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Telephones: (593-2) 3962800 ext. 2638

e-mail: editorial@abyayala.org.ec

UNIVERSIDAD POLITÉCNICA SALESIANA DEL ECUADOR

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Turuhuayco 3-69 y Calle Vieja
Cuenca, Ecuador.
Teléfono: (+593 7) 2 050 000
E-mail: srector@ups.edu.ec

Go to:
Secretaría Técnica de Comunicación y Cultura
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Sustainable consumption habits and future generations' awareness in Latin American

Consumo sostenible y conciencia de las generaciones futuras en Latinoaméric

Leonardo Ortegón-Cortázar
Professor and researcher at Institución Universitaria Politécnico Grancolombiano, Colombia
lortegon@poligran.edu.co
https://orcid.org/0000-0003-2130-636X
https://ror.org/00n7m6g17

Marina Santucci
Professor and researcher at Universidad Argentina de la Empresa, Argentina
msantucci@uade.edu.ar
https://orcid.org/0000-0003-3441-2540
https://ror.org/00vgfzn51

David Iglesias-Pina
Professor and researcher at Universidad Autónoma del Estado de México, Mexico
diglesiasp@uaemex.mx
https://orcid.org/0000-0002-7441-747X
https://ror.org/031f8kt38

Ángel Acevedo-Duque
Professor and researcher at Universidad Autónoma de Chile, Chile
angel.acevedo@uautonoma.cl
https://orcid.org/0000-0002-8774-3282
https://ror.org/010r9dy59

Christiam Méndez-Lazarte
Professor and researcher at Universidad de Lima, Peru
cmendezl@ulima.edu.pe
https://orcid.org/0000-0001-5668-3806
https://ror.org/01751w114

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Abstract: environmental challenges in Latin America demand a clearer understanding of what motivates consumers to behave sustainably. Accordingly, this study aimed to examine how future-generation awareness promotes sustainable consumption habits and drives eco-friendly purchasing among consumers in five developing countries—Mexico, Colombia, Peru, Chile, and Argentina—and, specifically, to test the mediating role of such habits in the relationship between future-generation awareness and eco-friendly buying. A survey of 1,466 consumers was conducted across the target countries. Data were analysed using partial least squares structural equation modelling (PLS-SEM) to explore the direct and indirect links between future-generation awareness, sustainable consumption habits, and eco-friendly product purchasing. The integrative model revealed that future-generation awareness strongly stimulates sustainable habits, which, in turn, account for a substantial proportion of eco-friendly purchasing behaviour, thereby confirming the proposed mediation. Multi-group analysis further uncovered country-specific nuances without undermining the global validity of the model. These findings suggest that campaigns grounded in intergenerational responsibility, combined with incentives that facilitate daily practice, can accelerate the widespread adoption of sustainable consumption behaviors in emerging economies, while also offering valuable guidance for public policy by supporting environmental regulation, fiscal incentives, and education as tools to promote sustainable consumption within institutional and governmental frameworks.

Keywords: awareness, consumption, sustainability, purchase, consumer, habits, generations, Latin America.

Resumen: los constantes problemas ambientales en Latinoamérica exigen comprender qué motiva a los consumidores a actuar de forma sostenible. Por tanto, el objetivo es analizar cómo la conciencia de las generaciones futuras puede promover los hábitos de consumo sostenibles e impulsar la compra de productos ecológicos en los consumidores de países en desarrollo: México, Colombia, Perú, Chile y Argentina; además, investigar el papel mediador de los hábitos de consumo sostenibles en la relación conciencia de las generaciones futuras y la compra de productos eco-amigables. Para tal fin, se llevó a cabo una encuesta a 1466 consumidores en los países mencionados. Los datos recopilados se analizaron utilizando el modelo de ecuaciones estructurales con mínimos cuadrados parciales (PLS-SEM) para explorar las relaciones directas e indirectas entre la conciencia sobre las generaciones futuras, los hábitos de consumo responsable y la compra de productos amigables con el medioambiente. El modelo integrador reveló que la conciencia hacia las generaciones futuras impulsa los hábitos sostenibles, y estos, a su vez, explican una parte sustancial de la decisión de compra ecológica, confirmando la mediación propuesta. Además, el análisis multigrupo mostró matices nacionales, sin comprometer la validez global del modelo. Estos hallazgos sugieren que las campañas basadas en responsabilidad intergeneracional, combinadas con incentivos que faciliten la práctica diaria, pueden acelerar la adopción masiva de comportamientos de consumo sostenible en economías emergentes, pudiendo también ofrecer valiosas orientaciones para las políticas públicas, respaldando la regulación medioambiental, los incentivos fiscales y la educación como herramientas para promover el consumo sostenible dentro de los marcos institucionales y gubernamentales.

Palabras clave: conciencia, consumo, sostenibilidad, compra, consumidor, hábitos, generaciones, Latinoamérica.

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Introduction

Understanding the factors that drive sustainable purchasing behavior has become a priority for both academic literature and public policy makers, particularly in the context of global challenges associated with climate change and environmental degradation. Sustainability, beyond being an emerging concern, has become a central axis in the decision-making processes of governments and corporations (Gillan *et al*., 2021; Ghaffar *et al*., 2023). Understanding consumer behavior within the context of sustainability offers valuable insights into how individuals incorporate eco-conscious practices into their routines and purchasing patterns (Lange, 2024; Lopes *et al*., 2024; Zeng *et al*., 2023).

Existing research has identified a range of determinants shaping sustainable consumption, emphasizing the influence of environmental awareness, pro-environmental attitudes, and concerns about future generations on responsible buying choices (Lavuri, 2022; Nguyen *et al*., 2024; Saari *et al*., 2021; Seyfang, 2013). In addition, collective values (Yang *et al*., 2024) and the formation of a pro-environmental identity (Zhao *et al*., 2024) are seen as reinforcing motivations to engage in sustainable consumption (Ahmad *et al*., 2022). Other contributing factors include materialistic values, consumer trust, and generational cohort membership (Dimitrova *et al*., 2022; Li *et al*., 2024), as well as environmental concern and knowledge, personal values, perceived consumer effectiveness, and social influence (Casalegno *et al*., 2022; Duque *et al*., 2024; Wei *et al*., 2017; Yusoff *et al*., 2023).

However, there is still a lack of literature exploring how concern for the well-being of future generations is linked to the actual purchase of environmentally friendly products, mediated by sustainable consumption habits. This gap is particularly relevant in developing contexts such as Latin America, where structural limitations—including inadequate infrastructure, low recycling rates, weak willingness to pay for sustainable products, and poor waste management systems—impede the transition toward responsible consumption patterns (de Carvalho *et al*., 2016; Barros *et al*., 2021; Maldovan, 2018; Miles and Munilla, 2004; Quispe-Palomino and Quispe-Huisa, 2021; Sánchez *et al*., 2020). Consequently, a global and integrative analysis is required to explain how to effectively foster sustainable consumption behaviors.

Although significant differences exist among Latin American countries in terms of income inequality, consumption patterns, and specific cultural values (Gorga *et al*., 2024; Ayala, 2018;

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Villa-Castaño *et al*., 2024), as well as mismatches between limited access to sustainable products and ineffective consumption policies (Sylvester, 2024), this research adopts a holistic and explanatory approach. As a first approximation to the proposed relationships, our aim is to understand the common dynamics that emerge across Latin American contexts, rather than emphasizing their cultural or structural divergences. We prioritize an integrative perspective to verify the existence and explanatory relationships between the key variables under study.

While the literature has suggested that motivations for sustainable consumption in Latin America are shaped by cultural, social, and economic factors (Alzamora-Ruiz *et al*., 2020; Santucci *et al*., 2023), empirical evidence on this phenomenon remains limited. For instance, although it has been noted that values such as family, religion, and nationalism may motivate responsible consumption behavior (Villa-Castaño *et al*., 2025), or that consumption may be influenced by social status (Gorga *et al*., 2024), few studies have explored the role of generational awareness as a driver of sustainable habits in the region. Moreover, although previous research has examined topics such as young people's purchase behavior regarding sustainable products (Cristancho-Triana *et al*., 2024) and the influence of eco-labeling and certifications (Arredondo *et al*., 2010; Feldman and Reficco, 2015), these findings have yet to be clearly linked to everyday behaviors such as sustainable consumption habits.

Accordingly, this study aims to analyze the role of sustainable consumption habits in the relationship between future generations awareness and the purchase of environmentally friendly products. Specifically, we seek to answer: What are the antecedents underlying the purchase of environmentally friendly products? This study seeks to examine how sustainable consumption habits mediate the relationship between awareness of future generations and the intention to purchase environmentally friendly products in the Latin American context. To investigate this, we conducted an empirical study with consumers from Argentina, Chile, Peru, Colombia, and Mexico. This approach enabled us to explore the presence and interplay of future generations' awareness, sustainable consumption behaviors, and green purchasing decisions across these five countries.

Literature Review

Awareness of future generations refers to an individual's concern for the well-being and legacy left to those who will inhabit the planet in the future. This concept has gained relevance in understanding sustainable consumption dynamics (McAdams and de St. Aubin, 1992), including its influence in contemporary business contexts (Barahona and Ortegón, 2024). Rooted in Erik Erikson's (1950) theory of psychosocial development, this notion aligns with a developmental stage where individuals seek to contribute meaningfully to future societal outcomes.

Sustainable consumption habits encompass behaviors and attitudes aimed at reducing environmental harm, conserving natural resources, and advancing ecological responsibility (Gatersleben *et al*., 2014; Vargas-Merino *et al*., 2023; Burkert *et al*., 2023). A key expression of these habits is the preference for and purchase of environmentally friendly products—those perceived as less damaging to the planet (Ortegón *et al*., 2025; Thøgersen and Noblet, 2012).

To examine the interrelationships among these constructs, this study draws on Schwartz's (1977) Norm Activation Model. This framework outlines how awareness of consequences—such as the long-term effects of present-day actions on future generations—can trigger personal moral norms, leading to prosocial and sustainable behaviors. In this context, future generations' awareness functions as a specific form of consequence awareness, which in turn activates internalized norms that promote sustainable consumption and environmentally responsible choices.

Hypothesis Development

A growing body of literature suggests that future generations' awareness may encourage sustainable consumption habits by fostering a sense of intergenerational responsibility

(Ulusoy, 2016; Carrigan *et al*., 2023). Borg *et al*. (2024) emphasize that ethical decision-making requires individuals to account for the long-term impacts of their consumption, supporting behaviors that mitigate environmental harm (Dragolea *et al*., 2023). Environmental psychology also indicates that when people recognize the potential consequences of their actions on future generations, they become more likely to adopt sustainable consumption practices (Jain *et al*., 2023), particularly in relation to environmental and social concerns (Confetto *et al*., 2023).

Social awareness campaigns and educational efforts that underscore the importance of preserving the planet for future generations have proven instrumental in shaping pro-environmental behaviors (Webb *et al*., 2008; Galiano-Coronil and Ortega-Gil, 2019; Luciano *et al*., 2021; Palacios-Chavarro *et al*., 2021). Building on these insights, we propose the following hypothesis:

H_1: Future generations' awareness has a positive influence on sustainable consumption habits.

Existing literature highlights that habits aligned with sustainable consumption—such as reducing waste, reusing materials, and recycling—are often linked to the selection of eco-friendly products (Pinto *et al*., 2011; Triana *et al*., 2023; Ibañez-Gaona *et al*., 2022). These choices, however, are not made in isolation; they are shaped by the availability of sustainable alternatives in the market (Ramírez *et al*., 2024) and by public policies that promote sustainable practices (Paužuolienė *et al*., 2022). Consumer concerns about the environmental consequences of unsustainable production also influence these behaviors (Tunn *et al*., 2019). As noted by Borg *et al*. (2024), individuals who consistently engage in conscious consumption are more likely to recognize and choose products that align with environmental preservation and cultural responsibility (Mejía-Giraldo, 2020; Randall *et al*., 2024; Von Flüe *et al*., 2024). Empirical studies further support the idea that everyday sustainable behaviors, such as minimizing plastic use or participating in recycling programs, increase the likelihood of purchasing certified organic or fair-trade products (Gomes and Lopes, 2024; Triana and Hernandez, 2023). In this context, sustainable consumption habits can be reinforced by previous experiences and knowledge (Müller-Pérez *et al*., 2023), including training programs and informative campaigns (Robinot *et al*., 2017). Consequently, it is expected that:

H_2: Sustainable consumption habits have a positive influence on the purchase of environmentally friendly products.

Beyond sustainable consumption habits, cognitive aspects such as future generations' awareness can determine eco-friendly purchasing behaviors (Quoquab and Mohammad, 2020; Fischer *et al*., 2017). That is, awareness of future generations can increase sensitivity to the environmental impact of consumption decisions (Rajak *et al*., 2022) and, in turn, act as a bridge between future awareness and the choice of eco-friendly products (Pacheco and Pastor, 2023). Additionally, the influence of future generations' awareness may not be direct but rather manifests through the development of habits (Kumar *et al*., 2021), driven by cognitive dissonance, which translates into internal pressure to adopt responsible habits, thereby reinforcing their predisposition to buy environmentally friendly products (Luna and Arce, 2022). Consequently, the relationship between future generations' awareness and eco-friendly purchases can also be mediated by responsible consumption habits, forming an indirect link between these two factors (Pacheco and Pastor, 2023). Therefore, previous literature suggests that:

H_3: Future generations' awareness has a positive and indirect influence on the purchase of environmentally friendly products, mediated by responsible consumption habits.

The conceptual model developed in this study investigates a previously underexplored relationship within the context of five Latin American developing countries. Specifically, it examines how awareness of future generations influences the purchase of environmen-

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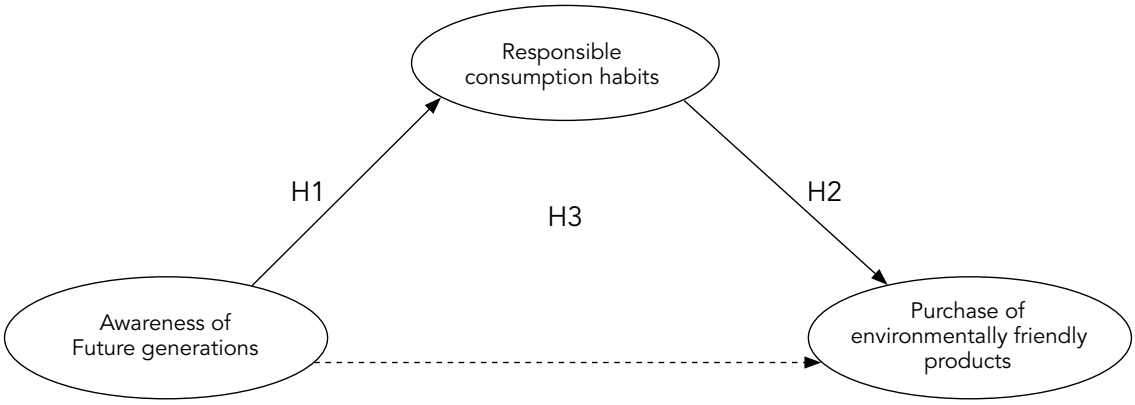
tally friendly products, with sustainable consumption habits acting as a mediating factor. Grounded in Schwartz's (1977) Norm Activation Theory, the model posits that future generations' awareness serves as a motivational trigger for the development of sustainable habits, which in turn enhance the likelihood of engaging in eco-conscious purchasing behavior (see Figure 1).This approach integrates perspectives specific to developing countries, making it an innovative conceptual framework that not only contributes to the understanding of responsible consumption, but also to a better future in relation to sustainability in developing nations.

Figure 1
Conceptual Research Model



Methodology

Sample and Data Collection

To carry out our research, we began with the need to analyze responsible consumption habits, future generations' awareness, and the purchase of environmentally friendly products. In response to this need, data were collected from a group of five Latin American countries (Mexico, Colombia, Peru, Chile, and Argentina) through an online questionnaire, obtaining 1,466 responses from consumers over 18 years old. On one hand, variables related to the sociodemographic and socioeconomic characteristics of the respondents (population, age, gender, and educational level) were incorporated. On the other hand, the question "Are you aware of sustainable consumption?" was included as a sample inclusion criterion.

The questionnaire provided clear information about the study's purpose and participation conditions, in addition to obtaining informed consent for the academic use of the data. The data collection period spanned from March to June 2024. Table 1 shows information regarding the sample profiles collected in the first part of the questionnaire. It is important to clarify that in this study the objective was to analyze the relationships between the aforementioned variables by using the data in a consolidated fashion and therefore no comparative studies among the countries were included.

Table 1

Sample Profile

Variable	Argentina	Chile	Peru	Colombia	México
Sex					
Female (%)	351 (63.5)	113 (50.2)	112 (51.4)	136 (56.9)	152 (65.8)
Male (%)	196 (35.4)	111 (49.3)	104 (47.7)	103 (43.1)	78 (33.8)
Prefer not to say (%)	6 (1.1)	1 (0.4)	2 (0.9)	0 (0.0)	1 (0.4)
Total Gender	553 (100)	225 (100)	218 (100)	239 (100)	231 (100)
Age Range					
18 a 29 Years (%)	342 (61.8)	96 (42.7)	122 (56.0)	159 (66.5)	185 (80.1)
30 a 39 Years (%)	84 (15.2)	104 (46.2)	85 (39.0)	29 (12.1)	20 (8.7)
40 a 49 Years (%)	62 (11.2)	12 (5.3)	6 (2.8)	26 (10.9)	16 (6.9)
50 a 59 Years (%)	44 (8.0)	11 (4.9)	4 (1.8)	19 (7.9)	6 (2.6)
Más de 60 Years (%)	21 (3.8)	2 (0.9)	1 (0.5)	6 (2.5)	4 (1.7)
Total Age	553 (100)	225 (100)	218 (100)	239 (100)	231 (100)
Educational Level					
Secondary/High School (%)	266 (48.1)	53 (23.5)	29 (13.3)	93 (38.9)	55 (23.8)
Technical/Technology (%)	35 (6.3)	26 (11.6)	48 (22.0)	45 (18.8)	64 (27.7)
Professional/Degree (%)	163 (29.5)	61 (27.1)	130 (59.6)	62 (25.9)	74 (32.0)
Postgraduate (%)	89 (16.1)	85 (37.8)	11 (5.0)	39 (16.3)	38 (16.5)
Total Educational Level	553 (100)	225 (100)	218 (100)	239 (100)	231 (100)
Purchase of sustainable products					
Yes (%)	520 (94.0)	211 (93.8)	211 (96.8)	233 (97.5)	217 (93.9)
No (%)	33 (6.0)	14 (6.2)	7 (3.2)	6 (2.5)	14 (6.1)
Total	**553 (100)**	**225 (100)**	**218 (100)**	**239 (100)**	**231 (100)**

Source. Prepared by the authors.

Measurement of Variables

The second section of the survey measured respondents' perceptions using items adapted from previously validated instruments. Specifically, scales developed by Quoquab *et al*. (2019) and Fischer *et al*. (2017) were employed to assess sustainable consumption behaviors. The construct Responsible Consumption Habits captured consumers' conscious and consistent actions aimed at minimizing resource waste, optimizing the use of products and services, and adopting digital tools and pro-environmental practices to lessen their ecological footprint.

The construct Awareness of Future Generations referred to individuals' ongoing concern for the welfare and quality of life of future generations (Davies, 2016). This awareness encourages more moderate consumption patterns and responsible decision-making to safeguard key

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environmental resources. Meanwhile, Eco-friendly Purchasing Behavior reflected consumption choices aligned with environmental care, including a willingness to pay more for products perceived as sustainable and less harmful to the planet (Dionela *et al*., 2022). The final measurement instrument included 15 items, which were translated and culturally adapted into Spanish through an expert validation process involving five specialists in sustainable consumption. This process ensured item clarity, relevance, and contextual appropriateness. For example, the original item "I reuse paper to write on the other side" was adapted to "I use applications and digital tools to minimize the need for paper and thus reduce my environmental impact," reflecting current digital practices. Similarly, "I recycle my old stuff in every possible way (e.g., distribute old clothes among needy people)" was reworded as "I recycle unused or unusable items in every possible way (for example, I distribute old clothes among those in need)," enhancing clarity by replacing "old stuff" with more precise terminology. All items were rated using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). This measurement structure allowed for robust collection of participants' perceptions regarding responsible consumption and their attitudes toward future generations and the purchase of eco-friendly products. Following expert validation, a pretest of the questionnaire was conducted with a pilot sample, yielding a Cronbach's alpha reliability coefficient of .91. This result indicates a high level of internal consistency among the items.

To control bias in the common method variance, the single-factor Harman test (Podsakoff *et al*., 2003) was applied, revealing the absence of bias, and the Kolmogorov-Smirnov test was performed to assess the normality of the data in each country, confirming that all samples present a normal distribution. This allows for a more precise analysis of the heterogeneity between countries in sustainable consumption behavior. Furthermore, multicollinearity was mitigated by inspecting the correlation matrix, conducting an exploratory factor analysis with principal-axis factoring and Varimax rotation, and removing items exhibiting high cross-loadings. Residual multicollinearity was then assessed through the Variance Inflation Factor; all indicators yielded VIF values below 4.0, confirming the absence of multicollinearity and thus supporting the discriminant validity of the latent constructs.

Table 2
Items

Variable	Item	Description	Source
Awareness of future generations	AFG1	I always remember that my excessive consumption can make it difficult for future generations to meet their basic needs.	Quoquab *et al*. (2019) ; Fischer *et al*. (2017).
	AFG2	I care about meeting the needs of the next generation.	
	AFG3	I often think about the quality of life of future generations.	

Responsible consumption habits	RCH1	I always strive to reduce the misuse of goods and services (for example, I turn off the lights and fan when I'm not in the room).	Quoquab *et al.* (2019) ; Fischer *et al.* (2017).
	RCH2	I use applications and digital tools to minimize the need for paper and thus reduce my environmental impact.	
	RCH3	When I eat at a restaurant, I only order the amount I can eat to avoid wasting food.	
	RCH4	I don't like to waste food or drink.	
	RCH5	I recycle unused or unusable items in every possible way (for example, I distribute old clothes to those in need).	
	RCH6	I prefer to bring my own reusable bag when shopping to reduce the consumption of disposable plastic bags.	
Purchase of environmentally friendly products	EFPB1	I use eco-friendly products and services.	
	EFPB2	I buy and use environmentally friendly and non-aggressive products.	
	EFPB3	I often pay extra money to buy eco-friendly products (for example, organic food).	

Source. Prepared by the authors.

PLS-SEM Statistical Analysis

To analyze data and test hypotheses, the PLS-SEM method was applied using SmartPLS4 (v.4.0.8). PLS-SEM is suitable for exploratory research focused on prediction, offering advantages over CB-SEM methods like AMOS (Henseler *et al.*, 2016). The analysis followed a two-step approach: first, assessing reliability and validity of the measurement model (Chin, 1998); second, evaluating the structural model to test hypotheses on the mediating effect of responsible consumption habits between awareness of future generations and eco-friendly product purchase.To achieve this, the following analyses were conducted: a) collinearity assessment (VIF); b) coefficient of determination (R^2); c) effect size (f^2); d) predictive relevance (Q^2); e) effect size (q^2); f) predictive power analysis using PLSpredict; and g) path coefficients of the structural model to evaluate direct, indirect, and total effects among constructs (Hair *et al.*, 2019; Sarstedt *et al.*, 2022).

Results and discussion

Measurement Model Assessment, Reliability, and Validity

The evaluation of the measurement model of the estimated constructs involves analyzing the individual reliability of their indicators examined through their loadings, the construct reliability through Cronbach's Alpha (CA), composite reliability (CR), and the Dijkstra-Henseler statistic (rho_A). Convergent validity (AVE) and the heterotrait-monotrait ratio (HTMT) were assessed to evaluate the measurement model (Hair *et al.*, 2019).

