becomes more feasible thanks to the instrument's availability.

Because the results demonstrate that the instrument is valid for profiling coffee consumers, this instrument can be used to identify and describe sustainable coffee consumers in Spanish-speaking Latin American countries with minimal adjustments to the language used. While emphasis is placed on the sustainability constructs, green and ethical, the other constructs of price, experience, and attachment are equally important for understanding and correctly describing the identified market segments.

Table 3: Diagnostic measures to examine the fit of the measurement model.

Diagnostic measurements			n=355	n=385	Interpretation n=385
Model adjustment		CFI	0.95	0.93	Acceptable adjustment
		TLI	0.93	0.91	Acceptable adjustment
		RMSEA	0.04	0.06	Acceptable adjustment
Validation of the construct	Convergent validation	FL	0.72	0.79	Acceptable
		AVE	0.37	0.53	Adequate convergent validation
	Discriminant validation	CC	0.16	0.36	The items represent each construct
Reliability		CR	0.77	0.91	Constructs are reliable
		α	0.72	0.87	Internally consistent

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis index; RMSEA = Root Mean Squared Error of Approximatio; FL = Factor Loadings; AVE = the Average Variance Extracted; CAC= Correlation Among Constructs; CR = Composite Reliability; α = Cronbach's alpha.

Table 4: Factor loadings, validation, and reliability measures by item and construct (n=385).

Construct		Item	M	SD	SFL	AVE	CR	α
Ethical	1	Prefiero consumir café que ha sido producido de forma socialmente responsable. (I can pay more for coffee which is a BIO product or is Fair Trade certified).	3.66	1.31	0.90	0.56	0.79	0.79
	2	Prefiero consumir café con etiquetas de sostenibilidad social. (I can pay more for coffee, which is a BIO product or is Fair Trade certified).	3.71	1.19	0.97			
	3	Me gusta conocer la historia del productor que está detrás del café que tomo. (When buying coffee, I always check who the producer is).	3.65	1.10	0.82			
Green	4	Prefiero consumir café con etiquetas de sostenibilidad ambiental. (I can pay more for coffee, which is a BIO product or is Fair Trade certified).	3.90	1.08	0.85	0.69	0.87	0.87
	5	Es importante para mí que el empaque de mi café sea amigable con el ambiente. (It is important for me that the packaging in which coffee is sold is as environmentally friendly as possible).	3.96	1.13	0.98			
	6	Prefiero consumir café que ha sido producido de forma ambientalmente responsable. (I can pay more for coffee, which is a BIO product or is Fair Trade certified).	4.08	1.05	0.90			
Price	7	Normalmente compro el café más barato disponible en la tienda. (I usually buy the cheapest coffee available in the store).	2.90	1.22	0.95	0.57	0.80	0.80
	8	No me importa qué café tomo: el café es café. (I do not care what coffee I drink: coffee is coffee).	2.84	1.30	1.00			
	9	Intento comprar café que está en oferta. (I try to buy coffee which is on offer (at a reduced price)).	3.15	1.16	0.85			
Experience	10	Estoy dispuesto a pagar más por café recién preparado. (I am willing to pay more for freshly roasted/produced coffee).	3.73	1.08	0.63	0.37	0.77	0.77
	11	Quiero saber cómo se preparó el café que tomo. (I want to know how the coffee I drink was made).	3.74	1.04	0.69			
	12	Puedo pasar mucho tiempo buscando un lugar donde comprar mi café favorito. (I am able to spend a lot of time searching for a place where I can buy my favorite coffee).	3.28	1.13	0.71			
	13	Prefiero comprar empaques pequeños. (Small packages are better, because only then the coffee is fresh enough—we will use it up before it becomes stale).	3.22	1.07	0.41			
	14	Los empaques de café deberían sugerir el método de preparación más apropiado. (Producers should provide consumers with practical knowledge about the proper preparation of coffee).	3.93	0.99	0.74			
	15	Me gusta probar cafés nuevos. (I like to try new coffees when they appear on the market).	3.86	1.00	0.60			

Continue...

Table 4: Continuation.

Attachme	16	Soy una persona exigente, solo me gustan unos cuantos tipos de café. (I am a demanding person—I only like a few coffee types).	3.34	1.08	0.77	0.48	0.74	0.74
	17	Tengo apego a mi café favorito y me resisto a cambiarlo. (I'm attached to my favorite coffee and I'm reluctant to change it).	3.20	1.04	0.72			
	18	Prefiero elegir café de marcas conocidas en el mercado. (I am more willing to choose coffee that has been on the market for a long time, has been tried and tested).	3.62	1.07	0.74			

Note. M = Mean; SD = Standard Deviation; SFL = Standard Factor Loading; AVE = the Average Variance Extracted; CR = Composite Reliability; α = Cronbach's alpha.

Table 5: Correlation Among Constructs (n=385).

Construct		Ethical	Green	Price	Enthusiastic	Attachment
1. Ethical	Pearson's r	-				
	p-value	-				
2. Green	Pearson's r	0.735	-			
	p-value	< .001	-			
3. Price	Pearson's r	0.087	0.162	-		
	p-value	0.085	0.001	-		
4. Enthusiast	Pearson's r	0.446	0.550	0.291	-	
	p-value	< .001	< .001	< .001	-	
5. Attachment	Pearson's r	0.273	0.320	0.222	0.507	-
	p-value	< .001	< .001	< .001	< .001	-

5 CONCLUSIONS

Market segmentation tools are needed to identify coffee consumers from a sustainability perspective in Latin America, as highlighted by previous studies. This study demonstrates that the instrument is valid and reliable for segmenting Latin American coffee consumers according to their values and positive attitudes towards environmentally or socially sustainable practices in coffee production, and characterizes their behavior according to price, experience or attachment. One limitation is the exclusion of consumers of less than one cup per day.

6 AUTHORS' CONTRIBUTION

Conceptual Idea: Achicanoy, V.; Sandoval, L.; Methodology design: Achicanoy, V.; Sandoval, L.; Morales, S.; Data collection: Achicanoy, V.; Sandoval, L.; Data analysis and interpretation: Achicanoy, V.; Sandoval, L., and Writing and editing: Achicanoy, V.; Sandoval, L.; Morales, S.

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