Indicator loadings and Cronbach's alpha should exceed 0.7 (Hair *et al.*, 2019). Composite reliability (CR) requires values above 0.6 or 0.7 (Bagozzi and Yi, 1988), while rho_A should exceed 0.6 (Dijkstra and Henseler, 2015). AVE values must be above 0.5 (Chin, 2009). Table 3 confirms acceptable reliability and validity.

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Table 3
Reliability and Validity

Construcción	Item	Loadings	CA	CR	rho_A	AVE
Responsible consumption habits	RCH1	0.896	0.86	0.896	0.861	0.589
	RCH2	0.882				
	RCH3	0.872				
	RCH4	0.836				
	RCH5	0.886				
	RCH6	0.826				
Awareness of future generations	AFG1	0.802	0.934	0.948	0.934	0.751
	AFG2	0.817				
	AFG3	0.786				
	AFG4	0.774				
	AFG5	0.727				
	AFG6	0.693				
Purchase of environmentally friendly products	EFPB1	0.841	0.885	0.929	0.897	0.814
	EFPB2	0.938				
	EFPB3	0.924				

Source. Prepared by the author with SMART-PLS data.

Table 4 presents discriminant validity data using the Fornell and Larcker (1981) criterion, revealing that there are no problems between variables that could have the same meaning (Henseler and Sarstedt, 2013; Hair *et al*., 2019). In addition, following the recommendations of Henseler *et al*. (2015), the heterotrait-monotrait relationship analysis test (HTMT) was applied, whose values were below the criterion of 0.85, more effectively demonstrating the existence of discriminant validity. This leads to the conclusion that there are no issues with variables potentially having the same meaning (Henseler and Sarstedt, 2013; Hair *et al*., 2019). Thus, the first part of the analysis concludes that the study has high validity and reliability.

Table 4
Discriminant Validity

	Fornell and Lacker criterion			HTMT criterion	
Construct	RCH	AFG	EFPB	RCH	AFG
Responsible consumption habits RCH	0.768				
Awareness of future generations AFG	0.71	0.867		0.792	
Purchase of environmentally friendly products EFPB	0.65	0.669	0.902	0.738	0.734

Source. Created by the author using SMART-PLS data.

Evaluation of the Structural Model

This section outlines the hypothesis testing is to evaluate the structural model. For this, it is necessary to analyze the collinearity of the structural model through the variance inflation factor (VIF) and the statistical significance of the path coefficients (Hair *et al*., 2019). The analysis revealed that most of the items had VIF values below 3.701, indicating acceptable levels of collinearity, with values ranging from 1.459 to 3.806. Although some items, such as "I worry about meeting the needs of the next generation" (VIF = 3.806) and "I buy and use environmentally friendly products" (VIF = 3.701), show moderate collinearity, they remain within permissible limits (Hair *et al*., 2019). No significant collinearity issues were observed that would affect the reliable estimation of the path coefficients of the model.

The next step was to analyze the data based on R^2, where a value of $R^2 = 0.504$ was identified for the endogenous variable Responsible consumption habits and a value of $R^2 = 0.509$ for the variable Eco-friendly purchasing behavior. Subsequently, the effect size was analyzed through predictive relevance, which showed that the relationship between Awareness of future generations and Responsible consumption habits has a large effect size ($f^2 = 1.017$), indicating substantial influence. The relationship between Awareness of future generations and Eco-friendly purchasing behavior presents a medium effect size ($f^2 = 0.177$), while the relationship between Responsible consumption habits and Eco-friendly purchasing behavior shows a small effect size ($f^2 = 0.125$), suggesting a lesser, yet significant, influence in both relationships. These results highlight the practical significance of the relationships between the exogenous construct and its associated endogenous variables (Hair *et al*. 2021).

Predictive Ability Test with Cross-Validation (CVPAT)

After analyzing the R^2 values, a predictive ability test with cross-validation (Cross-Validated Predictive Ability Test) (CVPAT) was conducted. CVPAT evaluates the predictive ability of a research model through a global inferential statistical test (Liengaard *et al*., 2021). We conducted the analysis using PLS-Predict and determined that predictive accuracy was analyzed across all endogenous constructs in the research model simultaneously (Sharma *et al*., 2022). The results from the PLSPredict analysis show that the model has good predictive ability, with predictive Q^2 values of 0.503 for Responsible consumption habits and 0.446 for Eco-friendly purchasing behavior, indicating predictive relevance. The prediction errors (RMSE and MAE) are acceptable for both endogenous variables. Furthermore, loss comparisons between the PLS-SEM model and the indicator mean (IA) show that the PLS model has lower prediction loss ($p < 0.001$), confirming superior performance. Although the comparison with the linear model (LM) also reveals a slight advantage for PLS-SEM for Responsible consumption habits ($t = 4.027$, $p < 0.001$), the difference in Eco-friendly purchasing behavior is not significant ($p = 0.094$), suggesting comparable performance in this variable. In other words, both models, PLS-SEM and LM, exhibit similar predictive performance for Eco-friendly purchasing behavior (Shmueli *et al*., 2019).

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Table 5
Cross-Validated Predictive Ability Test (CVPAT)

Construct	Q^2 predict	RMSE	MAE	Loss PLS	Loss IA	Mean Difference (PLS - IA)	p value (PLS vs IA)	Loss LM	Mean Difference (PLS - LM)	p value (PLS vs LM)
Responsible consumption habits	0.503	0.706	0.546	0.867	1.226	-0.359	0.0	0.845	0.022	0
Purchase of environmentally friendly products	0.446	0.745	0.595	0.866	1.346	-0.481	0.0	0.854	0.011	0.094

Source. Created by the author using SMART-PLS data.

Analysis of Direct, Indirect, and Total Effects Among Constructs Using Path Coefficients from the Structural Model

For the analysis of direct, indirect, and total effects among latent variables, a statistical significance analysis of the path coefficients was conducted. According to Hair *et al*. (2019) and Kline (2023), a bootstrapping procedure with 5,000 subsamples was performed to generate t statistics and confidence intervals (Table 6), organizing the complex relationships of the structural model and identifying both direct influences and mediating effects.

The analysis of the path coefficients reveals that Awareness of future generations has a significant effect on Responsible consumption habits (H1: $\beta = 0.710$, $t = 42.246$, $p < 0.001$), with a confidence interval of 0.676 to 0.743. Similarly, Responsible consumption habits also significantly influence Eco-friendly purchasing behavior (H2: $\beta = 0.352$, $t = 12.485$, $p < 0.001$), with a confidence interval between 0.298 and 0.410. Furthermore, Awareness of future generations has a positive and significant impact on Eco-friendly purchasing behavior (H3: $\beta = 0.419$, $t = 14.048$, $p < 0.001$), with a confidence interval between 0.358 and 0.475.

Regarding the indirect effects, the impact of Awareness of future generations on Eco-friendly purchasing behavior, mediated by Responsible consumption habits, is also significant ($\beta = 0.250$, $t = 12.104$, $p < 0.001$), with a confidence interval from 0.211 to 0.292. This confirms the mediating role of Responsible consumption habits in this relationship.

When evaluating the total effects, the cumulative impact of Awareness of future generations on Eco-friendly purchasing behavior is considerable ($\beta = 0.669$, $t = 40.495$, $p < 0.001$), with a confidence interval between 0.635 and 0.700. This result underscores the relevance of concerns for future generations, both directly and mediated through responsible consumption habits.

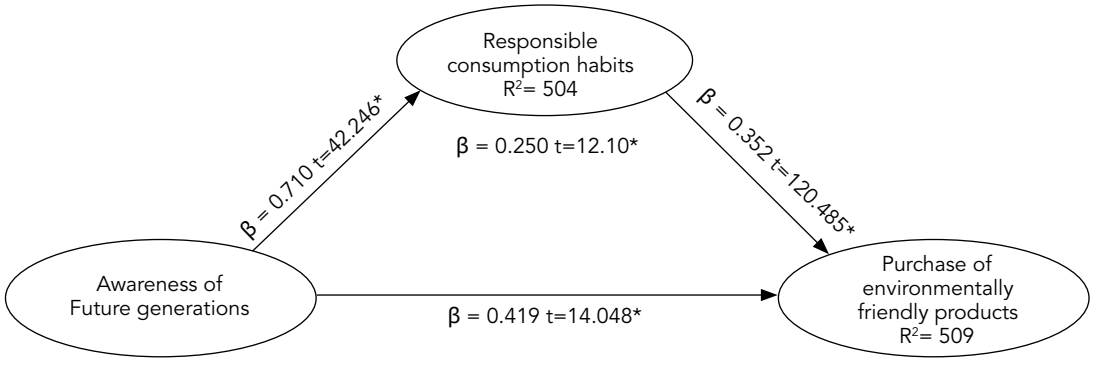
Table 6
Direct, indirect, and total effects among constructs

Relationship	Original Coefficient (O)	t-Value	p-Value	Confidence Interval (5%-95%)
Direct Effects				
Awareness of future generations → Responsible consumption habits	0.710	42.246	0.001	0.676 - 0.743
Awareness of future generations → Purchase of environmentally friendly products	0.419	14.048	0.001	0.358 - 0.475

Responsible consumption habits → Purchase of environmentally friendly products	0.352	12.485	0.001	0.298 - 0.410
Specific Indirect Effects				
Awareness of future generations → Responsible consumption habits → Purchase of environmentally friendly products	0.250	12.104	0	0.211 - 0.292
Total Effects				
Awareness of future generations → Responsible consumption habits	0.710	42.246	0.001	0.676 - 0.743
Awareness of future generations → Purchase of environmentally friendly products	0.669	40.495	0.001	0.635 - 0.700
Responsible consumption habits → Purchase of environmentally friendly products	0.352	12.485	0.001	0.298 - 0.410

The results from Table 6 indicate that Awareness of future generations not only has a significant direct impact on eco-friendly purchasing behavior ($\beta = 0.419$, $p < 0.001$) but also exerts a significant influence through the mediation of Responsible consumption habits (β indirect = 0.250, $p < 0.001$). According to Baron and Kenny (1986), and supported by Preacher and Hayes (2008), this indicates a partial mediation, as both the direct and indirect effects are significant (Hair *et al.*, 2019). These findings reinforce the importance of responsible consumption habits in adopting sustainable behaviors (See figure 2).

Figure 2
Research model results



Effect of demographic variables and multi-group analysis on eco-friendly purchasing behavior

Additionally, two control variables were incorporated into the model: age and gender, with the purpose of exploring their effect on eco-friendly purchasing behavior. The results showed that men (value 0) are more likely to engage in eco-friendly purchasing behavior compared to women (value 1), with a P-value of less than 0.05 (0.002). On the other hand, age has a direct impact on individuals' propensity

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to purchase eco-friendly products, with a P-value of 0.009, indicating that as the participants' age increases, so does their eco-friendly purchasing behavior (see Table 7).

Table 7
Comparison of effects with control variables

Relation	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Awareness of future generations → Eco-friendly purchasing behavior	0.406	0.406	0.033	12.144	0
Awareness of future generations → Responsible consumption habits	0.726	0.726	0.018	39.568	0
Responsible consumption habits → Eco-friendly purchasing behavior	0.381	0.381	0.032	11.969	0
Age Range → Eco-friendly purchasing behavior	0.050	0.051	0.019	2.597	0.009
Sex → Eco-friendly purchasing behavior	-0.125	-0.125	0.040	3.152	0

Furthermore, a multi-group analysis (MGA) was conducted to identify differences between the countries. As shown in Table 8, Argentina presents a significant difference in the relationship between awareness of future generations and responsible consumption habits with all countries. In the case of Mexico, a difference is added in the relationship between habits and purchasing behavior. Chile shows differences with Colombia, Mexico, and Peru in the relationship between sociodemographic variables and eco-friendly purchasing behavior. Additionally, in the case of Colombia, a difference is observed between awareness of future generations and responsible consumption habits, while Colombia and Mexico show differences in the relationship between awareness of future generations and eco-friendly purchasing behavior. Finally, Peru does not show significant differences with Colombia and Mexico. According to Sarstedt *et al*. (2011), MGA is a robust technique in SEM-PLS to detect statistically significant differences between groups when examining complex behavioral relationships.

Table 8
Cross-Country comparison of effects

		Argentina vs Chile	Argentina vs Colombia	Argentina vs Mexico	Argentina vs Peru	Chile vs Colombia	Chile vs Mexico	Chile vs Peru	Colombia vs Mexico	Colombia vs Peru	Mexico vs Peru
Awareness of future generations → Eco-friendly purchasing	Coefficient	0.031	-0.077	0.163	0.065	-0.108	0.132	0.034	0.240	0.143	-0.098
	2-tailed (Group_1 vs Group_2) p value	0.754	0.400	0.118	0.566	0.347	0.294	0.799	0.041*	0.259	0.472
Awareness of future generations → Responsible consumption habits	Coefficient	-0.227	-0.122	-0.208	-0.204	0.105	0.019	0.023	-0.086	-0,082	0.005
	2-tailed (Group_1 vs Group_2) p value	0.000**	0	0.000**	0.000**	0.029*	0.657	0.571	0.092	0,103	0.911

		Argentina vs Chile	Argentina vs Colombia	Argentina vs México	Argentina vs Peru	Chile vs Colombia	Chile vs México	Chile vs Peru	Colombia vs México	Colombia vs Peru	México vs Peru
Responsible consumption habits → Eco-friendly purchasing behavior	Coefficient	-0.089	0.010	-0.187	-0.113	0.099	-0.097	-0.024	-0.197	-0.123	0.073
	2-tailed (Group_1 vs Group_2) p value	0.358	0.908	0.045	0.277	0.375	0.410	0.844	0.070	0.295	0.556
Age →Eco-friendly purchasing behavior	Coefficient	-0.072	0	0.072	0.114	0.103	0.144	0.186	0.041	0.083	0.042
	2-tailed (Group_1 vs Group_2) p value	0.187	0.575	0.180	0.095	0.068	0.009*	0.007*	0.467	0.238	0.541
Sex → Eco-friendly purchasing behavior	Coefficient	0.122	-0.115	-0.006	0.033	-0.238	-0.128	-0.089	0.110	0.149	0.039
	2-tailed (Group_1 vs Group_2) p value	0.278	0.336	0.971	0.785	0.038*	0.311	0.438	0.411	0.222	0.777

Note. *$p < 0.05$; **$p < 0.001$.

Considering that the results of the multi-group analysis show a negative value in the difference between path coefficients, it is possible to interpret that the comparison group (i.e., Group 2) has a higher coefficient than the reference group (Group 1). Therefore, Argentina has a lower effect between awareness of future generations and responsible consumption habits compared to Chile (-0.227), Colombia (-0.122), Mexico (-0.208), and Peru (-0.204). On the other hand, the effect of age has a greater impact in Chile compared to Mexico (0.144) and Peru (0.186). Meanwhile, compared to Colombia, Chile has a stronger effect in the relationship between awareness of future generations and responsible consumption habits, as well as the effect of gender (0.105). Finally, Peru does not show significant differences with Colombia and Mexico, while Colombia has a greater effect of awareness of future generations on eco-friendly purchasing behavior compared to Mexico (0.240).

In Latin America, environmental problems are increasing, as evidenced by biodiversity loss, resource overconsumption, and the expansion of polluting solid waste. Therefore, it is necessary to design more responsible consumption strategies. In this regard, analyzing the role of awareness toward future generations, sustainable consumption habits, and eco-friendly purchasing becomes relevant, as these variables can modulate the transition from attitudinal motivation to actual purchasing and consumption behavior. Consequently, understanding how intergenerational responsibility motivations can facilitate daily routines, and how these routines translate into more sustainable purchasing decisions, allows the design of strategies that go beyond awareness campaigns. Moreover, exploring their relationships in contexts of inequality and informality from an integrative and multinational perspective helps identify management opportunities where public policies can maximize their impact on consumer behavior.

This research was conducted among consumers in Argentina, Chile, Colombia, Mexico, and Peru, confirming that awareness toward future generations drives sustainable consumption habits and, through them, can promote eco-friendly purchases. These explanatory relationships complement previous studies,

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expanding the domain of knowledge and environmental concerns as drivers of sustainable consumption behavior (Lavuri, 2022; Saari *et al*., 2021). The application of the study across five Latin American countries provides empirical and comparative richness that strengthens its external validity. Although these countries share certain structural challenges related to development, inequality, and environmental crisis, they also present specific social, political, and economic characteristics, making it crucial to observe variations and common patterns in sustainable behavior (Acevedo-Duque *et al*., 2023). The diversity of context allowed capturing cultural nuances that influence how consumers internalize environmental responsibility, reinforcing the need to design differentiated, culturally sensitive, and territorially specific policies and campaigns.

While earlier literature described moderate or inconsistent effects of awareness toward future generations on eco-friendly purchases (Seyfang, 2013; Wei *et al*., 2017), the present research offers a different reading: when habits are placed at the center of the model, the influence of awareness toward future generations is strengthened. In line with Norm Activation Theory (Schwartz, 1977), attitudinal (moral) motivation activates personal norms, but these norms must be translated into practices (habits of reducing, reusing, recycling) before becoming purchases. Without this intermediate layer (Seyfang, 2013), the intention to purchase decreases. In contrast, the chain from awareness toward future generations sustainable consumption habits eco-friendly purchases operates consistently, despite highly dissimilar socioeconomic contexts.

This result challenges studies that identify income as the main driver of green purchasing (Wei *et al*., 2017). Our analysis suggests that in Latin America, collective moral pressure based on intergenerational awareness can counteract the lack of purchasing power or limited supply of certified products. However, the presence of structural barriers (informality, precarious infrastructure, and lack of uniform sustainability standards) can threaten the promotion of sustainable habits and, in turn, eco-friendly purchasing (Barros *et al*., 2021; Sylvester, 2024; Shree *et al*., 2024). Therefore, although awareness toward future generations partially neutralizes the status logic (Gorga *et al*., 2024), it does not eliminate it. Hence, we argue that economic incentives and upward social mobility policies are still needed to strengthen the link between attitudes and behavior.

On the other hand, the findings related to the gender variable suggest greater complexity. Unlike patterns found in Northern economies, the data show a slight male advantage in eco-friendly purchasing. This result aligns with the role of provider in patriarchal societies, that is, the tendency of men to protect the future well-being of the family. Similarly, the results suggest that the influence of age on sustainable consumption practices intensifies when people attribute more importance to awareness toward future generations. In other words, older consumers tend to adopt sustainable behaviors more than younger ones, and this effect becomes even more pronounced when intergenerational motivation is particularly strong.

Among other contributions of the study and considering that the main objective was to integrate and explain the variables of interest, the multigroup analysis (Sarstedt *et al*., 2011) reveals nationally relevant nuances. Argentina shows a weaker link between awareness of future generations and sustainable consumption habits, perhaps because its formal eco-friendly market is still emerging; Chile highlights age and gender effects, consistent with a more developed sustainable market; Colombia exhibits the strongest relationship between awareness of future generations and eco-friendly purchases, possibly due to the growing visibility and media attention on sustainability (Alzamora-Ruiz *et al*., 2020). Far from contradicting the global logic, these differences illustrate how the same intergenerational awareness and concern can influence consumption habits and eco-friendly purchases with varying intensities, depending on local barriers informality in Peru, inequality in Mexico, relative costs in Argentina, and inequality in Chile.

This study presents three main limitations. First, the cross-sectional design prevents deter-

mining the temporal sequence between variables, limiting causal conclusions. Second, the use of online surveys excludes people with limited digital access, reducing the representativeness of the sample. Third, structural variables such as the level of informality or the price of sustainable products were not included, limiting the understanding of the economic context. Future research should consider longitudinal studies and complementary methods such as interviews, purchase records, or field experiments. It is also recommended to include macroeconomic variables to analyze how the environment affects sustainable behavior.

Finally, future lines of research could focus on longitudinal studies that analyze the evolution of sustainable behavior over time, as well as explore the role of digital technologies and social media as mediators of intergenerational awareness. It would also be relevant to deepen sectoral or local studies that consider variables such as gender, educational level, or ethnic background, to design more targeted interventions. It is recommended to extend the analysis to other Latin American countries and compare the results with regions of similar socioeconomic complexity in Africa or Asia, as well as with countries such as Brazil or those in North America. This broader scope would allow for the development of more robust and transferable comparative models, capable of capturing both regional specificities and global patterns in sustainable consumption behavior. Additionally, future studies could explore the influence of unsustainable industries (such as large-scale industrial agriculture or fast fashion) as potential barriers or moderating factors in the adoption of eco-friendly consumer habits.

Conclusion

This study provides evidence that awareness of future generations plays a pivotal role in shaping sustainable consumption habits and purchasing behavior across five Latin American countries. Notably, this relationship holds even in settings marked by structural inequality and economic informality, underscoring the transformative potential of intergenerational ethics. By integrating Norm Activation Theory with the sociocultural characteristics of the region, and applying Multigroup Analysis (MGA) to examine cross-national variations, the research contributes meaningful insights to the literature on sustainability in emerging economies.

From a practical standpoint, the findings highlight the importance of developing both public and private campaigns that foster intergenerational awareness. These initiatives should not only appeal to shared long-term values but also be supported by concrete incentives—such as subsidies, accessible sustainability certifications, and inclusive marketing strategies. Such measures can enhance ecological consciousness, reinforce responsible consumption habits, and encourage purchasing behaviors aligned with the Sustainable Development Goals (SDGs).

In particular, the confirmation of all three proposed hypotheses *"(1) that future generations' awareness positively influences sustainable consumption habits, (2) that such habits positively influence eco-friendly purchasing decisions, and (3) that awareness indirectly influences green purchasing through responsible consumption"* provides a strong empirical basis to inform public administration and policy design. These findings support the goals outlined in SDG 12 on responsible consumption and production and suggest the need for comprehensive policy frameworks. Governments and institutions are urged to implement environmental regulations, tax incentives for sustainable practices, and widespread environmental education to raise social awareness. Additionally, sustained investment in scientific research and technological innovation is essential for advancing sustainable production systems. Taken together, these strategies can foster more efficient resource management, reduce environmental externalities, and promote behavioral shifts toward sustainable consumption on a scale.

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Author(s)	Contributions
Leonardo Ortegón Cortázar	Conceptualization, Formal analysis, Project management,
Marina Santucci	Supervision, Writing—original draft.
David Iglesias Pina	Writing—revision and editing. Introduction and literature review.
Ángel Acevedo Duque	Writing—revision and editing. Literature review and discussion.
Christiam Mendez Lazarte	Writing-revision and editing. Literature review and discussion.

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Spain and artificial intelligence: installed capacities, challenges, and opportunities

España ante la inteligencia artificial: capacidades instaladas, desafíos y oportunidadess

José Luis Ros-Medina
Professor and researcher at Universidad Internacional de La Rioja Spain
joseluis.rosmedina@unir.net
https://orcid.org/0000-0003-2903-6632
https://ror.org/029gnnp81

José Manuel Mayor-Balsas
Professor and researcher at la Universidad de Murcia, Spain
josemanuel.mayor@um.es
https://orcid.org/0000-0001-5433-3415
https://ror.org/03p3aeb86

Thiago Ferreira-Dias
Professor and researcher at Universidad Federal del Río Grande del Norte, Brazil
thiago.ferreira.dias@ufrn.br
https://orcid.org/0000-0002-0749-5654
https://ror.org/04wn09761

Elias Jacob de Menezes-Neto
Professor and researcher at Universidad Federal del Río Grande del Norte, Brazil
elias.jacob@ufrn.br
https://orcid.org/0000-0002-1153-8899
https://ror.org/04wn09761

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Abstract: this research analyzes the current state and future of the installed capacities for the development of artificial intelligence (AI) in Spain. The study is justified by the growing strategic importance of AI as a driver of digital, economic, and social transformation, as well as by the scarcity of empirical analyses that address its specific evolution in the Spanish context. The main objective is to assess Spain's situation by adapting the Latin American Artificial Intelligence Index (ILIA), comparing its results with those of Chile and the Latin American average, which allows for the identification of strengths, weaknesses, and areas for improvement. The methodology combines the analysis of secondary data with qualitative primary data obtained through in-depth interviews with eight experts from the academic, public, business, and civil society sectors. The main findings of the index show that Spain significantly outperforms Latin American countries in enabling factors, R&D&I, and governance. However, weaknesses were identified in territorial coordination, citizen participation, and risk regulation. The interviews confirm an optimistic view of the future of AI in Spain, highlighting key sectors such as healthcare, education, industry, and human talent development. It is concluded that Spain has the potential to position itself as a regional and international benchmark, provided that it strengthens its institutional capacities, promotes public-private cooperation, and ensures ethical development aligned with human rights.

Keywords: AI, governance, innovation, regulation, development, ethics, data, society.

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Resumen: esta investigación analiza el estado actual y las perspectivas futuras de las capacidades instaladas para el desarrollo de la inteligencia artificial en Spain. El estudio se justifica por la creciente importancia estratégica de la IA como motor de la transformación digital, económica y social, así como por la escasez de análisis empíricos que aborden su evolución específica en el contexto español. El objetivo principal es evaluar la situación de Spain mediante la adaptación del Índice Latinoamericano de Inteligencia Artificial (ILIA), contrastando sus resultados con los de Chile y la media de América Latina, lo que permite identificar fortalezas, debilidades y oportunidades de mejora. La metodología combina el análisis de datos secundarios con datos primarios cualitativos obtenidos a través de entrevistas en profundidad a ocho expertos provenientes de los sectores académico, público, empresarial y de la sociedad civil. Los principales resultados del índice muestran que Spain supera ampliamente a los países latinoamericanos en factores habilitantes, I+D+A y gobernanza. No obstante, se identifican debilidades en la coordinación territorial, la participación ciudadana y la regulación de riesgos. Las entrevistas confirman una visión optimista del futuro de la IA en Spain, destacando sectores clave como salud, educación, industria y formación de talento humano. Se concluye que Spain tiene potencial para posicionarse como referente, siempre que refuerce sus capacidades institucionales, fomente la cooperación público-privada y garantice un desarrollo ético alineado con los derechos humanos.

Palabras clave: IA, gobernanza, innovación, regulación, desarrollo, ética, datos, sociedad.

Introduction

Generative AI, economic potential, and ethical considerations

Artificial intelligence (AI) has made remarkable progress in recent years, with an exponential impact following the emergence of generative AI (Weglarz *et al.*, 2025). These tools have become part of everyday life and general interest has skyrocketed; between 2022 and 2023, searches for generative AI grew by almost 700% (McKinsey and Company, 2024). According to Stanford University's *AI Index Report* (2025) in 2024, 78% of organizations used AI, an increase of 23 points over 2023, with investments of $33.9 billion, 18.7% more than the previous year (Maslej *et al.*, 2025). Therefore, although it is a recent technology, its development is rapid (Navarro, 2018).

Generative AI has strong economic potential. It is projected to be an engine of global growth (Azuaje, 2021). Goldman Sachs estimates that it will raise US labor productivity by 1.5 points annually for ten years and increase global GDP by 7% (Briggs and Kodnani, 2023). Other sources suggest that by 2030, AI could add €14 trillion to the global economy and double economic growth by 2035 (Ministerio de Ciencia, Innovación y Universidades, 2019).

The impact is already evident. *Deloitte Global's 2025 Predictions Report* anticipates that 25% of companies using generative AI will implement AI agents by 2025, and 50% by 2027 (Deloitte, 2024). According to the *2025 Generative AI in Professional Services Report*, its adoption in professional services grew from 12% to 22% in one year, while organizations with no plans to use it fell from 60% to 41% (Thomson Reuters, 2025). *The State of AI 2025* report indicates that 65% of organizations were already using generative AI on a regular basis in 2024, and that its governance is usually led by the CEO (McKinsey and Company, 2024). Despite the overall reduction in technology investment, investment in AI increased (McKinsey and Company, 2024). NTT DATA (2024) confirms that 83% of CEOs have a clear strategy, although only 49% have aligned it with their business; however, 99% plan to increase investment.

Expectations are positive: AI is projected to bring efficiency, new jobs, and improvements in most sectors (Comisión Europea, 2020; Ministerio de Ciencia, Innovación y Universidades, 2019). It could even anticipate pandemics such as COVID-19 (Robles-Fernández *et al.*, 2022). But there are also risks, such as discrimination, loss of privacy, and criminal use (Comisión Europea, 2020). Therefore, ethical and transparency standards are needed (Birkstedt *et al.*, 2023; Ministerio de Ciencia, Innovación y Universidades, 2019; Robles, 2014). Although it can benefit 134 Sustainable Development Goals (SDGs), it could also inhibit 59 (Vinuesa *et al.*, 2020).

In the context of technological revolution, AI has become the pillar of transformation in multiple sectors, including public administration. This has given rise to smart governance, based on data, algorithms, and citizen interaction. Cerrillo (2019) emphasizes that this form of governance is not limited to automation, but seeks more informed, agile, and fair decisions.

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Smart governance and AI in Spain

However, in democracies, the use of AI faces several obstacles, including a lack of transparency. Cerrillo (2019) warns about algorithmic opacity undermining public trust by operating as a "black box." In response to this, Cotino (2019) proposes applying five ethical principles: beneficence and non-maleficence, justice, freedom and autonomy, explainability and transparency, with empathy as an additional principle, recommending, in turn, codes of conduct and ethics committees.

These concerns open ethical and philosophical debates. De Pisón (2022) argues that legal concepts must be rethought in the face of challenges such as dystopian transhumanism, proposing disciplines such as roboethics and neuroethics. Viveros (2022) advocates for global AI governance that also holds states accountable.

In the democratic sphere, AI can enhance participation and transparency, although difficulties remain, as indicated by Moreno *et al.* (2023). Innerarity (2025), in *A Critical Theory of Artificial Intelligence*, asserts that traditional ethics are insufficient in the face of the structural goals of AI, and proposes transforming democratic institutions to integrate citizen deliberation into the design of AI systems.

Despite this, transparency and accountability remain fundamental, especially in public administration (Filgueiras, 2021). While these practices mitigate risks in companies, in the public sector they are fundamental democratic principles. Transparency promotes efficiency and institutional trust, with one of the main objectives being to make these systems understandable to both citizens and civil servants (Valero, 2019).

AI must be evaluated not only for its efficiency, but also for its respect for dignity and fundamental rights, with ethics integrated from the design stage (Martínez, 2019).

One of the persistent challenges is algorithmic opacity, especially in sub-symbolic AI. Binns (2017) recommends using more understandable models such as decision trees. However, Ananny and Crawford (2017) warn that the visibility of the algorithm does not guarantee its understanding, and they advocate for systems adapted to social and political contexts, distinguishing between the right to know and the right to understand.

From a legal perspective, AI raises several questions about civil rights and access to information. Cerrillo (2019) analyzes cases in Spain and Italy where access to algorithms is central and refers to a decision by the Commission for the Guarantee of the Right of Access to Public Information (GAIP) in Spain that recognizes algorithms as part of the right to public information, highlighting algorithmic transparency as fundamental to democracy.

The use of Big Data also involves risks in terms of privacy and responsibility. Estupiñán *et al.* (2021) call for the establishment of robust legal frameworks that promote AI without sacrificing rights. Ponce-Cedeño *et al.* (2023) reinforce this idea, insisting on design with privacy built in from the outset and the prevention of bias, also emphasized by Cotino (2019).

Thus, regulating AI is a global challenge. Organizations such as the Organization for Economic Cooperation and Development, the United Nations, and the Council of Europe have proposed regulatory frameworks for its use in public administrations. The European Union stands out for its ethical and democratic model, focused on data protection and privacy (Criado, 2021), and involves non-EU experts in its guidelines (Comisión Europea, 2020).

At the national level, the OECD noted that between 2011 and 2018, only 3% of investment in AI startups in the EU went to Spanish companies, compared to 13% in France, 14% in Germany, and 55% in the United Kingdom (Ministry of Science, Innovation, and Universities, 2019). Nevertheless, according to Roland Berger, Spain is one of the four most important countries in AI in Europe, alongside the United Kingdom, France, and Germany, accounting for 60% of the European ecosystem. However, the EU only accounts for 8% of global investment, compared to 85% for China and the US (Ministerio de Ciencia, Innovación y Universidades, 2019).

However, although the use of algorithms based on AI systems in the public sector is a growing reality, it remains an under-explored area (Criado, 2021), specially regarding assessing the current and potential development of AI in Spain and understanding the factors that drive or limit it. Therefore, this study—whose main objective is to analyze the current and future situation of the installed capacities for AI development in Spain—aims to take a step forward in filling this gap in the literature by providing empirical evidence on the subject.

Materials and method

Objectives

This study aims to analyze the current and future situation of installed capacities for the development of artificial intelligence in Spain. To this end, the following objectives are proposed:

i) Develop an index to assess the state of AI in Spain by adapting the Latin American Artificial Intelligence Index (ILIA) developed by the National Center for Artificial Intelligence of Chile (CENIA).

ii) Compare the development of AI in Spain with Chile and the LATAM average included in the CENIA study to observe Spain's relative position and its areas of strength and weakness.

Adaptation of the ILIA to the Spanish case

The ILIA is a public good promoted by CENIA and ECLAC, with the support of organizations such as the Development Bank of Latin America and the Caribbean (CAF), the Inter-American Development Bank (IDB), the Organization of American States (OAS), and UNESCO.

The index is composed of three fundamental quantitative dimensions: i) enabling factors, which measure technological infrastructure, access to open data, and the availability of specialized human talent, and allow for the projection of AI potential in each nation; ii) R&D&I, focused on the advancement of research, development, and adoption of AI technologies in the public, private, and academic sectors, which affects the global competitiveness of countries; and iii) governance, which assesses the degree of institutional maturity in public policies and regulations for the ethical and sustainable development of AI (ILIA, 2024).

In addition to these three quantitative dimensions, there are two other qualitative and prospective dimensions proposed by CENIA: iv) the future of AI, measured by expert perception, and v) social perception of AI.

In its second edition, the ILIA maintained these five dimensions, although it introduced new indicators and sub-indicators to achieve a more complete view of AI development in the region. In addition, it received support from new international actors such as the European Union, through the EU-LAC Digital Alliance, and from technology companies such as Google, Microsoft, and Amazon Web Services (AWS), which enriched its analysis (ILIA, 2024). In the case of Spain, the three quantitative dimensions were applied using primary sources of public information (Table 1).

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Table 1

Primary sources for the dimensions

Dimension	Sub dimension	Indicators	Proposed sub-indicators	Normalized score for Spain	Source
Enabling factors	Infrastructure	Connectivity	Percentage of population using the internet.	95.40	https://bit.ly/4nC6fbI
			Average mobile download speed.	121.60	https://bit.ly/4n63G1G
			5G implementation.	Source Not comparable	https://bit.ly/3IppMwK
			Mobile network coverage.	99.70	https://bit.ly/41TmUio
			Households with internet access.	96.40	https://bit.ly/48orSaK
			Active mobile broadband subscriptions. mobile broadband.	94.77	https://bit.ly/48kzMSD
			Fixed broadband subscriptions.	112.10	https://bit.ly/46sZMsz
			Average fixed broadband download speed.	87.5	https://bit.ly/41Pw1Ri
			Average latency.	99.52	https://bit.ly/4grRTIj
			Basic fixed broadband basket.	105.05	https://bit.ly/4megsd1
		Computing	Cloud.	32.5	https://bit.ly/466p7tq
			HPC infrastructure capacity.	200.00[1]	https://bit.ly/3VOi1Uf
			Certified data centers	16.67	https://bit.ly/48fjcU7
			IXP.	42.65	https://bit.ly/3Vlc7db
			Secure Internet servers.	225.28	https://bit.ly/466pe8k
		Devices	Households with computers.	82.27	https://bit.ly/4mdNNVv
			Smartphone affordability.	ND	ND
			IPv6 adoption.	18.47[2]	https://bit.ly/46ocpFd
	Data	Data Barometer Data	Availability.	46.62	https://bit.ly/3IpLYXE
			Capabilities.	74.41	https://bit.ly/482Q4Qb
			Governance.	58.53	https://bit.ly/4nShpt1
			Use and impact.	20.62	https://bit.ly/4polTJl
	Human Talent	AI literacy	Early science education.	152	https://bit.ly/4pphMMV
			Early education in AI.	80.00	https://bit.ly/42wYRWC
			English language skills.	57.58	https://bit.ly/4pqyxaF
		Professional training in AI	AI skills penetration.	ND	Información insuficiente
			STEM graduates.	55.75	https://bit.ly/4pl9pCl
		Talent Advanced	Master's Programs in AI at QS Ranking Universities.	60.23	Own elaboration
			PhD programs in AI at universities in the QS Ranking.	78.51	Own elaboration

Dimension	Sub dimension	Indicators	Proposed sub-indicators	Note of Spain	Source
	Talent Human	Talent Advanced	Master's Programs in AI. Accredited Universities.	74.62	Own elaboration
			Doctoral Programs in AI. Accredited Universities.	82.45	Own elaboration
Research, adoption, and development	Research	Research	Publications on AI.	452.23	https://bit.ly/4mjDhvU
			Active researchers in AI.	ND	ND
			Productivity of researchers in AI.	ND	ND
			Impact of AI research.	38.78	https://bit.ly/46hGshH
			Presence of AI research centers.	80.00	Own elaboration
			Proportion of female authors in AI.	74.84	https://bit.ly/46ojA02
			Consistent research in AI.	ND	ND
			Participation in main track of A+ conferences.	ND	ND
			Participation in side events at A+ conferences.	ND	ND
	R&D	Open Source Productivity Development	Open Source Productivity.	ND	ND
			Open Source Quality.	ND	ND
			Number of Patents.	212.56	https://bit.ly/3VQJNiV
		Innovation	Number of private investments.	263.93	https://bit.ly/4meygEP
			Total estimated value of private investment.	362.22	https://bit.ly/4pE8pJE
			AI companies.	187.33	https://bit.ly/3K2DnL7
			Unicorn companies.	215.29	https://bit.ly/3IezrGE
			Research and development expenditure as a proportion of GDP.	124.28	https://bit.ly/4pp9gxB
			Application development.	93.00	https://bit.ly/46iNByf
			Entrepreneurial environment.	60.56	ND
	Adoption	Industry	Workers in the high-tech sector.	48.35	https://bit.ly/3ViWl2o
			Medium and high technology manufacturing.	ND	ND
			Proportion of added value of medium-tech manufacturing and high technology manufacturing in total added value.	136.61	https://bit.ly/3Vle21n
		Government	Digital Government.	98.72	https://bit.ly/4nxdph1
Governance	Vision and Institutional Framework	AI Strategy	Existence of the strategy.	100	https://bit.ly/47Lpaw2
			Presence of institution responsible for the implementation.	100	https://bit.ly/41XtS66
			Presence of evaluation mechanisms.	100	https://bit.ly/41QyevJ
			Presence of mechanisms for inter-institutional coordination mechanisms of Ethics and governance of AI.	100	https://bit.ly/48i3N5u

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Dimension	Sub dimension	Indicators	Proposed sub-indicators	Note for Spain	Source
Governance	Vision and Institutional framework	AI Strategy	AI Infrastructure and Technology.	100	https://bit.ly/4popCXj
			Capacity Building.	100	https://bit.ly/41SRpoF
			Data.	100	https://bit.ly/48eR7wg
			Digital Government.	100	https://bit.ly/4gyQDmY
			Industry and Entrepreneurship	100	https://bit.ly/3K5ihM7
			R&D.	100	https://bit.ly/3K4nqE3
			Regional and International Cooperation.	100	https://bit.ly/4n24SCV
		Community involvement	Citizen participation.	60	https://bit.ly/3I9C3Wd
			Multistakeholder methodology.	20	-[3]
		Institutionality	Existence of the institution.	100	https://bit.ly/42yqD57
	International	Participation in defining standards	Participation in ISO.	100	https://bit.ly/48flDWL
		Participation in international organizations	Participation in international committees.	100	https://bit.ly/3K2Idbi
	Regulation	AI regulation	Risk mitigation.	0	https://bit.ly/4gpEd0x
		Cyber security	Cybersecurity index.	101.99	https://bit.ly/41RBxTw
		Ethics and Sustainability	Civil and Political Rights Data Protection and Privacy (GIRAI).	100.83	https://bit.ly/3IoCOuw
			Technical Standards Security, Accuracy and Reliability (GIRAI).	136.2	https://bit.ly/47FP5Fe
			Sustainability	108.11	https://bit.ly/46CMsCZ

Note. [1] Despite being the highest result, we limited the data to twice the maximum obtained in the ILIA 2024 country data. / [2] LACNIC does not produce statistics for Spain, so Google's statistics are used. / [3] No information has been published by the government on the creation of the strategy. / ND = Data not available.

Prepared internally based on ILIA (2024).

The methodology used by CENIA (2023) was followed, which establishes the need to homogenize heterogeneous data. This was done by recoding the raw values of each sub-indicator on a scale of 0 to 100. Replicating the proposal of these authors for Spain, and thus following the methodology used in the Government AI Readiness Index by Oxford (Fuentes *et al.*, 2024) and in The Global AI Index (Tortoise, 2024), the Min-Max criterion was used to normalize the collected data. Two types of minimums and maximums were used: feasible

(for categorical sub-indicators) and observed effective (for continuous sub-indicators). Thus, when the possible extreme values were known, these were used; otherwise, the values observed in the ILIA 2024 were used.

The sub-indicators were aggregated by assigning them the same weight, given the lack of evidence to prioritize some over others. This logic was maintained throughout the entire structure of the index: all sub-indicators have the same weight within an indicator, all indicators have the same weight within a sub-dimension, and each sub-dimension counts equally within its dimension.

However, applying the ILIA 2024 to Spain posed several challenges. First, adapting a regional methodology designed for Latin America to a European country proved complex, as many ILIA indicators are based on regional statistics that do not have a direct correspondence in Spain. Furthermore, as it is a comparative index in which the worst-performing country scores 0 and the best-performing country scores 100, in some cases it was not possible to calculate a score for Spain, even with data available, due to a lack of transparency in the comparative data. Despite meetings held with CENIA, it was not possible to achieve full comparability of the data.

However, the level of synchronization was high: 90.32% in the enabling factors dimension, 65.21% in R&D&I, and 100% in governance. The overall synchronization average reached 85.52%, which allows us to conclude that the data generated is robust and comparable with the ILIA results.

Regarding the fourth dimension—perceptions about the future of AI—eight semi-structured interviews were conducted with experts from academia, business, the public sector, and civil society in Spain between March and July 2024. The interviewees were: a professor of constitutional law with experience at the Spanish Data Protection Agency (interview 1); an associate professor at the Open University of Catalonia (interview 2); a technical director in the field of technology (interview 3); a professional in digital strategy and AI from an autonomous community (interview 4); a digital transformation manager in the Region of Murcia (interview 5); a professional in the area of digitization in the judicial system (interview 6); an expert in digital rights and member of the Spanish Association for Artificial Intelligence (interview 7); and a consultant specializing in AI (interview 8).

The audio recordings of the interviews were transcribed and analyzed using open-source AI tools and/or tools developed by the researchers involved. The interviewees were then segmented using deep neural networks, based on the proposal by Bredin *et al.* (2020) and Bredin and Laurent (2021), which was combined with the extraction of vector representations (embeddings) from the interviewees' texts (Jacob de Menezes-Neto and Clementino, 2022).

Likewise, unsupervised clustering of the textual passages was performed based on a TF-IDF score, ranging from 0 to 1, with the aim of identifying the main groups of words from bigrams (Grootendorst, 2022). To this end, human analysis and the definition of stopwords obtained in the previous stages were considered to guarantee the quality and accuracy of the information.

Finally, the fifth dimension—social perception of AI—was evaluated through Study 3495 "Artificial Intelligence" by the Sociological Research Center (CIS, 2025), conducted from February 6 to 15, 2025. This survey, representative of the Spanish population over the age of 18, was conducted with a confidence level of 95.5% and a margin of error of ±1.6% under the assumption of simple random sampling. Thanks to this, the data can be extrapolated to Spanish society as a whole and accurately capture the general perception of AI among citizens.

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Results and discussion

Social perception of AI in Spain

We analyze the dimension of the ILIA that this study does not address with primary data, i.e., social perception, using Study 3495 "Artificial Intelligence" from the Sociological Research Center (CIS, 2025) to analyze how Spaniards perceive AI and the technological advances associated with it.

According to the data, 96.4% of the population recognizes that technological advances are generating profound changes. This transformation arouses ambivalent emotions: uncertainty (67.2%) and interest (68.3%) predominate, followed by concern (58.4%) and fear (34.4%). These emotions are reflected in the most frequent conceptual associations with technology, such as "power," "progress," "dependence," and "risk," all of which score highly in terms of their connection with AI.

When it comes to privacy and the use of personal data, 77.2% of respondents consider internet privacy to be "very important." However, there is notable concern about the use of data by private companies (77% are quite or very concerned) and, to a lesser extent, by public institutions (59.2%). In addition, the vast majority fear possible negative consequences: 89.7% believe that their data may be used without their consent, and more than 85% fear its commercial use or even becoming victims of fraud.

Added to this concern is the perception of insufficient regulation: 77.2% believe that there is no adequate regulatory framework for data collection and use, and 74.2% believe that privacy policies are unclear. As a result, there is strong social consensus on the need to regulate AI: more than 92% support establishing regulations on its use, programming, and transparency in its application by companies.

Although 92.3% have heard of AI, its everyday use remains limited. ChatGPT is the best-known tool (41.1%), but only 16.7% of its users use it on a daily basis. AI generates more intensely negative emotions than technology in general: uncertainty (75.7%) and concern (69.6%) stand out, while optimism and confidence are in the minority.

Therefore, citizens are reluctant to engage in everyday interactions with AI, such as robotic medical operations or autonomous cars, and perceive positive effects mainly in sectors such as health, industry, and the environment, while fearing harm to employment, artistic creation, and security.

Enabling factors, R&D&I, and governance

Within the framework of the comparative study developed from ILIA 2024, the case of Spain is analyzed as a reference case outside the Latin American region, allowing for an assessment of its relative situation with respect to Latin America as a whole. The analysis is structured around the three quantitative dimensions of the index: enabling factors, research, development, and adoption (R&D&I), and governance, highlighting the European country's outstanding position in the regional context.

The first dimension addressed is that of enabling factors, considered the most extensive in the index, as it contains a total of 31 indicators. This dimension evaluates the installed capacity of countries to develop robust artificial intelligence ecosystems, focusing on aspects such as technological infrastructure, data availability, connectivity, and human capital. As shown in Table 2, Spain achieves an average score of 75.86 out of 100, significantly higher than the Latin American average and the performance of Chile, the country with the highest score in the region. This result does not necessarily mean that Spain obtains the best value in all indicators, but rather that its score far exceeds the maximum values obtained within Latin America in many of them.

Table 2
Ilia 2024 for Chile, LATAM, and Spain

Dimensions	Sub-dimension	Indicators	Weight	Chile	LATAM	Spain
Enabling factors Enabling	Infrastructure	Connectivity	50%	87.55	57.12	101.34
		Computing	25%	44.26	21.76	103.42
		Devices	25%	49.41	36.47	50.37
	Infrastructure score		**45%**	**67.19**	**43.12**	**89.11**
	Data	Data Barometer	100%	48.32	35.76	50.04
	Data Score		**25%**	**48.32**	**35.76**	**50.04**
	Human Talent	AI Literacy	40%	84.62	57.90	96.52
		Professional training in AI	30%	65.80	43.49	55.75
		Human Talent advanced	30%	69.04	11.69	73.95
	Human Talent Score		**30%**	**74.30**	**39.71**	**77.51**
Enabling Factors Score			**40%**	**64.60**	**40.26**	**75.86**
Research, development, and adoption	Research	Research	100%	76.85	41.43	161.46
	Research score		**40%**	**76.85**	**41.43**	**161.46**
	R&D	Innovation	50%	67.54	31.57	186.66
		Development	50%	15.11	20.93	212.56
	R&D score		**30%**	**75.60**	**42.53**	**199.61**
	Adoption	Industry	60%	59.52	54.29	92.48
		Government	40%	92.37	69.65	98.72
	Adoption Score		**30%**	**72.66**	**60.44**	**94.97**
Research, Development, and Adoption Score			**35%**	**75.21**	**47.46**	**152.96**
Governance	Vision and Institutional Framework	AI Strategy	50%	100	33.33	100
		Involvement of society	25%	100	19.08	40
		Institutionality	25%	100	21.05	100
	Vision and institutionality score		**50%**	**100**	**26.70**	**85**
	International	Participation in standard setting	50%	0	13.16	100
		Participation in international organizations	50%	100	92.11	100
	International score		**20%**	**50**	**52.63**	**100**
	Regulation	AI regulation	20%	100	47.37	0
		Cybersecurity	30%	71.25	49.85	101.99
		Ethics and sustainability	50%	74.70	41.71	115.04

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Dimensions	Subdimension	Indicators	Weight	Chile	LATAM	Spain
	Score Regulation		**30%**	**78.73**	**45.28**	**88.11**
Governance Score			**25%**	**83.62**	**37.46**	**88.93**
ILIA 2024			**-**	**73.07**	**42.08**	**106.11**

Note. Prepared internally based on ILIA (2024).

A more disaggregated analysis reveals particularly strong performance in indicators related to digital infrastructure—connectivity, computing, and cloud services—although the subcomponent of devices slightly weighs down the average. Nevertheless, the overall infrastructure component continues to show highly favorable results. For several indicators, although it has not been possible to calculate exact scores due to a lack of detailed information or operationalization issues, relevant data has been collected, such as the number of supercomputers according to the *Top500.com* ranking, data centers certified by *the Uptime Institute*, and internet exchange points (IXPs) according to *Packet Clearing House*.

In terms of data availability and human capital, the results are equally encouraging. Although certain gaps have been identified in the latter component due to the difficulty in calculating some indicators, a relevant estimate has been made by counting 43 master's degrees in artificial intelligence offered by the 35 Spanish universities that appear in the QS 2024 ranking. Although these data could not be translated into a definitive score, their compilation reflects an active academic ecosystem in specialized AI training.

The second dimension of the ILIA focuses on research, development, and adoption (R&D&A) capabilities, projecting a country's future potential in the field of AI. In this section, Spain stands out even more: its weighted average exceeds 100, indicating that, in several indicators, it comfortably surpasses the best performance recorded within the Latin American environment. This situation reflects the structural differences between the European science and innovation ecosystem and the Latin American one, even though Spain's R&D spending is moderate compared to the European Union average.

Breaking down this dimension, there is an advantageous position in research and, especially, in development. In the latter case, the indicators for technological innovation and patents reflect significant differences compared to Latin American countries: for example, the number of AI-related patents in Spain is four times that of Chile. In terms of innovation, the relative advantage is also notable, with Spain practically doubling the highest scores in Latin America. Furthermore, in both the industrial and government sectors, the level of adoption and digitization is high and reinforces the country's competitive profile.

The third dimension, governance, introduces a political-institutional analysis of the AI ecosystem, considering whether public policies and the legislative framework favor an environment conducive to the ethical, safe, and stable development of this technology. In this area, Spain also scores high, reaching an average of 88.93 out of 100. The recent National Artificial Intelligence Strategy, published in May 2024, obtains the highest score in the section corresponding to strategic design. This strategy incorporates important institutional elements, such as the creation of the Spanish AI Supervision Agency and an Advisory Council made up of international experts. Likewise, an Interministerial Commission is established to coordinate digitization within the General State Administration (AGE).

However, there are weaknesses in this governance. First, the strategy lacks robust accounta-

bility and evaluation mechanisms, a weakness that is understandable given its incipient nature but relevant in terms of effective governance. Second, there is no clear coordination with the autonomous communities, which is a problem in a country with such a marked model of administrative decentralization. Even more relevant is the lack of social participation in the development of the strategy: there is no evidence that social actors have been consulted, nor has a committee or forum been established to bring together civil society, academia, the private sector, and other stakeholders. This shortcoming contravenes one of the guiding principles of the ILIA, which advocates for participatory and multisectoral governance.

In terms of international outreach, Spain ranks among the highest: it actively participates in the ISO/IEC JTC 1/SC 42 committee on AI, is a signatory to the Council of Europe Convention on AI and Human Rights, and has endorsed the Ibero-American Charter on AI in Public Administration. However, its score in the regulation subcomponent is slightly lower (88.11 out of 100) due to the absence of specific risk mitigation measures within the national strategy, an aspect that will be important to improve in the immediate future.

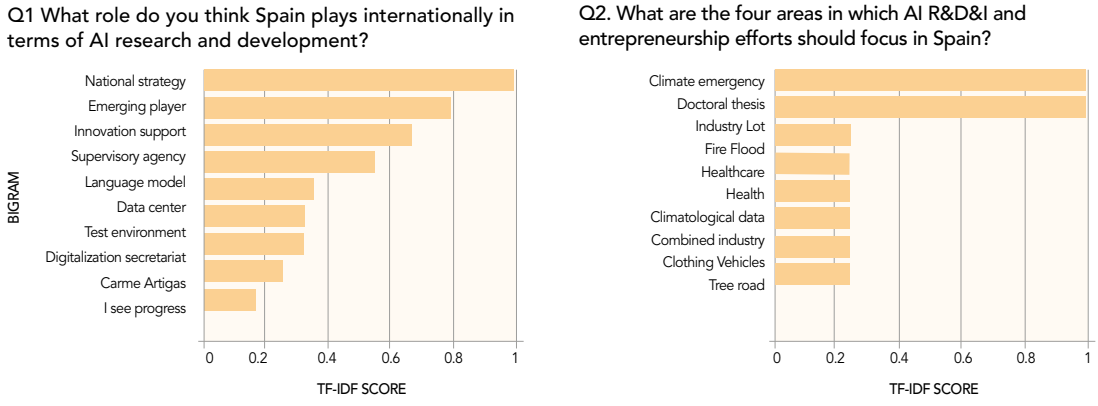
Comparing the results, Spain shows a clear structural advantage over Latin America and, especially, over Chile, in the three components of the index analyzed. In enabling factors, it doubles the regional average, excelling in connectivity, data, and human capital. In R&D&I, although it is not considered qualitatively different, its indicators place it well above Latin American countries, allowing it to lead cooperation in artificial intelligence. In governance, it also significantly outperforms the region, particularly in vision and institutionality. Only in the latter aspect does Chile come close to Spanish levels, but in general, Spain maintains a leading position in all areas evaluated.

The future of AI: expert perception

In order to gain insight into the future of AI in Spain from the perspective of experts in the field, a total of eight in-depth interviews were conducted. The interview script was structured in four blocks: 1) impacts and challenges, 2) the future of AI, 3) ethics and regulation, and 4) collaboration and future research.

Regarding Spain's role at the international level, it was possible to observe how most of the interviewees point to Spain as a benchmark for Latin America (interviews 1, 2, 7) that is emerging as a key player (interviews 3, 4, 5) —see P1, Figure 1—.

Figure 1
AI in Spain



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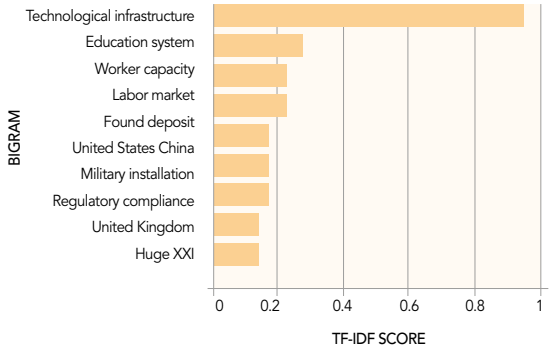
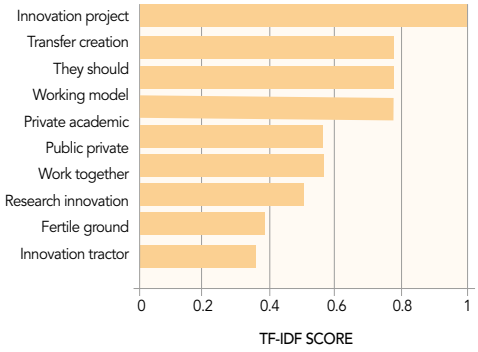
Q3. What are the four main challenges Spain will face in developing AI over the next five years?



Q4. What is your opinion on the importance of collaboration between the public, private, and academic sectors in the development of AI in Spain?



Spain is making decisive progress in positioning itself as a relevant player in the development and regulation of AI in Europe. This momentum is observed in initiatives such as the National Artificial Intelligence Strategy (ENIA), the creation of the Spanish AI Supervision Agency (AESIA), and test environments (sandboxes), designed to prepare for the implementation of the European AI Regulation (interview 7). These actions have attracted international interest, consolidating Spain's position as a relevant technical and regulatory partner in Europe.

Interviewees 2 and 4 highlight that Spain has a promising technological infrastructure. Since 2018, through the Secretariat of State for Digital Advancement (SEDIA), public policies have been promoted to strengthen the technological ecosystem (interview 1). In addition, Spain has actively participated in European debates on digital rights and AI ethics. However, both Spain and the European Union face a historic gap in R&D&I investment compared to powers such as US and China (interview 4). In this regard, interviewee 2 stresses the need to increase investment in digital technologies, promote innovation, and consolidate a competitive business.

The impacts of AI are already seen, although still not very visible to the general public. According to the interviewees, public administrations and companies are implementing AI tools to improve processes and personalize services. Interview 5 mentions sectors such as healthcare, education, mobility, and entertainment, where AI is already helping to improve access and user experience.

Based on the analysis of the P2 bigram (Figure 1), climate emergency, health, education, and industry are identified as priority areas. In the case of climate change, AI makes it possible to predict fires or droughts through massive data analysis. In education, interview 1 mentions transformations in teaching methods, while interviews 3 and 5 advocate for accessible tools and curricula adapted to the digital age.

In health, AI is revolutionizing the diagnosis and treatment of diseases through predictive algorithms and image analysis. In the workplace, AI is transforming professional profiles, especially in data science and technology. Although its impact on some services is still limited, phenomena such as "digital nomads" show a change in progress. Despite fears about automation, interviewees compare this transition to the end of the industrial era (interview 2).

Regarding the challenges (P3, Figure 1), the interviewees agree on three priorities: improving technological infrastructure, adapting training to the new labor market, and strengthening the innovation ecosystem. They also highlight the importance of data networks and educational programs, as proposed by Salvador and Ramió (2020).

There is moderate optimism about the future of AI in Spain. If investments in infrastructure, education, and public policies are consolidated, Spain could become a global benchmark and a

bridge between Europe and Latin America. To achieve this, it will be essential to overcome bureaucratic rigidity and adopt a more agile vision (interviews 1 to 5). Interviewee 2 proposes three lines of action: financing knowledge, retaining talent through quality jobs, and participating in international networks.

In terms of regulation and ethics, interviews 3 and 4 value the European approach to risk management, although they warn of the need for flexible frameworks. Interview 5 highlights that trust in AI will depend on principles such as transparency, auditability, and security. The PIO model of the Observatory of Ethics in AI (OEIAC) is mentioned, and cross-disciplinary training in digital ethics is advocated.

Finally, the interviews (P4, Figure 1) highlight the importance of cooperation between the public, private, and academic sectors, as no single actor has sufficient capabilities on its own. Interview 2 emphasizes the improvement of collaboration mechanisms and knowledge transfer, as well as citizen inclusion in the formulation of AI policies to ensure their legitimacy.

Future priorities include health, education, labor transformation, basic research, and security, reflecting concerns about ethical risks and disorganized implementation, as stated by Cotino (2019).

Conclusions

This research examines Spain's current and future capabilities for AI development, using data from the Latin American Artificial Intelligence Index (ILIA) adapted to the Spanish context and interviews with eight experts in the field. The analysis focused on three dimensions: enabling factors, R&D&I, and governance.

In terms of enabling factors, which include technological infrastructure and human capital, Spain performs well, with notable progress in creating conditions conducive to AI development. In the R&D&I dimension, the country maintains a competitive position in Europe thanks to relevant projects led by the public, private, and academic sectors. In governance, although there are solid regulatory frameworks and favorable public policies, there is a lack of data on citizen participation in institutional processes.

The interviews with experts were grouped into four areas: impacts and challenges, the future of AI, ethics and regulation, and collaboration and research. The experts view the ENIA and other digitization initiatives positively, although they recognize that Spain is still far from global leadership compared to countries such as the US and China. The priority areas identified for AI development were health, education, industry, and talent training, but several difficulties remain related to infrastructure and the need to promote inclusive governance aligned with human rights.

One limitation of the research identified was the need to adapt the ILIA due to the absence of some specific indicators available for Spain. Likewise, regarding the interview phase, increasing the number of interviewees would have allowed for a broader and more representative range of opinions to be obtained.

For a future stage in the research agenda, it is recommended that the comparative analysis of the ILIA and its dimensions be extended to other European Union countries. It is also suggested that a greater number of interviews with experts be included by incorporating voices from other countries and multilateral organizations, with the aim of enriching the understanding of the context, challenges, and opportunities related to the dissemination and use of AI.

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Author(s)	Contributions
José Luis Ros-Medina	Conceptualization, data curation, formal analysis; Research; Methodology; Project management; Resources; Software; Supervision; Validation; Visualization; Writing: original; Writing: revision and editing.
José Manuel Mayor Balsas	Conceptualization, data curation, formal analysis; Research; Methodology; Project management; Resources; Software; Supervision; Validation; Visualization; Writing: original; Writing: revision and editing.
Thiago Ferreira Dias	Data curation, formal analysis; Research; Methodology; Software; Supervision; Validation; Visualization; Writing: original; Writing: revision and editing.
Elias Jacob de Menezes Neto	Conceptualization, data curation, formal analysis; Software; Supervision; Validation; Visualization; Writing: correction and editing.

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Determinants of the quality of accounting information at Brazilian federal universities

Determinantes de la calidad de la información contable en las universidades federales brasileñas

Joelma Viviane de Paula Mendes
Master from Universidad Federal de Paraná, Brazil
jvpmendes@ufpr.br
https://orcid.org/0009-0007-5044-5015
https://ror.org/05syd6y78

Henrique Portulhak
Professor and researcher at Universidad Federal de Paraná, Brazil
henrique.portulhak@ufpr.br
https://orcid.org/0000-0002-9097-2481
https://ror.org/05syd6y78

Luciana Klein
Professor and researcher at Universidad Federal de Paraná, Brazil
lucianaklein@ufpr.br
https://orcid.org/0000-0001-6815-1831
https://ror.org/05syd6y78

Patrik Donizetti Rodrigues da Silva
PhD student at Universidad Federal de Santa Catarina, Brazil
patrik.silva@alumni.usp.br
https://orcid.org/0000-0002-0999-174X
https://ror.org/041akq887

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Abstract: this research examined the determinants of the quality of accounting information at Brazilian federal universities, from a contingency perspective, focusing on both internal and external factors that influence the information disclosed by these institutions. Understanding these determinants is relevant for improving financial transparency and decision-making in public higher education. An explanatory and quantitative approach was adopted to analyze secondary data and documentary sources. A sample of 62 federal universities was studied, and their quality of accounting information was assessed using the index developed by Beest *et al*. (2009). Seven variables, based on contingency theory, were tested using an Ordinary Least Squares (OLS) multiple regression model. The findings revealed that internal factors —such as administrative efficiency, the number of accounting professionals, the presence of a female dean, and governance quality —have a significant impact on the quality of accounting information. On the other hand, external factors like socio-economic development in education and university location (capital vs. interior) did not significantly affect the quality of information. The study concluded that internal factors play a more critical role than external ones in determining quality of accounting information in Brazilian federal universities. These insights are valuable for university management and control bodies to focus on enhancing internal characteristics, such as administrative efficiency, technical structure, governance and leadership, in the production of information useful for decision-making.

Keywords: quality, accounting, information, universities, contingency, IPSAS, Brazil, determinants.

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Resumen: este estudio investigó los determinantes de la calidad de la información contable en las universidades federales brasileñas, desde una perspectiva contingencial, enfocándose en los factores internos y externos que influyen en la información divulgada por estas instituciones. Resulta fundamente comprender estos determinantes para mejorar la transparencia financiera y la toma de decisiones en la educación superior pública. Se adoptó un enfoque explicativo y cuantitativo para analizar los datos secundarios y las fuentes documentales. La muestra incluyó 62 universidades federales brasileñas, evaluando la calidad de su información contable y utilizando el índice desarrollado por Beest *et al*. (2009). Se probaron siete variables basadas en la teoría de la contingencia mediante un modelo de regresión múltiple por mínimos cuadrados ordinarios. Los resultados revelaron que el ambiente interno, incluyendo variables como la eficiencia administrativa, el número de profesionales contables, la presencia de una decana mujer y la calidad de la gobernanza tiene un impacto significativo en la calidad de la información contable. En cambio, los factores externos, como el desarrollo socioeconómico en educación y la ubicación de la universidad (capital vs. interior), no tuvieron un impacto significativo en la calidad de la información. El estudio concluye que los factores internos son más determinantes que los externos en la calidad de la información contable en las universidades federales brasileñas, ofreciendo valiosos conocimientos para la gestión universitaria y los órganos de control.

Palabras clave: calidad, información, contable, universidades, contingencia, IPSAS, Brasil, determinantes.

Introduction

In recent decades, public sector reforms under the New Public Management (NPM) paradigm have aimed to improve transparency, quality of information, and public finance efficiency and ensure better accountability (Hyndman and Liguori, 2016). This movement has resulted in profound changes in the accounting and budgeting practices of several nations, leading to better decision-making and accountability processes (Schmidthuber *et al*., 2022).

One of the main pillars of these reforms is the International Public Sector Accounting Standards (IPSAS), designed to ensure international comparability of public financial reports (Bilhim *et al*., 2022). Their adoption has been encouraged by international organizations such as the International Monetary Fund (IMF) and the World Bank, which view IPSAS as a means to enhance transparency and accountability in public financial management (Aquino *et al*., 2020), a recommendation especially emphasized for developing countries (Bilhim *et al*., 2022). Brazil began adopting IPSAS in 2008, to improve public sector transparency and accountability (Lima and Lima, 2019).

Adopting IPSAS is a relevant factor in assuring the confidence of the people and national and foreign investors; by demanding greater transparency and disclosure of accounting information, the expected outcome is an improvement in the quality of information reported by public entities (Bilhim *et al*., 2022). Empirical studies have confirmed the benefits associated with the adoption of these standards, particularly enhancements in information quality for both external and internal decision-making purposes (Schmidthuber *et al*., 2022).

Since the quality of accounting information is vital for its users to benefit from in their decision-making (Zhai and Wang, 2016), and considering that the successful implementation of accounting practices in the public sector depends on various internal and external factors — such as central government policies, information and communication technology, the size of the organization (Woods, 2009), cultural aspects, historical context, and structural elements (Pina *et al*., 2009) — recent studies have focused on discussing the factors that influence the quality of accounting information in the public sector.

Mnif and Gafsi (2020), drawing on contingency theory, evaluated environmental factors that influenced IPSAS compliance in the financial information disclosed by public organizations across different countries. Sellami and Gafsi (2020) examined the level of transparency and IPSAS compliance among 60 government entities in Sub-Saharan Africa, assessing their relationship with the quality of public management systems and the level of accounting education. Sousa (2022) investigated the determinants of accounting information quality in Brazilian municipalities, including spatial clustering, population size, and per capita administrative expenditures. Gomes and Silva (2022) investigated the explanatory factors behind ranking the

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quality of accounting and fiscal information at a municipal level.

Universities are responsible for an extensive operational structure and voluminous financial resources, with a diversity of stakeholders who are increasingly pressing for improvements in efficiency and effectiveness. It leads to great interest in their accounting and fiscal information (Kim and Chung, 2023). Despite their relevance for public sector accounting research (Kim and Chung, 2023), we did not identify any studies dedicated to investigating contingency aspects that influence the quality of their accounting information.

Thus, through the lens of contingency theory, the objective of this study was to examine the determinants of the quality of accounting information at Brazilian federal universities. The Contingency Theory assumes that there is no optimal structure; instead, organizational adapt to internal and external conditions achievement of its objectives (Chenhall, 2003). Public universities play a crucial in the country's development through education, research and innovation (Kim and Chung, 2023). According to the SCImago Institutions Rankings (2024), which evaluates institutions based on research performance, innovation results, and social impact — 16 of the 20 best Brazilian universities are federal institutions.

Understanding what affects quality of accounting information is vital for successful reforms, such as IPSAS (Herath and Albarqi, 2017). By filling a gap in knowledge about the determinants of the quality of university accounting information, this investigation enables public managers to understand the influence of exogenous factors that may require greater managerial effort and internal factors that need to be maximized in order to effectively improve the quality of their accounting reports. This study could also guide policymakers variables that influence reform success in the public sector.

Literature review

Contingency Theory studies the connection between an organization and its environment, seeking to identify patterns or variable configurations, emphasizing their multivariate nature, and elucidating how they operate in specific circumstances (Kast and Rosenzweig, 1972). Greenwood and Hinings (1976) argue that contingencies trigger adjustments in controls and organizational structure. Stoner and Freeman (1985) emphasize the interdependence of the various factors in administrative situations.

cause the optimization of arrangement is a response of the contingencies broader environment (Donaldson, 1999). Organizations strive to adjust between environment and structure to maximize performance and efficiency (Brignall and Modell, 2000).

Contingency Theory is widely applied in accounting research, especially in private sector management accounting (Freitag *et al*., 2021). This approach understands that accounting systems elements relate to specific operating circumstances, internal and external factors, making their adequacy contingent on these factors (Otley, 2016). Its use also extends to other fields of accounting, such as the public sector, helping identify contextual factors relevant to government accounting reforms (Jorge and Mattei, 2016).

High-quality accounting information is defined as information that is useful for decision-making, meaning it must be understandable and suitable to the needs of its users (Hendriksen and Van Breda, 1999). Thus, the quality of accounting information enhances user value, by promoting efficient resource allocation (Herath and Albarqi, 2017). Considering IPSAS as a platform for improving the quality of accounting information in the public sector, international studies have focused on assessing the quality of reported accounting information based on its compliance with these standards. There has been interest in both low and high quality. While the former increases investor confidence, access to credit and better capital costs, the latter can lead to risks of fraud, misguided deci-

sions and loss of credibility (Opanyi, 2016). In this sense, the literature has approached the elements of quality, the different ways of measuring it and identifying the factors that influence this quality (Herath and Albarqi, 2017).

Within the contingency approach, the organization is an open system, that no structure can be used in all organizations, beThe understanding and analysis of accounting information quality in the public sector are commonly grounded in compliance with the concepts outlined in the IPSAS Conceptual Framework for General Purpose Financial Reporting—specifically, the qualitative characteristics prescribed in this framework: relevance, faithful representation, understandability, timeliness, verifiability, and comparability. Opanyi (2016), studying 19 Kenyan ministries, found improvements in comparability, relevance, timeliness and representation after adoption of IPSAS, while comprehensibility was harmed. Ambarchian and Ambarchian (2020) analyzed 20 supranational organizations, highlighted predictive value, integrity, neutrality, absence of material errors, punctuality and verifiability.

Measurement methods include based on accruals and earnings management (Ambarchian and Ambarchian, 2020; Herath and Albarqi, 2017; Opanyi, 2016), statistical models like Baneish's (Herath and Albarqi, 2017), accuracy in profit forecasts (Opanyi, 2016) and accounting judgment and subjectivity (Ambarchian and Ambarchian, 2020). Influential factors include accounting standards adopted, corporate governance mechanisms, independent auditing and audit committees, the regulatory and legal environment, earnings management and the characteristics of the firm (Opanyi, 2016). Mnif and Gafsi (2020) identified a positive effects from government openness, quality of public administration and previous experience with IFRS in IPSAS compliance, while the financial condition was not a significant factor.

Hypotheses development

Understanding factors that may influence the quality of accounting information is crucial for the success of accounting reforms (Herath and Albarqi, 2017). This study proposes seven hypotheses exploring the determinants of the quality of accounting information at Brazilian federal universities, grounded in contingency theory.

The first hypothesis relates socio-economic development in education to the external environment and the quality of the organization's accounting information. In the literature, the Municipal Human Development Index (IDHM) is identified as contingent on municipal performance, fiscal and municipal management transparency, as well as the quality of accounting information in Brazilian municipalities. According to Brocco *et al*. (2018, p. 140), the influence occurs because "... citizens with better health, education, and employment conditions are in a better position to exercise social control over municipal management." In this regard, Sell *et al.* (2020) found a positive relationship between the Municipal Human Development Index (IDHM) and municipal performance. Positive relationships between the FIRJAN Municipal Development Index (IFDM)and and municipal transparency are observed in Brocco *et al.* (2018), Baldissera *et al.* (2020), and Visentini *et al.* (2021). Gomes and Silva (2022) also identified a positive relationship between the IFDM and accounting information quality in Brazilian municipalities. Supposedly, federal universities based in states with higher socioeconomic educational development have higher-quality accounting information.

H_1: The socioeconomic development in education of the state where the federal university is based positively influences the quality of its accounting information.

The second hypothesis relates to the size of the population served by the university and the quality of its accounting information. According to Souza (2022), population size can positively affect the quality of accounting information, as it provides access to a greater amount of technological and financial resources allocated to maintaining the administrative structure. Baldissera *et al.* (2020) and Visentini *et al.* (2021) found a positive relationship between population size and municipal transparency. Avellaneda and Gomes (2015) identified a positive relationship between population size and municipal performance in terms of tax collection. Sell *et al.* (2020)

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observed a positive relationship between size and municipal performance. Sousa (2022) also identified a positive relationship between population size and the quality of accounting information in municipalities, as did Souza (2022) in analyzing the accounting disclosure of Brazilian state governments. Therefore, it is expected that a larger population served by public higher education institutions (IFES), including undergraduate and graduate programs, will lead to higher quality accounting information.

H_2: The size of the population served by the federal university positively influences the quality of its accounting information.

The third hypothesis explores the impact of organizational efficiency on the quality of accounting information. How an organization converts input into products reflects quality of its management (Chenhall, 2003). Efficient practices improve accounting information higher quality (Marenco *et al*., 2017; Grin *et al*., 2018). In public institutions, the quality of management relates to adopting more efficient methods (Mnif and Gafsi, 2020). Efficiency is associated with reduced operating costs (Soares *et al*., 2019). The current cost per student is an efficient metric used to evaluate federal universities' institutional performance from the management quality perspective (Sousa and Callado, 2019). Therefore, this study regards efficiency, as measured by the current cost per student, as a potential explanatory factor for the quality of accounting information reported by federal universities.

H_3: A lower current cost per student positively impacts the quality of accounting information at federal universities.

The fourth hypothesis proposes an association between the size of the accounting team and the quality of accounting information. The expertise of the accounting professional is related to the quality of the financial forecasts disclosed (Clatworthy and Peel, 2021). Anderson *et al*. (2004) indicate that larger audit committees can lead to higher levels of transparency and disclosure. In the public sector, Sell *et al*. (2020) found that higher per capita personnel expenditure leads to better municipal performance measured by per capita net current revenue. The allocation of professionals with knowledge and understanding of accounting is important for the quality of the financial reports and projections disclosed. In the context of Brazilian federal universities, it is anticipated that a higher number of accounting professionals available to management will improve the quality of accounting information.

H_4: The number of accounting professionals positively impacts the quality of accounting information at federal universities.

The fifth hypothesis explores the influence of the gender of the top manager on the quality of the organization's accounting information. The presence of women in leadership positions has a positive influence on the quality of financial information, often linked to the personal characteristics of women (Krishnan and Parsons, 2008; Molero, 2011). Gul *et al*. (2009) and Burns (2012) argue that women exhibit greater risk aversion and ethical behavior. Arun *et al*. (2015) and Nicoló *et al*. (2022) note that women tend to be more conservative regarding accounting policies and financial reporting practices, thereby contributing to the quality of financial information. Lara *et al*. (2017) reveal that female CEOs, CFOs, or directors manage the financial reporting process more rigorously.

In recent decades, there has been a trend to promote women's participation in university governance structures (Deem, 2003). However, in the Brazilian university context, the advancement of women into managerial positions remains uneven, with only 30.2% of universities being led by female rectors (Ambrosini, 2017). Therefore, it is expected that universities led by women will promote initiatives, practices, and policies that enhance the quality of accounting information.

H_5: Female deans positively impact the accounting information quality at federal universities.

The sixth hypothesis relates the quality of institutional governance and the quality of accounting information. Governance is commonly associated with the level and quality of information disclosed (Pessôa *et al.*, 2018). Setiyawati and Doktoralina (2019) emphasize the adoption of good governance principles significantly influence the quality and reliability of financial reporting, as they tend to reduce fraud and errors in financial statements.

In the university context, governance refers to the mechanisms and structures that aim to ensure the institution's effectiveness, efficiency, and professionalism in its performance, based on improving transparency and accountability (Flórez-Parra *et al.*, 2017). According to Flórez-Parra *et al*. (2021), governance structures and mechanisms, along with stakeholder demands, influence universities' Corporate Social Responsibility (CSR) information disclosure policies. Thus, this study considers that a higher governance index is related to the quality of accounting information reported by Brazilian federal universities.

H_6: A higher governance index positively impacts accounting information quality at federal universities.

The seventh hypothesis proposes that the location of the university influences the quality of accounting information. Because considering higher education institutions as drivers of economic and social development, Brazil initiated an effort in the 21st century to expand universities into rural areas, aiming to promote national development and reduce regional disparities (Casqueiro *et al.*, 2020). Dallagnol and Portulhak (2025) noted that, although there is a strong alignment in the mission and vision statements of Brazilian federal universities, some universities distinguish themselves by emphasizing the promotion of regional development. Thus, considering the differences in strategic directions between federal universities located in capitals and those in rural areas, it is understood that these variations in strategies lead to differences in the quality of accounting information..

H_7: The location of headquarters in capital cities positively impacts accounting information quality at federal universities.

Methodology

This explanatory and quantitative study is based on secondary data and documentary sources. To identify the variable Quality of Accounting Information (QAI), financial reports disclosed by federal universities were examined using content analysis techniques (Bardin, 2011). For this purpose, the instrument developed by Beest *et al.* (2009) was employed—one of the main sources for measuring accounting information quality (Herath and Albarqi, 2017) and widely applied in empirical studies in the public sector (e.g., Opanyi, 2016; Radebe *et al.*, 2023). The model consists of 21 items and operationalizes the assessment of qualitative characteristics of accounting information, comprising four items for relevance, five for faithful representation (including four related to verifiability), five for understandability, six for comparability, and one item for timeliness.

When applying this index, the following observations procedures were adopted: (I) For the operationalization of item T1 - Timeliness, we inverted the metric so that it adequately represented its purpose, i.e., the higher the number of days required for the auditors to sign the report, the lower the timeliness score; in cases of absence of the audit report, we considered the date of signature of the accounting professional responsible for the reports; (II) the gradation of each characteristic refers to the data collection conducted by two independent investigators, resulting in an average obtained from these collections.

The financial reports were obtained from the federal universities' institutional websites Management Reports. When unavailable, we analyzed the auxiliary reports on the same subject. In both cases, we chose for the research the financial reports released for the year 2022. We

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considered the contingency variables shown in Table 1.

For the variables collected on the *Universidade 360* website, the latest data available of 2022 was considered. For availability reasons, data relating to the Education MHDI, the number of accounting professionals, and the governance index are for 2021, the most recent base year available.

It should be noted that the classification of the dean as "female" is based solely on gender, which is derived from observable elements (social name, textual identification as female dean, and pictures) since not enough information was found to allow classification by gender. The Brazilian Public Governance Index (IGOVPUB) is derived from the methodology used by the Federal Court of Auditors (TCU) to calculate the Governance and Management Index (IGG). In this study, the index is employed as an indicator to reflect the level of governance across Brazilian federal agencies.

Table 1
Variables of independent researchs

Variable	Measurement	Source	References
Socioeconomic development of the state [EducMHDI]	Education MHDI	Atlas Brazil Website	Baldissera *et al.* (2020); Visentini *et al.* (2021); Gomes e Silva (2022).
Affected population [POP]	Natural logarithm of students enrolled in undergraduate and graduate programs	*Universidade 360* Platform (Brazilian Ministry of Education)	Baldissera *et al.* (2020); Sell *et al.* (2020); Visentini *et al.* (2021); Sousa (2022).
Efficiency [CPS]	Natural logarithm of the current student cost	*Universidade 360* Platform (Brazilian Ministry of Education)	Grin *et al.* (2018); Marenco *et al.* (2017); Mnif and Gafsi (2020).
Accounting Professionals [AP]	Number of accounting professionals in practice	Brazilian Federal Government Transparency website	Clatworthy and Peel (2021); Sell *et al.* (2020)
Sex of the Dean [FEMALE]	Dummy variable for female dean	University website	Molero (2011); Nicolò *et al.* (2022)
Governance [IGOVPUB]	Public Governance Index	Brazilian Federal Court of Auditors (TCU) Website	Pessôa *et al.* (2018); Setiyawati and Doktoralina (2019).
Location [LOC]	Dummy variable for headquarters in the capital or countryside	University website	Baldissera *et al.* (2017); Casqueiro *et al.* (2020).

Multiple regression by Ordinary Least Squares (OLS) was applied for data analysis. According to Fávero and Belfiore (2023), the model assumes normally distributed residuals, absence of multicollinearity among explanatory variables, non-sparsity of residuals and variables, and independence and randomness of residuals. These assumptions were preliminarily assessed using R and RStudio software.

The Shapiro-French test was employed to assess the normality of the residuals. This test is recommended for samples with more than 30 observations (Marôco, 2014), as is the case in this study. The Durbin-Watson test was used for residual autocorrelation, and heteroscedasticity was verified using the Breusch-Pagan test.

Accordingly, the proposed equation for this study is detailed as follows:

$$QAI = \beta_0 + \beta_1(EducMHDI) + \beta_2(POP) + \beta_3(CPS) + \beta_4(AP) + \beta_5(Female) + \beta_6(IGOVPUB) + \beta_7(LOC) + \varepsilon$$

A total of 69 federal public universities were analyzed. The sample consisted of institutions that had all the necessary data to carry out the examination. In the case of three universities (UFR, UFAPE, and UFNT), the financial reports for 2022 had not been published on their websites. For four universities (UFJ, UFCAT, UFDPAR, and UFSJ), the 2021 data for the collected variables could not be found on the *Universidade 360* website. These seven universities were excluded. Thus, the final sample consisted of 62 institutions (89.9% of the population).

Results and discussion

Quality of accounting information

Figure 1 shows the results obtained for the accounting information quality index. Among qualitative characteristics, relevance had the lowest average (2.370). The best score was for non-financial information (item R2, average 3.516), indicating reasonably useful financial disclosures but opportunities for improving predictive value. The worst item evaluated was the use of fair value (item R3; average 1.185), with historical cost predominating and fair value rarely mentioned.

Regarding reliable representation (average 2.733), the choice of accounting principles based on valid arguments (F2) emerged positively (average 3.185) The worst performance regarded the explanations and arguments offered for the estimates made (F1; average 1.887). It is also worth mentioning the less favorable result regarding the type of audit report included in the financial report (F4; average 2.282), an item related to the presence or absence of caveats and reservations to the financial data disclosed.

Comprehensibility received the highest overall score (3.169), particularly due to graphic elements (U3; 4.491). On the other hand, the absence or presentation of an adequate glossary (U5) impacted on the quality, being the worst-rated item (2.153).

Comparability (average 2.826), obtained the lowest score when adjustments to previous periods were considered (C3, 2.056), followed by the item on the disclosure of the current period's results compared to previous years (C4; average 2.080), as universities typically only compared the current year to the previous one. Comparisons over a longer period, as well as the resulting developments or implications, by the quality provisions of the Beest *et al*. (2009) instrument, were not observed. The best results for this characteristic were obtained in item C1, dedicated to explanations of changes in accounting policy (average 3.758).

The results for timeliness (average 2.088), which measure the number of days taken for the auditor to review the report after the end of the fiscal year (or, when unavailable, the date

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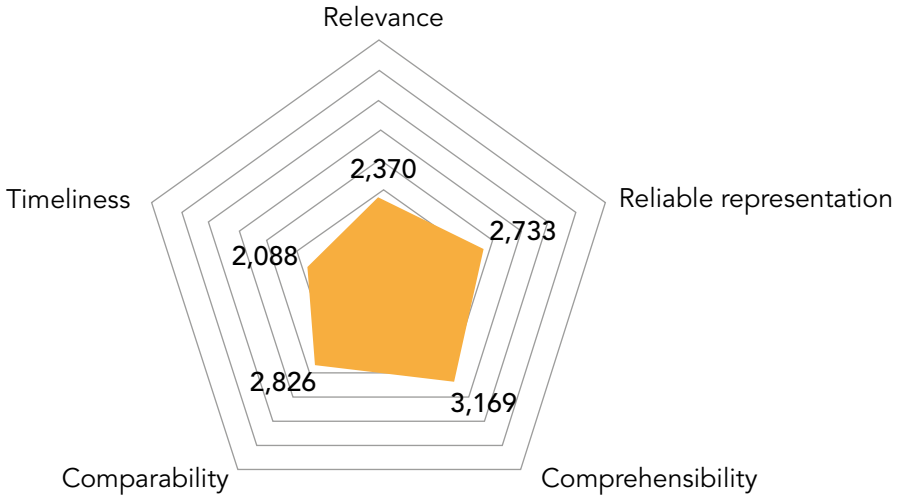
of the responsible accountant's signature), show the lowest among the five assessed qualitative attributes. It is worth noting that the average number of days taken by all institutions was approximately 86.

Figure 1
Quality of Accounting Information by Information Characteristic



Note. research data.

The universities with the best average scores were the Federal University of Minas Gerais (UFMG), with an average QAI of 3.005, the Federal Rural University of the Semi-Arid Region (UFERSA), with 2.987, and the Federal University of Mato Grosso (UFMT), with 2.937.

Analyzing the ranking of universities based on the results of the accounting information quality index alone does not allow for the identification of patterns or explanatory factors for these results. This was followed by the multivariate analysis stage, in which the QAI variable was evaluated through a contingency lens.

Regression model

The presentation of the multivariate analysis results begins with the diagnostic tests used to verify the assumptions of the regression models. The Shapiro-Francia test for residual normality showed W=0.988 and p-value= 0.768 (>0.05), suggesting no statistically significant evidence to reject the null hypothesis that the residuals are normally distributed.

Autocorrelation of the residuals was evaluated using the Durbin-Watson test, which produced a value of 1.932—indicating low autocorrelation. According to Fávero and Belfiore (2023), the Breusch-Pagan test assesses heteroscedasticity, where the null hypothesis assumes constant error variance (homoscedasticity), and the alternative indicates heteroscedastic errors. The test result was BP = 5.546 with a p-value of 0.593, thus confirming homoscedasticity in the residuals.

The fourth assumption in regression analysis is the absence of high correlations among the independent variables, also referred to as multicollinearity. To evaluate this, correlations between the numerical independent variables were calculated, as presented in Table 2. No high correlations were found among the variables, except for POP (population) and AP (administrative personnel). This suggests that

larger universities require more administrative staff. However, when analyzing the relationship between the dependent and independent variables, no significant differences were observed.

Table 2

Correlation between the explanatory variables

Variable	EducMHDI	POP	CPS	AP	IGOVPUB
EducMHDI	1.0				
POP	0.17	1.00			
CPS	0.24	-0.07	1.00		
AP	0.04	0.79	0.07	1.00	
IGOVPUB	0.17	0.17	-0.06	0.13	1.00

Note. research data.

In addition to this analysis, we analyzed the Variance Inflation Factor (VIF). According to Fávero and Belfiore (2023), the variance inflation factor measures multicollinearity among independent variables. High VIF values can indicate that a particular variable is highly correlated with other independent variables. The test result did not show high values (maximum VIF of 2.482 for ap); therefore, it is understood that the model is suitable for this analysis in terms of the absence of multicollinearity.

Table 3 shows the coefficients and significance level of each model. The results of the regression model indicate that the F-statistic had a p-value below 0.05, allowing us to reject the null hypothesis that the model does not include a variable capable of explaining the behavior of the QAI variable. The following analysis will focus on the results obtained by this model.

Regarding the EducMHDI variable, a positive value was observed, indicating a direct relationship between the quality of accounting information and the Human Development Index for Education. However, this variable is not significant for the proposed model.

Concerning the population served variable (POP-ln), the coefficient showed a negative sign, which was also significant at 10%. These results suggest that as the size of the population served increases, the quality of accounting information tends to decrease, or viceversa.

The cost per student (CPS), an indicator of university efficiency, was also found to be inversely correlated with the dependent variable. This variable was significant, indicating that the lower the current cost per student, the higher the QAI index tends to be.

The variables related to the number of accounting professionals in practice (AP), the female dean (FEMALE), and the governance index (IGOVPUB) were statistically significant and positively related to the dependent variable. The model suggests that more accounting professionals, a female dean, and a higher governance index are associated with better accounting information quality.

Finally, the location of the university's headquarters, whether in the capital or in rural areas (LOC), did not show statistical significance. Therefore, based on the proposed model, it cannot be concluded that this variable influences the quality of accounting information.

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Table 3
Coefficients and statistical significance

Variable	Coefficient	Standard error	p value
EducMHDI	0.044	0.460	0.923
POP (ln)	-0.064	0.037	0.090
CPS (ln)	-0.190	0.082	0.024*
Variable	**Coefficient**	**Standard error**	**p value**
AP	0.002	0.001	0.018*
FEMALE	0.107	0.047	0.026*
IGOVPUB	0.254	0.115	0.032*
LOC	0.054	0.047	0.253
Intercept	4.821	0.892	0.000***
Adjusted R^2	0.167		
F- statistics (value p)	0.016		

Note. Statistical significance: 0 '***'; 0.001 '**'; 0.01'*'; 0.05'.'; 0.1'' 1. Source: Research data.

Regarding the hypotheses not rejected, it is noted that all of them are related to internal contingency variables The H3 which addresses the influence of current costs per student on the quality of accounting information at federal universities. This hypothesis was confirmed, and the results indicated a negative relationship, meaning that the lower the cost per student the higher the quality of accounting information. This can be explained by the fact that institutions with greater capacity to optimize the relationship between inputs and outputs (Mnif and Gafsi, 2020), reflecting better managerial quality (Grin *et al*., 2018; Marenco *et al*., 2017), also manage to present accounting information with more desirable quality characteristics.

The number of accounting professionals has a positive impact on the quality of accounting information at federal universities (H4). This finding aligns with Clatworthy and Peel (2021) on the importance of accounting expertise for financial reporting quality, and with Sell *et al.* (2020) on the relevance of administrative staff size. Therefore, a higher number of accounting professionals to lead to more detailed and higher-quality management reports, contributing to greater transparency.

The gender of the university's rector (female) positively influences the quality of accounting information (H5) is consistent with on related studies (Krishnan and Parsons, 2008; Molero, 2011). This can be explained by factors such as tendency of female leaders to have a higher aversion to risk (Arun *et al.*, 2015; Gul *et al.*, 2009; Nicoló *et al.*, 2022), to be more successful in obtaining voluntary information (Gul *et al.*, 2009), and to demonstrate stronger ethical behavior (Burns, 2012; Gul *et al.*, 2009).

The level of governance showed a positive effect on the quality of accounting information at federal universities (H6). Therefore, higher governance standards improve areas such as transparency and control, thus enhancing the attention given to the quality of reports. This finding aligns with similar studies (Pessôa *et al*., 2018; Setiyawati and Doktoralina, 2019).

The results of the regression model showed a positive, yet non-significant, relationship between the IDHM Education of the state where the university is located and their quality of the

accounting information (H1). This result contradicts expectations based on related studies (Brocco *et al*., 2018; Baldissera *et al*., 2020; Sell *et al*., 2020; Visentini *et al*., 2021; Gomes and Silva, 2022). The acceptance of other hypotheses suggests that internal factors are more relevant in explaining the quality of accounting information at federal universities.

The provision of services to a larger population by federal universities was negatively related to higher quality of accounting information, rejection of H2. This result is also contrary to other studies that found a positive relationship between population size and variables related to transparency (Baldissera *et al.*, 2020; Visentini *et al.*, 2021), performance (Avellaneda and Gomes, 2015; Sell *et al.*, 2020), and quality and disclosure of accounting information (Souza, 2022; Sousa, 2022). This also suggests that other variables are more relevant for explaining this phenomenon than to the size of the institution.

No significant evidence was found that the location of the university's headquarters in capital cities impacts the quality of accounting information at federal universities (H7). This result is surprising, since the financial and non-financial resources available in Brazilian capital cities are generally higher and there are strategic particularities that distinguish universities located in capital cities from those located in inland areas (Casqueiro *et al.*, 2020; Dallagnol and Portulhak, 2025). Possible explanations for this result include: (I) homogeneous and centralized regulations to which Brazilian federal universities are subject, including accounting rules and evaluation by the same public audit; (II) homogenization in terms of distribution (and contingency) of resources by being subordinated to the same ministry; (III) universities located in the interior are newer, which may lead them to have more modern infrastructures that neutralize the differences in the surrounding environment, while older universities located in the capitals may be more dependent on legacy systems and have less flexible structures.

Dallagnol and Portulhak (2025) argue that some inland universities internalize missions with a regional impact, which can lead to more detailed and locally relevant reports. Although this result indicates that the strategic differences between universities based in the capital and in the interior may not be strong enough to influence the quality of accounting information, it can be understood that this factor can generate institutional pressure to disclose accounting information of equivalent quality to that of the capitals. Thus, this result reinforces the importance of the institution's internal aspects, such as technical capabilities and quality of governance, in generating higher quality accounting information, in comparison to factors related to the environment, such as location in capital cities.

Conclusions

This research identified determinants that influence the quality of accounting information at Brazilian federal universities from a contingency perspective. The analysis covered 62 of the 69 institutions. The results suggest pathways for themes in public administration and accounting, primarily for public and higher education organizations.

The evaluation of QAI (Quality of Accounting Information) revealed findings that deserve attention. The characteristics of understandability and comparability showed the highest average scores, while timeliness and relevance had the lowest scores. This situation raises a red flag, as the timeliness of information – especially under the scrutiny of auditors' opinions – and the relevance of information can affect decision-making processes. These elements point to priority areas for improving the quality of accounting information at Brazilian federal universities in favor of their users.

In the multivariate analysis phase, the research identified that certain internal contingency factors are important as they relate to the quality of accounting information disclosed by Brazilian federal universities. The study's findings indicate that higher administrative efficiency, a larger number of accounting professionals, the presence of a female rector, and better institutional governance quality positively impact the quality of disclosed accounting

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information. On the other hand, external contingency factors such as the socioeconomic development of the region's education sector and the location of the university's headquarters (capital or rural areas) appear not to influence the quality of accounting information produced by these institutions. In other words, the findings suggest that the surrounding environment does not have a significant impact on the quality of accounting information, while the internal environment, from the perspective analyzed, does.

By revealing the determinants of the quality of accounting information disclosed by Brazilian federal universities from a contingency perspective, this study enables university managers and related institutions to better understand the influence of internal and external factors on the management of educational institutions, and consequently, on the quality of accounting information disclosure. In particular, understanding the internal factors that can influence the quality of disclosures allows pro-rectors and directors of accounting and finance to map the strengths and reinforce the necessary aspects of each institution.

These findings may also have implications for actors in the field of internal and external public administration control. Based on the results, it is recommended that actions to improve the quality of accounting information be reinforced in institutions with fewer accounting professionals, lower internal governance quality, and higher current costs per student. Additionally, efforts should focus on monitoring institutions led by male managers.

Based on the quality aspects investigated, it is recommended that actions prioritize the following areas: (I) expand the use of fair value assessment methods to increase the predictive value of information; (II) address issues identified in audit reports to reduce or eliminate reservations or qualifications regarding financial information and internal control (reliability, verifiability, and neutrality); (III) improve explanations and justifications regarding the formation of estimates (reliability and verifiability); (IV) ensure greater speed in signing and disclosing reports, including the audit opinion (timeliness).

Therefore, the study demonstrates that the quality of accounting information at federal universities is determined by internal management aspects and not by external factors. Reinforcing the centrality of organizational capabilities – such as administrative efficiency, technical structure, governance and leadership – in the production of information useful for decision-making. Thus, the study provides empirical evidence relevant to the strengthening of public administration, indicating that reinforcing internal institutional attributes is an effective way to promote greater transparency, accountability and decision-making.

This analysis is not free from limitations. Despite using a validated and widely used instrument, the measurement of the dependent variable is prone to the subjectivity inherent in qualitative methods, although an independent judgment procedure was carried out by two specialists. Additionally, although the multiple regression model used identified statistically significant relationships between some internal factors and the quality of accounting information in Brazilian federal universities, it is important to consider the explanatory power of these findings. The model presented an adjusted R^2 of 0.167, indicating that only 16.7% of the variability in the quality of accounting information can be explained by the variables included. This low predictive capacity suggests that there are other relevant factors not considered in this study, and that the results should be interpreted as indicative rather than conclusive.

Considering the evidence obtained from the research, it is critical to further explore the issues and reflections on the determinants of accounting information quality at public federal universities from other methodological perspectives or theoretical lenses. A similar approach, based on financial reports disclosed by non-federal public universities, could help reinforce or contrast the results obtained in this study. This approach could enable comparisons to be made about differences in the quality of accounting information by organizations with the same characteristics but with control exercised by subnational entities and bring new perspectives or additional ex-

planations about the determinants of the quality of accounting information reported by universities. Future studies could also take an in-depth look at universities with higher or lower quality accounting information, or even consider including moderating variables, which could provide additional explanations for the hypotheses rejected in this study.

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Author(s)	Contributions
Joelma Viviane de Paula Mendes	Conceptualization (lead); data curation (lead); formal analysis (support); investigation (lead); writing—original draft (lead).
Henrique Portulhak	Conceptualization (lead); methodology (support); project management (lead); supervision (lead); visualization (lead); writing—original draft (support); writing—review and editing (lead).
Luciana Klein	Conceptualization (lead); methodology (lead); project management (lead); supervision (support); writing—original draft (support); writing—review and editing (lead).
Patrik Donizetti Rodrigues da Silva	Data preservation (lead); formal analysis (lead); research (lead); methodology (support); visualization (lead); writing—original draft (lead).

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Estimating accounting operating performance in business sectors in Ecuador: adaptation of the CAPM Model

Estimación del rendimiento operativo contable en sectores empresariales del Ecuador: adaptación del Modelo CAPM

Iván Felipe Orellana-Osorio
Professor and researcher at Universidad del Azuay de Cuenca, Ecuador
ivano@uazuay.edu.ec
https://orcid.org/0000-0001-6279-2734
https://ror.org/037xrmj59

Luis Gabriel Pinos-Luzuriaga
Professor and researcher at Universidad del Azuay de Cuenca, Ecuador
lpinos@uazuay.edu.ec
https://orcid.org/0000-0002-3894-8652
https://ror.org/037xrmj59

Marco Antonio Reyes-Clavijo
Professor and researcher at Universidad del Azuay de Cuenca, Ecuador
mreyes@uazuay.edu.ec
https://orcid.org/0000-0001-5279-4234
https://ror.org/037xrmj59

Luis Bernardo Tonon-Ordóñez
Professor and researcher at Universidad del Azuay de Cuenca, Ecuador
ltonon@uazuay.edu.ec
https://orcid.org/0000-0003-2360-9911
https://ror.org/037xrmj59

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Abstract: in countries with economies characterized by underdeveloped financial markets and limited availability of stock market information, the traditional CAPM model presents limitations in its application, making it difficult to value companies in this environment. The objective of this research is to estimate the expected accounting operating performance for different Ecuadorian business sectors, using an adaptation of the CAPM model based on accounting data, specifically the operating return on equity (OROE). To this end, a series of historical data taken from the Superintendency of Companies, Securities and Insurance database for the period 2013-2023 was analyzed. The sample consisted of 374,340 observations. Estimates were made using the Ordinary Least Squares (OLS) method, obtaining the following results for the Required Accounting Return values, locating the minimum value of 9.69% in the Transportation and Storage sector, compared to the Arts, Entertainment and Recreation sector, which presented the maximum value of 15.16%. The work concluded that, in Ecuador, the use of accounting data and accounting Beta emerge as an alternative to traditional models. This generates a more precise way to analyze the balance between risk and return in the financial decisions of unlisted companies, providing a replicable methodology in economies with similar contexts.

Keywords: entreprise, financial resources, financial.

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Resumen: en países cuyas economías se caracterizan por mercados financieros poco desarrollados y la escasa disponibilidad de información bursátil, el modelo CAPM tradicional presenta limitaciones en su aplicación, por lo que es difícil la valoración de las empresas en este entorno. Este trabajo tuvo por objetivo estimar el rendimiento operativo contable esperado para los diferentes sectores empresariales ecuatorianos, utilizando una adaptación del modelo CAPM basada en datos contables, especialmente en el rendimiento operativo sobre el capital contable OROE (Operational Return on Equity). Para esto se analizó una serie de datos históricos tomados de la base de la Superintendencia de Compañías, Valores y Seguros para el periodo 2013-2023. La muestra utilizada consistió en 374 340 observaciones. Se realizaron estimaciones utilizando el método de Mínimos Cuadrados Ordinarios (MCO), se obtuvieron los siguientes resultados de los valores del Rendimiento Contable Requerido ubicando el valor mínimo de 9.69 % en el sector de Transporte y almacenamiento, en comparación con el sector de Arte, entretenimiento y recreación que presentó el valor máximo de 15.16 %. El trabajo concluyó que, en el caso de Ecuador, el uso de datos contables y el Beta contable surgen como una alternativa para los modelos tradicionales. Esto genera una forma más precisa para analizar el equilibrio entre riesgo y rendimiento en las decisiones financieras de las empresas no cotizadas, proporcionando una metodología replicable en economías con contextos similares.

Palabras clave: empresa, inversión, recursos financieros, estado financiero, tasa de rendimiento.

Introduction

Estimating the required net operating return and assessing risk in the business sector are important for financial and investment decision-making. Isaac *et al*. (2024) stated that these estimates directly influence company performance. The traditional CAPM (*Capital Asset Pricing Model)*, formulated by Sharpe (1964), Lintner (1965), and Mossin (1966), has been widely adopted in developed economies to estimate systematic risk-adjusted returns using the beta coefficient. However, its application in emerging economies, such as Ecuador, has significant limitations due to structural and contextual traits specific to these markets: limited availability of stock market data, since stock markets in developing countries tend to be poorly consolidated and highly volatile; the risk-free rate (RFR) is not representative, as the CAPM uses the inflation-adjusted yield on US Treasury bonds as the RFR, which does not reflect the political, economic, and social conditions of emerging countries; and there are methodological differences between accounting and financial data, since the expected market return in the CAPM is based on continuous variation in stock market prices, while accounting data is annual and related to business operations, not financial speculation. Vélez-Pareja (2002) stated that the CAPM model is inconsistent with reality for unlisted companies in developing countries.

An alternative to the use of CAPM in developing economies is accounting beta coefficients, which measure the relationship between net accounting operating returns and system patterns that affect a group of companies defined as a market. In the work of Menéndez *et al.* (2008), a link was described between the beta coefficient and the financial risk indicators known as *Accounting Risk Measures* (ARMs). For their part, Gambi *et al.* (2014) pointed out that an accounting beta coefficient could also be an estimator of a company's market beta. The correspondence between the two types of beta coefficients suggests a relevant theoretical integration between financial data and market information. This methodological transposition facilitates the application of financial models to accounting data, enriching the set of tools available to analysts and scholars in company valuation. Furthermore, Hill and Stone (1980) confirmed that there is a functional equivalence relationship between accounting beta coefficients and their market counterparts, based primarily on the fact that the financial results documented in accounting are considered to be the result of a probabilistic process whose fundamental architecture is comparable to that which determines and shapes the returns that stocks generate in the stock markets.

This research is based on academic interest in accounting beta coefficients and their relationship with risk-adjusted returns. Vivanco (2017) highlighted that the beta coefficient is a substantial indicator of the risk assumed in investment decisions, while recent studies, such as Rutkowska *et al.* (2024), have shown that accounting data-based approaches offer promising results for identifying systematic risks in emerging markets. Isaac *et al.* (2021) emphasized that accounting information has useful qualities for financial analysis in scenarios with stock market data limitations. Thus, the functional analogy between accounting betas and

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market betas is not merely a theoretical parallel, but an operational tool that significantly broadens the horizon of contemporary financial analysis.

The main objective of this study is to estimate the required accounting operating return for sectors of the Ecuadorian economy using an adapted CAPM model with accounting data, using Net *Operating Return on Equity* (OROE) as the key variable. The study thus proposes a methodology that can be replicated for other emerging markets with characteristics similar to the case study. For this purpose, 374,340 observations from the database of the Superintendency of Companies, Securities, and Insurance (SCVS) (2024) were used, covering the period from 2013 to 2023. The estimates were obtained by applying the Ordinary Least Squares (OLS) method.

The beta coefficients obtained from accounting information represent a solid option for estimating systematic risk in contexts where stock markets lack depth. The application of the OROE model proposed in this study, based on company financial data, allows for the establishment of a replicable methodology for analyzing investments and managing risks effectively within different economic sectors in Ecuador. These accounting coefficients thus become key references for guiding financial decisions and identifying investment opportunities in scenarios with limited access to market information.

This article is organized into sections. Following the introduction, which contextualizes the problem and justifies the use of accounting beta coefficients in underdeveloped markets, a literature review is presented, consisting of a theoretical framework and state-of-the-art. This section reviews the fundamentals of the OROE model and its relationship to the measurement of systematic risk. The methodology describes the approach used to calculate the coefficients based on accounting information. The following section presents the results applied to Ecuadorian economic sectors, and finally, the conclusions highlight the implications for financial evaluation and possible lines of future research.

Literature review

Theoretical framework

Financial risks represent the probability that the returns obtained from an investment will differ from those expected (Gitman and Zutter, 2016). Compensation for the risk assumed is defined as return; in this sense, the greater the risk, the greater the compensation should be (Orellana *et al.*, 2020). Return on equity (ROE) measures the profit obtained by common shareholders' investment in the company (Caicedo, 2022). Another indicator used is return on assets (ROA), which shows the asset's ability to generate profits without depending on the financing method used (Isaac *et al.*, 2021).

The capital asset pricing model (CAPM), developed by Sharpe (1964), Lintner (1965), and Mossin (1966), establishes that asset returns are a linear function of their equivalent systematic risk, measured by the beta coefficient (Aguilar, 2017). This coefficient is the slope of the regression line that models the returns on securities over the market risk premium (Bedoui and BenMabrouk, 2017; Sarmiento and Sadeghi, 2014). The beta coefficient is a fundamental component of the CAPM model; the values it adopts indicate the company's sensitivity to the market and are determined by measuring variations in the company's returns in relation to changes in market earnings (Támara *et al.*, 2017).

The calculation of the leveraged beta coefficient is based on the relationship between the covariance of market returns and an asset's returns and the variance of market returns (Isaac *et al.*, 2024; Zainul *et al.*, 2021), which can be presented mathematically as a measure of systematic risk adjusted for financial leverage, represented in equation 1:

$$\beta_i = \frac{COV\,(R_i, R_m)}{VAR(R_m)} \qquad (1)$$

Where:

- β_i = Beta of the asset or company.
- $COV\ (R_i R_m)$ = Covariance of asset returns against market returns.
- $VAR(R_m)$ = Variance of market returns.

Valverde and Caicedo (2020) indicated that the results of the beta coefficient show the volatility of the asset relative to the market. It is worth mentioning that, according to Phuoc *et al*. (2018), the OLS method is also commonly used to calculate the beta coefficient (assuming a normal distribution of securities returns). On the other hand, to determine the unlevered beta coefficient, Hamada's (1972) formula and Rubinstein's (1976) adjusted formula are used, as shown in equation 2:

$$\beta_u = \frac{\beta_L}{[1+(1-T)(D/E)]} \qquad (2)$$

Where:

- β_u = Unlevered beta.
- β_L = Beta of the company's leveraged capital.
- T = Tax rate.
- D= Book value of total debt.
- E = Book value of net equity.

Accounting Beta Coefficients

In recent years, interest in studying accounting beta coefficients and their relationship to risk-adjusted returns has grown considerably. The concept of accounting beta was proposed by Gonedes (1973), who measured the sensitivity of a company's accounting return to the average accounting return of the market (Mellado *et al.*, 2011). According to Vélez-Pareja and Tham (2012), for accounting values to be close to market values, they should have been adjusted for inflation or asset values should have been revalued. According to López-Dumrauf (2006), if the correlation between the market beta coefficient and the accounting beta is significant, the accounting beta could be considered a representation of the market beta coefficient.

Accounting beta coefficients are used in emerging economies where there are limitations to traditional calculation, such as few stock market transactions, high volatility, lack of statistical data (Poquechoque, 2020; Isaac *et al.*, 2021), or in companies that do not have historical data on their share prices (Támara *et al*., 2017). Accounting beta coefficients can therefore be considered another way of determining the risk of a privately held company (Reyes-Clavijo *et al*., 2023).

Accounting return can be measured using accounting profit (either operating or net), ROE, ROA, or another similar indicator. Market return can be average ROA or ROE. The key benefit of the accounting beta coefficient lies in the greater availability of financial information compared to stock market data. Even in unlisted companies, accounting records are accessible and theoretically allow for the calculation of a systematic risk indicator analogous to that used for listed companies (Russo, 2011).

The financial literature suggests that the expected return on an asset depends on a TLR that compensates the investor for the delay in consumption over time and for the loss of purchasing power, and on a premium linked to the business and financial risks of the investment. This premium is determined by the amount of risk assumed by the investor multiplied by the price of each unit of risk (Rutkowska *et al*., 2024). This relationship, well known in finance and described by the CAPM model, can be expressed by equation 3:

$$R_j = R_f + \beta j\ (R_m - R_f) \qquad (3)$$

State-of-the-art

Beaver *et al.* (1970) argued that accounting figures are integrated into the systematic risk of publicly traded companies. In their analysis, they considered financial ratios such as dividend payments, business growth, financial leverage, and earnings variability as relevant factors explaining this risk. Watts and Zimmerman (1986) argued that it is feasible to calculate a beta coefficient using accounting data for unlisted companies.

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Arcas (1991) studied systematic risk and its relationship with accounting variables for a sample of Spanish banks. The beta coefficient calculated with accounting ratios is a measure of market risk and can be a good approximation of systematic risk. It was concluded that the accounting variables related to market risk were the variability of returns and dividends.

Azofra *et al.* (1997) analyzed the risk of Spanish industries using panel data with 17 financial ratios. It was stated that the accounting data reflect important events for the company that are also reflected in the behavior of stock market prices. It was determined that the factors that most influence systematic risk are operational flexibility, asset size, and leverage, both financial and operational.

On the other hand, Isaac *et al*. (2021), in a study applied to Colombian companies, determined that CAPM results based on beta coefficients calculated with ROA showed positive results for all companies, while CAPM based on beta coefficients calculated with ROE reported uneven returns. This research highlighted that the accounting beta coefficient is a reliable measure of risk and emphasizes the importance of having accounting information that complies with international standards to obtain an effective analysis.

The study by Rutkowska and Markowski (2022) asserted that ROE-based beta coefficients focus on the return on equity for shareholders, while ROA-based beta coefficients measure overall operating efficiency. In addition, capital structure may affect ROE more than ROA. Empirical studies show differences in the results obtained with each method.

Within this context, most studies on accounting beta coefficients focus on advanced economies, leaving a gap in research on their application in emerging markets. These markets have unique characteristics, such as lower market capitalization and high volatility, which can affect the estimation of the beta coefficient. In this sense, the lack of studies limits our understanding of how accounting beta coefficients can be used effectively in these environments (Martínez *et al.*, 2014).

On the other hand, Poquechoque (2020) points out that there are few studies that address the extrapolation of accounting beta coefficients to unlisted companies, which highlights the need for a more in-depth analysis of how to apply the accounting beta coefficients of listed companies to those that are not on the market, especially in contexts where information is scarce. Another area that has been little explored in the estimation of the accounting beta coefficient is related to the impact of non-accounting factors, such as macroeconomic changes or industry-specific events, and their influence on the relationship between accounting and market performance. It has been established that the environment can make a difference, with the economic context and specific industry characteristics influencing the validity of the beta coefficient as a predictor of performance (De Sousa, 2013).

Associated with these factors, further research is also needed on the influence of financial leverage on the estimation of accounting beta, given that ROE and ROA may be affected by the company's leverage. Current research gaps in accounting beta coefficients highlight important areas of improvement in their study, thereby increasing their usefulness in asset valuation and risk management. It is necessary to evaluate the robustness of the results obtained using these coefficients, which includes verifying the effectiveness of the methods used and ensuring that the results are consistent across different times and market conditions (Martínez *et al.*, 2014).

Regarding the methodologies used to calculate beta coefficients, there are technical approaches such as linear regression (Poquechoque, 2020); Ordinary Least Squares (OLS), analysis of variance, and correlation, which are used to analyze the relationship between Beta and other variables (De Sousa, 2013); and alternative models, such as the Downside CAPM (D-CAPM), which adapts the traditional CAPM approach to show investor behavior in highly volatile markets. Similarly, there are qualitative methods for estimating beta, such as the Noderfelase method, the Martillo method, and

the Nadeflex method (Poquechoque, 2020). The methodologies for calculating accounting and market beta coefficients differ significantly in their approach and results. The selection of the appropriate method is conditioned by the context of the company and the market landscape in which it operates. As mentioned above, although various methodologies have been proposed for calculating the accounting beta coefficient, there is still a gap in the systematic comparison of these methodologies (Támara *et al.*, 2017).

Table 1 summarizes the relationship between systematic risk and accounting data.

Table 1
Studies on the relationship between systematic risk and accounting data

Authors	Results
Logue and Merville (1972)	Systematic risk is conditioned by financial indicators.
Hamada (1972)	The corporate beta coefficient is calculated based on market beta, debt, and market value.
Pettit and Westerfield (1972)	There is a correlation between cash flow betas and market betas.
Gonedes (1973)	A relationship was detected between market risk and risk based on accounting data.
Breen and Lerner (1973)	Systematic risk is related to indicators of indebtedness, earnings growth, size, and dividend distribution.
Melicher (1974)	Systematic risk is related to a set of financial ratios.
Beaver and Manegold (1975)	Approximately 20% of the variation in the market beta coefficient is explained by accounting betas.
Bildersee (1975)	Relationship between systematic risk and ratios of profitability, cash flow/debt, coverage, and size.
Thompson (1976)	Accounting beta-based models are better at explaining differences in market risk.
Bowman (1979)	There is a relationship between leverage and accounting beta.
Hill and Stone (1980)	Changes in both debt structure and operational risk play an important role in the configuration and evolution of market betas.
Elgers (1980)	Relationship between systematic risk and leverage, size, return variability, and accounting beta.
Mandelker and Rhee (1984)	There is a relationship between financial and operational leverage and market betas.
Karels and Sackley (1993)	Detected a consistent relationship between the accounting beta coefficient and the market beta.

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Ball *et al*. (1993)	Accounting profit can be an indicator of market risk.
Laveren *et al*. (1997)	Accounting variables can estimate leveraged or unleveraged market betas.
Brimble and Hodgson (2007)	There is a strong association between operating and growth variables and accounting betas.
Ecker *et al*. (2009)	Accounting variables had greater explanatory power for the cost of equity capital of companies in environments with low amounts of information.

Nota. Adapted from Azofra *et al*. (1997) and Gambi *et al*. (2014).

Materials and method

The study considered 544,308 observations that presented financial statements on the SCVS website (2024) from 2013 to 2023, which was the last year of available records. For greater consistency and objectivity in the results, inactive companies, i.e., companies that did not report operating income, were not considered. In addition, outliers were removed from the financial indicators used in the analysis, according to limits established by quartiles in a box plot (Madrid *et al*., 2022), according to equations 4 and 5. Where Q3 is the third quartile, Q1 is the first quartile, and Q3-Q1 is the interquartile range. After the data cleansing, 374,340 observations remained.

$$\text{Upper outlier} > Q3+1.5\,(Q3-Q1) \quad (4)$$

$$\text{Lower outlier} > Q1-1.5\,(Q3-Q1) \quad (5)$$

Equation 6 presents the classic CAPM model, which is considered the basis for the proposed model. This formula indicates the risk-return relationship required by investors for an asset "i," based on historical data on the return on its shares and the stock market index.

$$E(R_i) = R_f + \beta_i * (E\,(R_m) - R_f) \quad (6)$$

Where:

- $E(R_i)$ = Return required by investors on asset i.
- R_f = Risk-free rate.
- β_i = Beta coefficient of the sector.
- $(E(R_m)$ = Average market return.

However, in the Ecuadorian context, the returns generated by corporate shares and stock market indicators lack statistical relevance and economic representativeness. To overcome this methodological limitation, an alternative approach is proposed using accounting information, specifically the operative return on equity (OROE) indicator, which allows the balance between risk and return to be quantified from an operational perspective based on financial statements. This calculation is formalized in equation 7, offering a metric adapted to the traits of companies in emerging economies with underdeveloped capital markets.

$$OROE = \frac{Operative\ return\ without\ taxes_t}{Equity_{t-1}} \quad (7)$$

In this sense, the risk-return equation set out in equation 6 is expressed as follows:

$$RCR_i = R_{fc} + \beta c_i * (R_{mc} - R_{fc}) \quad (8)$$

Where:

- RCR_i = Accounting return required by investors in asset i, which is the.
- R_{fc} = Accounting risk-free rate, or accounting operating rate of return before taxes at which one can invest without risk
- βc_i = Accounting beta coefficient of the sector.
- R_{mc} = Average market accounting return, which is the market's.

To estimate equation 8, the following steps were taken:

1. Estimate the accounting beta coefficient.
2. Determine the TLR and the systematic risk premium.
3. Calculate the required accounting return set out in equation 8.

To comply with the first step, with a set of time series data, the OLS estimation method was used, in which each sector was related to R_{mc} through regression.

$$RCR_i = \widehat{\beta_0} \pm (R_{mc}) + \widehat{u_i} \quad (9)$$

The Beta coefficient $(\widehat{\beta_{ci}})$ (measures the relationship between the return on an asset (sector) and the market return; a sector is considered risky when the calculated Beta is greater than one. Authors such as Rutkowska (2022) propose accounting Beta coefficients as measures of sensitivity to market risk, using ROA and ROE. Graphically, equation 9 is referred to as the accounting characteristic line equation.

The second point was a regression between the estimated accounting Beta coefficient from equation 9 $(\widehat{\beta_{ci}})$ and the required accounting return for each sector (18 sectors). This regression was used to estimate the risk-free return of the Ecuadorian economy (*Rfc*) and the market risk premium (*E*(*Rmc*) - *Rfc*). It is worth mentioning that R*(fc)* is an accounting operating return rate that can be invested without risk. Finally, with all the parameters of equation 8, the Required Accounting Return for each sector was estimated.

It should be noted that the OLS method must meet certain important assumptions for its estimators to be efficient and unbiased (Wooldridge, 2016). In this sense, it is required that there be linearity in the parameters; fixed values of the independent variable and that it is not correlated with the error term *cov(X(i),u(i))*= 0; the mean error is equal to zero, E(u*(i)*/ *X(i)*)= 0; Homocedasticity, *var*(u*(i)*)= σ(2) ;no autocorrelation cov(u*(i)* ,*u(j)* /*X(i)* ,*X(j)*)= 0, and the number of observations must be greater than the number of parameters to be estimated (Gujarati and Porter, 2009).

Finally, two aspects should be emphasized: the first has to do with the hypothesis tests performed to verify compliance with the OLS assumptions, as well as the individual and overall significance of the model, using a significance level of 0.05. The second is that in the regression proposed in equation 9, the coefficients of determination were obtained, which determine the level of explanatory power of market performance on the performance of the sector analyzed.

Results

As a first step, the accounting beta coefficients were estimated using equation 9, through the OLS method. The results are shown below:

Table 2

Beta coefficient of the corporate sector in Ecuador, according to the National Classification of Economic Activities of the National Institute of Statistics and Census (2012)

ISIC	Description	Beta	R2	*	**	***
A	Agriculture, livestock, forestry, and fishing.	1.11	0.93	yes	no	yes
B	Mining and quarrying.	0.82	0.95	no	no	yes
C	Manufacturing industries.	0.99	0.97	no	no	yes
D	Supply of electricity, gas, steam, and air conditioning.	0.79	0.88	no	no	yes

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E	Water distribution, sewerage, waste management, and sanitation activities.	0.98	0.80	no	no	yes
F	Construction.	1.26	0.95	no	no	yes
G	Wholesale and retail trade; repair of motor vehicles and motorcycles.	1.02	0.97	no	no	yes
H	Transportation and storage.	0.61	0.93	no	no	yes
I	Accommodation and food service activities.	0.95	0.78	no	no	yes
J	Information and communication.	0.95	0.89	yes	no	yes
K	Financial and insurance activities.	0.77	0.83	no	no	yes
L	Real estate activities.	0.76	0.89	yes	no	yes
M	Professional, scientific, and technical activities.	1.04	0.89	no	no	yes
N	Administrative and support service activities.	0.99	0.94	no	no	yes
P	Teaching.	1.04	0.94	no	no	yes
Q	Human health and social work activities.	1.29	0.89	no	no	yes
R	Arts, entertainment, and recreation.	1.39	0.76	no	no	yes
S	Other service activities.	1.22	0.81	no	no	yes

Note. * Heteroscedasticity ** Autocorrelation *** Normality in residuals

The estimates show sectors R, Q, and F as having the highest risk, each with an accounting beta coefficient of 1.39, 1.29, and 1.26, respectively. However, the sectors with the lowest level of risk are H, L, and K, each with a beta coefficient of 0.61, 0.76, and 0.77, respectively.

It should be noted that for estimating the accounting characteristic line for each sector, market performance was statistically significant in all cases presented in Table 2, with a significant level of 0.05, and its level of explanation for the variation in accounting performance in each sector was relatively high in all cases.

As mentioned above, for the Ecuadorian economy, the method used to estimate the beta of the sectors was the OLS method, so that if these assumptions are not met, the estimates are no longer the best. For this reason, Table 2 shows the verification of these assumptions for the estimates made. It should be noted that tests were performed for heteroscedasticity (Breusch, Pagan, Godfrey), autocorrelation (Breusch, Godfrey), and normality of residuals (Jarque, Bera). In all cases, the assumption of normality in the residuals and no autocorrelation was verified, however, three of the sectors analyzed show heteroscedasticity.

A regression was performed between the average market return and the estimated beta coefficients in Table 2, using the OLS estimation method. The results were:

Table 3
Statistical indicators

	Coefficients	Standard error	T-statistic	Probability
Intercept	0.0543	0.0260	2.0829	0.0527
Beta	0.0683	0.0261	2.6149	0.0181

The equation is:

$$E(RC_i) = 0.0542 + Bc_i * 0.0683 + \hat{u}_i \qquad (10)$$

The results of equation 10 show that the TLR for the Ecuadorian economy, in the period studied, was 5.42% and the market risk premium was 6.83%. The estimated model was verified for homoscedasticity, non-autocorrelation, and normality of residuals using the Breusch, Pagan, Godfrey; Breusch and Godfrey; and Jarque, Bera tests, respectively.

Once all the components of equation 10 had been estimated, the required accounting return was calculated (see Figure 1):

Figure 1
Required accounting return (RCR) of the corporate sector in Ecuador

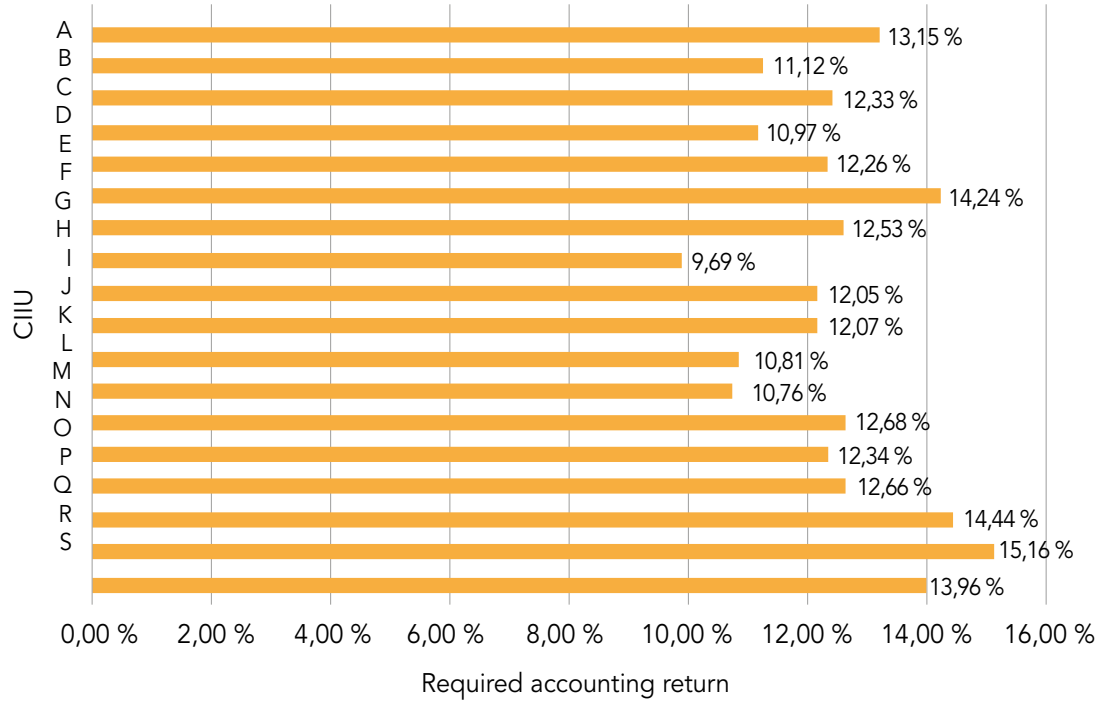

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Figure 1 confirms the results of the accounting beta coefficients shown in Table 2, which show that sectors R, Q, and F are the riskiest and, therefore, are the sectors with the highest required returns: 15.16%, 14.44%, and 14.24%, respectively.

To verify whether companies in a sector add or destroy value, the estimated required accounting return must be compared with the observed accounting return for each sector. If the estimated required accounting return is greater than the observed required accounting return, the sector destroys value; otherwise, it adds value.

For 2023, Table 4 shows the list of sectors that add and destroy value. It can be seen that 3 of the 18 sectors (A, L, and R) obtained returns below the required return.

Table 4

Required accounting return vs. average return of the corporate sector in Ecuador

CIIU	RCR	OROE 2023	Value
A	13.15 %	13.10 %	Destroys value
B	11.12 %	13.06 %	Adds value
C	12.33 %	18.31 %	Adds value
D	10.97 %	16.35 %	Adds value
E	12.26 %	12.49 %	Adds value
F	14.24 %	15.36 %	Adds value
G	12.53 %	20.37 %	Adds value
H	9.69 %	17.26 %	Adds value
I	12.05 %	19.64 %	Adds value
J	12.07 %	22.21 %	Adds value
K	10.81 %	19.50 %	Adds value
L	10.76 %	9.28 %	Destroys value
M	12.68 %	19.32 %	Adds value
N	12.34 %	18.94 %	Adds value
P	12.66 %	22.53 %	Adds value
Q	14.44 %	23.02 %	Adds value
R	15.16 %	14.62 %	Destroys value
S	13.96 %	26.12 %	Adds value

Given the limitations outlined above, Sharpe (1964), Lintner (1965), and Mossin (1966) proposed the traditional CAPM model, which is applicable to countries with developed capital markets. An alternative model is proposed that uses accounting beta coefficients to estimate the required accounting operating return (OROE). This approach is based on the relationship between net accounting operating returns and system patterns that affect a group of companies defined as a market. Authors such as Vélez-Pareja (2002), Menéndez *et al.* (2008), Reyes-Clavijo *et al.* (2023), among others, have highlighted that accounting beta coefficients can be a valid approximation of systematic risk in contexts where stock market data is scarce or non-existent. Furthermore, recent

studies such as that by Rutkowska *et al.* (2024) have shown that accounting-based approaches offer promising results for identifying systematic risks in emerging markets.

Unlike the studies by Sharpe (1964), Lintner (1965), Bedoui and BenMabrouk (2017), Sarmiento and Sadeghi (2014), among others, which propose estimating the beta coefficient and obtaining the minimum required return using information on stock returns, this research proposes the use of a CAPM adapted with accounting data, where, instead of using stock market returns as the main input, operating return on equity was used, which allows the balance between risk and return to be quantified from an operational perspective based on financial statements. The accounting approach is used by authors such as Gonedes (1973), Mellado *et al.* (2011), Velez-Pareja and Tham (2012), Poquechoque (2020), Isaac *et al.* (2021), Faiteh and Aasri (2022), and Reyes-Clavijo *et al.* (2023). Additionally, Vos (1992) and Russo (2011) put forward key arguments for understanding the limitations of accounting betas in unlisted companies for capturing risk, such as: a) the companies in the analysis tend to concentrate their operations without asset diversification strategies, b) the absence of an active secondary market hinders the objective valuation of their holdings, and c) the financial statements and financial of these firms often lack rigorous audits, which affects the accuracy of performance indicators.

Regarding performance metrics, this study used operating return on equity (OROE), which only considers returns due to the operation of companies. However, Támara *et al*. (2017) mentioned that ROA is not directly affected by the corporate capital structure, since it measures operational efficiency without considering the source of financing of the assets, whether debt or equity. On the other hand, ROE can be considerably influenced by this structure, where it should be considered that a high degree of financial leverage can raise ROE, but also increases the financial risk inherent in the company (Poquechoque, 2020).

Finally, to estimate the components of the minimum required return, in this study the value of the TLR was obtained through an OLS estimate, where the regression intercept represents 5.43%. The rate will vary according to the estimation methods or their deduction. For example, Reyes-Clavijo *et al*. (2023) do so through the central bank's reference passive rate, which was 5.04%. Other authors propose the use of the US Treasury bill rate and 10- and 20-year bonds.

Regarding the beta coefficient, Poquechoque (2020) and Reyes-Clavijo *et al*. (2023) align with the methodology proposed in this article. The results show that the OCA assumptions are met in most of the sectors analyzed.s.

Conclusions

The traditional CAPM model is not applicable for estimating the required accounting operating return in emerging economies due to its methodological and contextual limitations. For this reason, this model has been adapted to the Ecuadorian reality, where the required accounting return for the country's different industries is estimated.

Accounting beta coefficients represent a viable alternative for measuring systematic risk using data available in markets with shallow stock exchanges. The implementation of the OROE model based on accounting data offers a replicable methodology for evaluating investments and managing risks in Ecuadorian economic sectors. The adjustment was made using operating returns on equity (OROE) instead of returns on equity (ROE) and returns on assets (ROA). In this sense, the beta coefficient for each market, the average market return, and the TLR are obtained using OROE. This adaptation proves to be a viable alternative for estimating the required return in a market with limited stock market information such as Ecuador. This approach overcomes the limitations of traditional methods in emerging economies with underdeveloped stock markets.

The analysis revealed that sectors R, Q, and F have the highest accounting beta coefficients, indicating a higher level of risk compared to the market in general. Consequently, these sectors also show the highest required accounting returns. On the other hand, sectors H, L, and K exhibited the lowest beta coefficients, suggesting a

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lower level of relative risk. This translates into more moderate required accounting returns for these sectors.

The study estimated an accounting TLR of 5.42% for the Ecuadorian economy, along with a market risk premium of 6.83%. These values provide important benchmarks for investment evaluation and financial decision-making in the Ecuadorian context. When comparing required accounting returns with observed returns, it was found that most sectors (15 out of 18) managed to add value in 2023. However, sectors A, L, and R obtained returns below those required, indicating a destruction of value in that period.

The results obtained provide a valuable tool for investors, managers, and regulators in the Ecuadorian context. Estimating the required accounting return by sector allows for a more accurate assessment of risk and potential return, facilitating informed decision-making regarding investment and resource allocation. This approach contributes significantly to the understanding of risk and return in the Ecuadorian corporate sector, offering financial tools adapted to the specific characteristics of its economy and providing a valuable perspective for financial decision-making in an emerging market context, broadening the horizon of contemporary financial analysis.

Despite the valuable findings proposed by the authors, it is necessary to recognize limitations and work on some methodological aspects. On the one hand, this research has been based solely on time series, which makes it difficult to capture the individual heterogeneity of the companies or sectors analyzed. This also reduces the amount of data used in the estimates. Furthermore, a key variable within financial risk-return models could be the way in which economic agents form their expectations and how these affect the required return.

For future research, this implies working with dynamic models. In this regard, for future research, we propose the use of dynamic panel data for estimates of beta, TLR, market risk premium, and the role of economic agents' expectations. This could correct endogeneity problems and control for unobservable fixed effects.

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Author(s)	Contributions
Iván Felipe Orellana Osorio	Conceptualization, formal analysis, research, project management, supervision, writing. Original draft, writing. Review and editing.
Luis Gabriel Pinos Luzuriaga	Conceptualization, research, data curation, methodology, writing. Original draft, writing.
Marco Antonio Reyes Clavijo	Conceptualization, research, data curation, writing. Original draft, writing.
Luis Bernardo Tonon Ordóñez	Conceptualization, research. Original draft, writing. Review and editing.

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University entrepreneurship in Colombia: family support, entrepreneurial persistence and performance

El emprendimiento universitario en Colombia desde el apoyo familiar, persistencia emprendedora y desempeño

Edgar Julián Gálvez-Albarracín
Professor and researcher at Universidad del Valle, Colombia
edgar.galvez@correounivalle.edu.co
https://orcid.org/0000-0003-3972-2310
https://ror.org/00jb9vg53

César Arvey Granado-Mandinga
PhD student at Universidad Icesi, Colombia
cagranado@icesi.edu.co
https://orcid.org/0009-0005-8005-0271
https://ror.org/02t54e151

Juan David Peláez-León
Professor and researcher at la Universidad del Valle, Colombia
juan.d.pelaez@correounivalle.edu.co
https://orcid.org/0000-0001-8122-9920
https://ror.org/00jb9vg53

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Abstract: University entrepreneurship (UE) is gaining increasing academic and organizational attention. However, there is little research on the role of family social support (FSS) in the business performance (BP) of businesses established by students. This information gap is significant given that FSS, in its emotional (EFSS) and instrumental (IFSS) dimensions, can be strategic for the development and sustainability of these ventures. Consequently, this study aims to analyze the effect of FSS on the BP of ventures led by university students in Colombia, additionally considering the mediating role of Entrepreneurial Persistence (EP), a central quality for maintaining entrepreneurial commitment and overcoming obstacles. The study adopts a quantitative approach, using information from 1,287 student entrepreneurs covered in the GUESSS Colombia 2021 Report. Statistical processing of the data was performed using partial least squares structural equations modeling (PLS-SEM). The results indicate that FSSE and FSSI have a positive impact on BP. Likewise, it is found that the mediation of EP is more relevant when considering the emotional component of family support. It is concluded that family support plays a relevant role in the success of university entrepreneurship, which, based on close support networks, has important implications for designing educational policies and institutional programs aimed at strengthening entrepreneurship among university students.

Keywords: university entrepreneurship, entrepreneurial students, family support, entrepreneurial persistence, firm performance.

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Resumen: el emprendimiento universitario (EU) viene ganando cada vez mayor atención académica y organizacional, sin embargo, son escasas las investigaciones respecto al papel que tiene el Apoyo Social Familiar (ASF) en el Desempeño Empresarial (DE) de los negocios establecidos por estudiantes. Dicho vacío de información resulta relevante dado que el ASF en sus dimensiones emocional (ASFE) e instrumental (ASFI), puede ser estratégico para el desarrollo y sostenibilidad de estos emprendimientos. Consecuentemente este estudio tiene por objeto analizar el efecto del ASF sobre el DE de los emprendimientos liderados por estudiantes universitarios en Colombia, considerando adicionalmente el rol mediador de la Persistencia Emprendedora (PE), cualidad central para mantener el compromiso emprendedor y asumir obstáculos. El trabajo adopta entonces un enfoque cuantitativo, utilizando información de 1287 estudiantes empresarios abordados en el Informe GUESSS Colombia 2021. El procesamiento estadístico de los datos se realizó a través de ecuaciones estructurales por mínimos cuadrados parciales (PLS-SEM). Los resultados señalan que el ASFE y el ASFI inciden positivamente en el DE. Asimismo, se encuentra que la mediación de la PE es más relevante cuando se considera el componente emocional del apoyo familiar. Se concluye que el apoyo familiar tiene un papel relevante en el éxito de los emprendimientos universitarios, lo que, con base en redes de apoyo cercanas, conlleva importantes implicaciones para el diseño de políticas educativas y programas institucionales orientados a fortalecer el emprendimiento de estudiantes universitarios.

Palabras clave: emprendimiento universitario, estudiantes emprendedores, apoyo familiar, persistencia emprendedora, desempeño.

Introduction

University entrepreneurship (UE) is a field of growing interest due to its potential contribution to local progress and dynamism (Valencia-Arias *et al.*, 2022). Likewise, it is an alternative of work among university students (Romero-Parra *et al.*, 2022). In this regard, there is interest in understanding the elements that promote or facilitate the development of an entrepreneurial career as a professional option for these students, and the factors that lead to its conduction (Inoubli and Gharbi, 2024). However, little attention has been paid in the literature to strategies that promote the permanence and growth of university students' entrepreneurial initiatives (Clarysse *et al.*, 2022).

One approach to closing this gap is to analyze the factors that influence the performance (BP) of ventures. In this regard, BP can be affected by contextual or external factors (Badulescu *et al.*, 2021) and by the personal characteristics of the manager (Asghar *et al.*, 2023). At the contextual level, various studies have shown that due to the social nature of entrepreneurship, it is linked to the support ecosystem to which it belongs (Chen *et al.*, 2021), which means that the assistance it receives from this ecosystem is important (Huang, 2021). In this regard, it has been observed that the family is one of the actors with the greatest impact on the development of young managers' organizations, given their degree of dependence on the resources and support provided by their immediate environment for decision-making (Zhu *et al.*, 2021; Lingappa *et al.*, 2020; Aldrich and Cliff, 2003). In this sense, previous studies highlight how family social support (FSS) influences the BP of entrepreneurship (Lee *et al.*, 2022; De Clercq *et al.*, 2022; Powell and Eddleston, 2017).

However, this relationship has not been studied in the context of the UE, so the purpose of this research is to analyze how FSS influences the BP of ventures managed by university students, based on previous findings in other organizational contexts where its relevance has been demonstrated (Lee *et al.*, 2022; De Clercq *et al.*, 2022). Additionally, it is expected that the effect of a contextual factor such as FSS will influence entrepreneurial traits, just as it has been shown that contextual factors such as access to human, social, and financial resources significantly influence an entrepreneur's decision to persist in pursuing the development of their business (Coppens and Knockaert, 2022; Zhu *et al.*, 2021). Therefore, this study incorporates Entrepreneurial Persistence (EP) into the analysis, understood as a key personal trait of the entrepreneur for organizational survival and growth (Al Issa, 2022; Chen *et al.*, 2021), which can mediate the relationship between FSS and the BP of the venture.

To achieve this purpose, we analyze the perceptions of 1,287 university students who participated in the GUESSS Report[1] Colombia 2021 (Martins *et al.*, 2022). The results, analyzed

1 The GUESSS (Global University Entrepreneurial Spirit Students Survey - https://www.guesssurvey.org/) is a global study created and led since 2003 by the Universities of St. Gallen and Bern in Switzerland, which aims to understand the

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using partial least squares structural equation modeling (PLS-SEM), reveal the value of FSS in both the BP of the business and the persistence of the entrepreneur, which strengthens university students' determination to develop their entrepreneurial careers by improving the conditions and strategies of their businesses.

The article is structured as follows. First, the theoretical elements that support the relationships and hypotheses proposed are presented. Next, the methodology used is described. Subsequently, the results of the statistical tests are presented. Next, the results are discussed with previous studies. Finally, the conclusions, limitations, and future lines of research are presented.

Theoretical framework and hypothesis development

University Entrepreneurship (UE)

University entrepreneurship (UE), according to Valencia-Arias *et al.* (2022), is the process by which university students create and develop new businesses, generally based on research and innovation processes. This view complements that of Manzi-Puertas *et al.* (2024), who describe UE as the transformation of acquired knowledge into entrepreneurial actions that generate goods and services with the potential to create value. For Longva (2021), student entrepreneurs, unlike traditional entrepreneurs, often face greater restrictions in accessing resources and rely heavily on support networks, mentoring, and other services that facilitate their development. In addition, many of these entrepreneurs continue to develop their businesses after graduation, highlighting the importance of an adequate support ecosystem for their sustainability (Manzi-Puertas *et al.*, 2024).

Family Social Support (FSS)

Among the sources of support available to entrepreneurs, family is considered one of the most important sources of non-work-related social support, as it provides resources, norms, and values that influence the management of the venture and the development of competitive advantages (Kupangwa *et al.*, 2025; Aldrich and Cliff, 2003). This support, defined as the emotional and instrumental support that the family can provide to the entrepreneur (Xu *et al.*, 2020), is mainly addressed from two dimensions: Emotional Family Social Support (EFSS) and Instrumental Family Social Support (IFSS) (Adams *et al.*, 1996). EFSS manifests itself in behaviors that seek encouragement, understanding, and psychological support, promoting the entrepreneur's resilience and self-confidence in the face of the challenges posed by their initiative (Cogan *et al.*, 2022; Lu *et al.*, 2022). On the other hand, IFSS consists of family actions aimed at helping to solve operational problems in the business, including contributions of economic, human, intellectual, and social capital, which can be strategic in overcoming inefficiencies in the initial or growth stages of the company (Lee *et al.*, 2022; Powell and Eddleston, 2017; Edelman *et al.*, 2016).

The importance of FSS within the UE framework has been highlighted by studies that indicate that it reduces the perception of vulnerability in entrepreneurial students by offering them emotional support and resources at critical moments (Lingappa *et al.*, 2020). This family connection is more relevant for students, who often depend on these resources to start and maintain their businesses (Edelman *et al.*, 2016), as well as to receive guidance during the transition and adaptation to work and organizational environments (Marzana *et al.*, 2010).

Effect of family social support (FSS) on business performance (BP)

BP is analyzed in relation to an organization's operational capacity to efficiently use available resources to achieve its objectives, respond to the needs of its stakeholders, and ensure its longevity (Heckl and Moormann, 2010).

entrepreneurial spirit and initiative of university students. Fifty-eight countries participated in the 2021 version of the study, including 21 higher education institutions (HEIs) in Colombia.

Measuring BP is therefore important to ensure the sustainability and growth of businesses. Hence, the literature considers the analysis of financial, commercial, internal process, and organizational learning factors to obtain a holistic view of the business's performance, growth, and market share (Kaplan and Norton, 2001).

Various studies have shown that BP depends not only on the personal skills and characteristics of the manager or entrepreneur, but also on the environment in which the business takes place. Social, political, and economic contexts, as external factors, play a decisive role in the results of organizations (Badulescu *et al.*, 2021). FSS has been identified as an important element in addressing environmental uncertainties and strengthening management capabilities. This is consistent with *Social Support Resources Theory* (Hobfoll *et al.*, 1990), derived from *Resource Conservation Theory* (Hobfoll, 1989), which posits that social connections, and the tangible and intangible resources they offer, reinforce entrepreneurs' sense of belonging and competence in their activity.

In this sense, some authors find that external factors such as EFSS increase entrepreneurs' confidence in their management capabilities and the potential of their companies, facilitating the formulation of strategic plans and decision-making for the development and growth of their organizations (Lee *et al.*, 2022; Powell and Eddleston, 2017). On the other hand, several studies highlight the role of FSS in organizational sustainability within changing environments. For example, De Clercq *et al.* (2022) state that family assistance in business operations increases the chances of success in highly competitive markets. Lee *et al.* (2022) point out that FSS helps entrepreneurs and organizations adapt to environmental dynamics and cope with changes and operational challenges. Similarly, Xu *et al.* (2020) found that family assistance and participation contribute to organizational sustainability, especially in emerging economies and in general in adverse contexts, where companies face higher levels of uncertainty.

Based on the above, the following hypotheses are proposed:

$H_{1.1}$: EFSS has a positive impact on the BP of ventures managed by university students.

$H_{1.2}$: IFSS has a positive impact on the BP of ventures managed by university students.

Effect of family social support (FSS) on entrepreneurial persistence (EP)

EP is described by Caliendo *et al.* (2020) as the manifestation of the entrepreneur's commitment to the development and sustainability of their initiative, despite the existence of other alternatives, choosing to exploit and improve their skills and resources to achieve their proposed objectives. EP is an important trait of the entrepreneur for the evolution of their business, as it influences their intention to continue their initiative and persist in achieving their goals, even in difficult and uncertain contexts (Simmons *et al.*, 2023).

According to the literature, the family plays a fundamental role in the development of EP (Kar and Ahmed, 2022), influencing the entrepreneur's motivation and commitment to the advancement of their initiative (Coppens and Knockaert, 2022; Dewitt *et al.*, 2023; Li and Kang, 2025; Zhu *et al.* 2021). In line with Social Support Resources Theory (Hobfoll *et al.*, 1990), FSS contributes to increased EP by mitigating the effects of uncertainty and stress. This type of support provides protection, belonging, validation, guidance, and tangible assistance, which increases the entrepreneur's motivation, self-confidence, and resilience in the face of environmental challenges.

Thus, Saleem *et al.* (2023) argue that FSS reinforces the entrepreneur's perception of identity, acceptance, and belonging, which strengthens their dedication to the company and their ability to solve organizational problems, face adversity, and adapt to external changes. Gao *et al.* (2021) also identify EFSS as

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a critical factor in fostering the entrepreneur's determination to continue their projects, thus promoting risk-taking and strengthening their ability to overcome adversity in their venture and improving the prospects for future growth of their business.

On the other hand, Powell and Eddleston (2017) observe that IFSS influences the entrepreneur's decision to continue with their initiatives, promoting the adoption of strategies that contribute to their entrepreneurship over time. Complementarily, Cogan *et al.* (2022) find that active family participation promotes the entrepreneur's commitment to the evolution of their company.

Considering the above, the following hypotheses are proposed:

$H_{2.1}$: EFSS has a positive impact on the EP of university student entrepreneurs.

$H_{2.2}$: ISFF has a positive impact on the EP of university student entrepreneurs.

Effect of entrepreneurial persistence (EP) on business performance (BP)

Various studies have identified that internal factors such as skills, competencies, management practices, and the ability to achieve objectives determine BP. Asghar *et al.* (2023), for example, indicate that they contribute to organizational development by enhancing the ability of companies to adapt to competitive challenges, be more productive, and be sustainable in the long term. Along these lines, EP, as a factor linked to the entrepreneur's personality, influences their business performance (Adomako, 2020; Al Issa, 2022). This relationship exists because EP drives the focus and motivation necessary to achieve organizational goals, strengthening entrepreneurs' determination to overcome obstacles and continue developing their businesses. It has also been shown that entrepreneurs who persist in their projects are more likely to succeed, as such persistence favors continuous learning and the emergence of important skills for business management.

Ramanust (2020) finds that entrepreneurs with higher levels of EP perform better in the execution of core tasks, thus boosting competitiveness and organizational sustainability, especially in uncertain markets. Similarly, Chen *et al.* (2021) state that EP favors the survival of companies in competitive and dynamic environments by strengthening their determination and passion to adapt strategies that boost their competitive level. In addition, Adomako (2020) finds that entrepreneurs who persist in developing their businesses meet their organizational objectives more consistently, which translates into sustained long-term growth. This is consistent with the results obtained by de Al Issa (2022), who argues that EP improves BP and also facilitates organizational evolution, thus highlighting its importance in building successful companies.

Based on the above, the following hypothesis is proposed:

H_3: EP has a positive impact on the BP of business managed by university students.

Mediating effect of entrepreneurial persistence (EP) on the relationship between family social support (FSS) and business performance (BP)

According to the literature, entrepreneurship is influenced by family ties, as the resources and assistance they provide have a direct impact on the entrepreneur's persistence and, through this, on the results of their management (Kar and Ahmed, 2022; Zhu *et al.*, 2021). In this sense, EFSS is a key factor in shaping attitudes and achieving positive entrepreneurial outcomes. For Klyver *et al.* (2020), for example, it helps to solve problems effectively, promoting optimism, passion, and creativity, while generating greater commitment to organizational goals. Similarly, Mei *et al.* (2022) state that EFSS creates a sense of belonging and commitment in entrepreneurs, which streng-

thens their determination to overcome adversity and maintain their businesses in the long term. Furthermore, Lu *et al.* (2022) argue that EFSS provides emotional tools to overcome problems arising from business management, allowing entrepreneurs to focus on achieving their goals, which directly helps improve their organizations' BP rates.

On the other hand, IFSS also has an impact on EP and increases the chances of business success. For example, Symeonidou *et al.* (2022) and Fang *et al.* (2021) agree that family involvement in business operations strengthens entrepreneurial determination to persevere in the face of difficulties, promoting the implementation of strategies and behaviors geared toward sustainable development and long-term organizational survival.

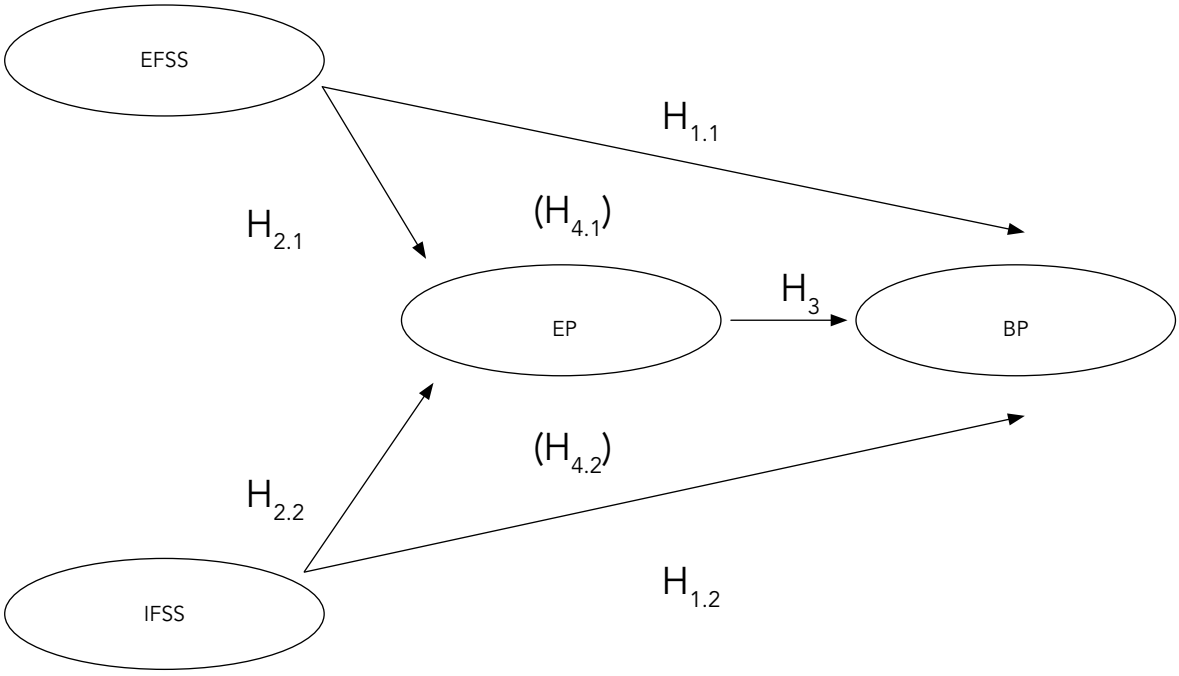
Considering that both EFSS and IFSS can strengthen EP, and that EP has in turn been directly linked to BP, it is expected that EP mediates the relationship between FSS (both EFSS and IFSS) and BP in business managed by university students. Therefore, the following hypotheses are proposed:

$H_{4.1}$: EP mediates the relationship between EFSS and BP in ventures managed by university students..

$H_{4.2}$: EP mediates the relationship between IFSS and BP in ventures managed by university students..

Figure 1 illustrates the proposed relationships and hypotheses.

Figure 1
Theoretical model



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Methodology

This research adopted a quantitative, explanatory, non-experimental, cross-sectional approach. The target population was the 2,359 university students in Colombia who participated in the GUESSS Report in 2021 (Martins *et al.*, 2022) and who, at the time of the research, had a company in operation. The study was based on a non-probabilistic sampling of a voluntary or convenience type, since the students participated voluntarily by responding to an electronic survey. This was distributed by the researchers designated at each institution, under the national coordination of the study. In total, students from 21 universities in the country participated. To form the final sample, the database was cleaned, leaving only those cases with complete data on all variables of interest, i.e., FSS, EP, and BP. The result covers 1,287 university students with at least one active business. Table 1 shows the composition of the sample by level of education, gender, and field of study.

Table 1
Sample composition

Dimension	Frequency	Percentage
Level of education		
Undergraduate	1,047	81.4
Master's	70	5.4
Doctorate	5	0.4
Other*	165	12.8
Gender		
Male	625	48.6
Female	662	51.4
Field of study		
Administrative Sciences	502	39.0
Engineering	297	23.1
Other**	488	37.9

Note. Other levels of education include technical and technological programs, MBAs, and specializations. Other fields of study include humanities, arts, and exact sciences. Prepared by the authors based on data from Martins *et al.* (2022).

Measurement scales and study variables

Based on the literature, the study variables listed in Table 2 were measured in the 2021 GUESSS Report based on the respondents' perceptions using a 1-to-7 Likert scale, where 1 was "strongly disagree" and 7 was "strongly agree."

Table 2
Systematization of variables

Constructo	Items	Description	Theoretical references
EFSS	EFSS1	When I have a work problem that affects me, my family shows concern.	Powell and Eddleston (2017)
	EFSS2	When I am upset about my business, someone in my family tries to understand me	
	ASFE3	My family members take an interest in my business	
IFSS	IFSS1	My family members often help out in my business without expecting to be paid.	Powell and Eddleston (2017)
	IFSS2	I can count on my family members to replace me and / or my employees if necessary	
	IFSS3	My family gives me useful advice about my ideas for my business	
	IFSS4	My family often goes above and beyond what is normally expected of them to help my business succeed.	
	IFSS5	My family often helps me with my business	
EP	EP1	In many complex situations, I persist in achieving my goals despite seeing others give up.	Coppens and Knockaert (2022)
	EP2	I have achieved goals that took me some time to reach.	
	EP3	I have overcome setbacks to face major challenges.	
	EP4	I always finish what I start.	
	EP5	Setbacks do not discourage me.	
BP	BP1	Sales growth	Kaplan and Norton (2001)
	BP2	Market share growth	
	BP3	Profit growth	
	BP4	Job creation	
	BP5	Innovation	

Nota. Prepared internally based on Martins *et al*. (2022).

Statistical data processing

The data obtained in the research were processed using the PLS-SEM algorithm given its power for estimating statistical models resulting from the observation of multiple compounds and trajectories that provide causal explanations (Hair *et al*., 2019). In this regard, to test the hypotheses, a measurement model based on reflective components (Mode A) was proposed, taking into account that the indicators make up the construct and, therefore, the construct is a feature that explains its indicators; the indicators represent consequences of the construct; removing an indicator alters the component and could change its meaning; and the items are mutually interchangeable.

To evaluate the model, bootstrapping was applied with 10,000 subsamples, a two-tailed test, and a significance level of 0.05. The analysis was divided into two stages: evaluation of the measurement model and the structural model,

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following the guidelines of Hair *et al.* (2019). In the first stage, external loadings, composite reliability (Cronbach's alpha and composite reliability), convergent validity (AVE), and discriminant validity (Fornell-Larcker and HTMT criteria) were verified. In the second stage, collinearity, significance of structural relationships, coefficients of determination (R^2), and predictive relevance values (Q^2) were evaluated.

Results and discussion

Evaluation of the reflective measurement model

Regarding the external loadings of the reflective measurement indicators, it can be noted that in the EFSS and IFSS constructs, all reported values above 0.708, which are considered appropriate. On the other hand, in the BP construct, the load of two items was below the critical reference value: BP4 (0.687) and BP5 (0.632), and in the EP construct, item EP4 reported a value of 0.695. However, these indicators were retained to maintain the definition of the construct, as they did not affect the degrees of reliability and convergent validity indicated by Hair *et al.* (2019) (see Table 3).

Table 3
Assessment of reliability and convergent validity of the measurement model

Construct	Item	Loadings	Cronbach's alpha	Composite reliability	Average extracted variance (AVE)
EFSS	EFSS1	0.813	0.831	0.855	0.745
	EFSS2	0.907			
	EFSS3	0.867			
IFSS	IFSS1	0.791	0.910	0.920	0.735
	IFSS2	0.828			
	IFSS3	0.843			
	IFSS4	0.915			
	IFSS5	0.904			
EP	EP1	0.777	0.823	0.832	0.585
	EP2	0.824			
	EP3	0.742			
	EP4	0.695			
	EP5	0.781			
BP	BP1	0.873	0.840	0.858	0.617
	BP2	0.841			
	BP3	0.864			
	BP4	0.687			
	BP5	0.632			

Note. External loadings > 0.708; Cronbach's α > 0.70; Composite reliability > 0.70; AVE > 0.50
Source: Own elaboration based on data from Martins *et al.* (2022).

Regarding discriminant validity, which assesses the extent to which constructs differ from each other based on the correlation between indicators, Table 4 shows that the values obtained in the HTMT matrix were lower than the critical value of 0.85, considering different the assessment of conceptually variables (Henseler *et al.*, 2015), thus showing that the indicators that make up each construct are more correlated with each other than with those of the other constructs. Therefore, the proposed model is valid and reliable for the proposed measurements.

Table 4
Evaluation of discriminant validity

	Fornell-Larcker				HTMT ratio			
	EFSS	**IFSS**	**EP**	**BP**	**EFSS**	**IFSS**	**EP**	**BP**
EFSS	0.863							
IFSS	0.624	0.858			0.695			
EP	0.331	0.327	0.765		0.384	0.373		
BP	0.394	0.457	0.390	0.786	0.457	0.514	0.464	

Note. Prepared by the authors based on data from Martins *et al.* (2022).

Evalution of the structural model

Table 5 presents the values of the construct collinearity test, which, being lower than the critical value of 3, indicates that this is not a problem in the structural model (Hair *et al.*, 2019).

Table 5
Collinearity assessment (VIF)

Construct	EFSS	IFSS	BP	EP
EFSS			1,688	1,638
IFSS			1,683	1,638
BP				
EP			1,154	
Note: VIF < 3.03				

Note. Prepared by the author based on data from Martins *et al.* (2022).

Table 6 reports the values of the direct relationships between constructs. The results suggest that EFSS has a positive and significant effect on the BP of businesses managed by university students (β=0.126; t=3.765; p<0.001). Therefore, hypothesis H1.1 is accepted. Likewise, they indicate that IFSS positively and significantly influences BP in these organizations (β=0.295; t= 9.600; p<0.001), which allows hypothesis H1.2 to be accepted. Similarly, the data indicate that EFSS (β=0.207; t= 5.648; p<0.001) and IFSS (β=0.198; t= 5.780; p<;0.001) have a positive and significant effect on the EP of businesses managed by university students, thus accepting hypotheses H2.1 and H2.2 respectively. In addition to this, they point out that EP has a positive and significant impact on the BP of their organizations (β=0.252; t= 9.540; p<;0.001), allowing hypothesis H3 to be accepted.

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Table 6
Path analysis of direct relationships

Relationship	Path coefficient	Confidence intervals		T	p	Decision
		5,0%	95,0%			
EFSS->BP	0.126	0.072	0.182	3.765	0.000***	Accepted
IFSS ->BP	0.295	0.245	0.345	9.600	0.000***	Accepted
EFSS ->EP	0.207	0.148	0.269	5.648	0.000***	Accepted
IFSS -> EP	0.198	0.141	0.253	5.780	0.000***	Accepted
EP > BP	0.252	0.208	0.296	9.540	0.000***	Accepted
Note. *p < 0.05 **p < 0.01 ***p < 0.001						

Note. Prepared by the authors based on data from Martins *et al*. (2022).

On the other hand, as illustrated in Table 7, the results indicate that in the relationship between EFSS and BP, EP exerts a significant mediating effect (β=0.052; t= 4.636; p<;0.001), and given the results of the direct effect (see Table 5) and indirect effect (see Table 6), the result suggests complementary partial mediation (Cepeda Carrión *et al.*, 2018; Hair *et al.*, 2022), as this explains part of the effect of EFSS on BP, but not all of it. Similarly, it was found that in the relationship between IFSS and BP, EP exerts a mediating effect (β=0.050; t= 4.910; p<;0.001), and taking into account the results of the direct effect (see Table 5) and indirect effect (see Table 6), a complementary partial mediation is obtained that explains part of the effect of IFSS on BP, but not all of it.

Table 7
Analysis of the mediation effects

Relationship	Effect indirect	Confidence intervals		t	p	Decision
		5,0%	95,0%			
EFSS -> EP ->BP	0.052	0.035	0.072	4.636	0.000***	Accepted
IFSS -> EP -> BP	0.050	0.034	0.067	4.910	0.000***	Accepted Partially
Note. *p < 0.05 **p < 0.01 ***p < 0.001						

Note. Prepared by the author based on data from Martins *et al*. (2022).

In addition to the information recorded in the table above, the value of the variance accounted for mediation (VAF) index was calculated to assess the strength in the case of partial mediation (Cepeda Carrión *et al.*, 2018). This index is obtained by dividing the indirect effect by the total effect, allowing us to determine the extent to which the mediation process explains the variance of the endogenous variable. Under this framework, the mediation of EP in the relationship between IFSS and BP refers to a VAF value of 0.144, which indicates weak or non-substantial mediation; therefore, hypothesis H4.2 is partially accepted. In contrast, in the relationship between EFSS and BP, the VAF index was 0.292, which is interpreted as partial mediation (Cepeda Carrión *et al.*, 2018) and, consequently, hypothesis H4.1 is accepted. Con-

sidering the complete model, the overall VAF is 0.195, which implies that, on average, 19.5% of the total effect of exogenous variables on performance is explained indirectly through EP. In this sense, EP mediation is more relevant in the emotional dimension of family support, while the effect on performance is mainly direct in the instrumental dimension.

Regarding the evaluation of the explanatory and predictive power of the model (see Table 8), the value obtained for the endogenous variable BP (=0.283) indicates that the model explains 28.3% of the variance in performance in organizations of businesses managed by university students, which is considered satisfactory for empirical studies in the social sciences. Likewise, the model has sufficient predictive power (=0.224) to lead to conclusions applicable to the rest of this type of business in Colombia that are not observed in the sample (Hair *et al.*, 2019).

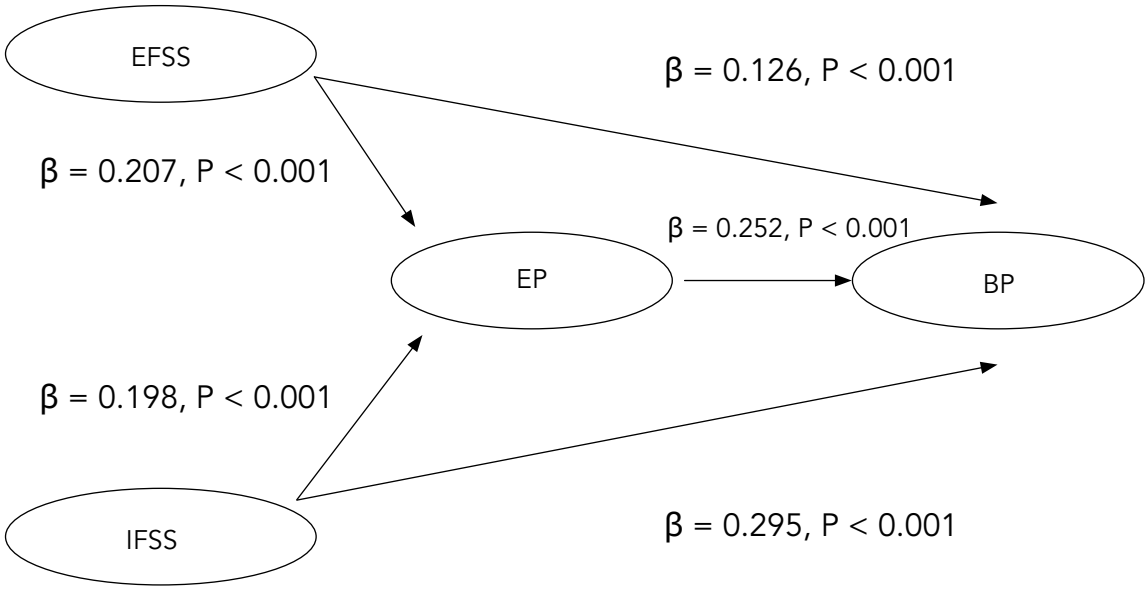
Table 8
Evaluation of the explanatory and predictive power of the model

Variable	R^2	*Adjusted* R^2	Q^2
BP	0.283	0.281	0.224
EP	0.133	0.132	0.129
Note.$R^2 > 0.10$; $Q^2 > 0$			

Note. Prepared by the author based on data from Martins *et al.* (2022).

Figure 2 graphically presents the results of the structural model.

Figure 2
Results of the structural model



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This study analyzed the impact of FSS in its emotional and instrumental dimensions, on the BP of businesses managed by university students in Colombia, also considering the mediating effect of EP in this relationship. The results confirm previous findings that highlight the positive link between the family, the entrepreneur, and the company (Adams *et al.*, 1996; Aldrich and Cliff, 2003; Zhu *et al.*, 2021; Kupangwa *et al.*, 2025). Specifically, it was observed that the EFSS provided by family members to university entrepreneurs contributes to significantly improving their performance, which is expected given the existing bond and emotional support that strengthens their confidence and resilience in the business environment (Dewitt *et al.*, 2023).

In the case of Latin America, and particularly in Colombia, this is in line with the cultural tendency to provide support in the process of adapting to work (Marzana *et al.*, 2010), allowing us to infer that as families show greater interest in students' entrepreneurial initiatives, students strengthen their skills, behaviors, and perspectives for managing their businesses and results (Li and Kang, 2025; Lee *et al.*, 2022; Powell and Eddleston, 2017).

Regarding IFSS, the results obtained indicate that family participation has a positive impact on the development of businesses led by university students. This can be explained by the favorable dependence of such initiatives on the human, social, and intellectual resources that their families can provide (Edelman *et al.*, 2016). The result is consistent with previous studies, suggesting that family support in business operations facilitates organizational adaptation and improves responsiveness to environmental dynamics, thereby promoting the development and sustainability of their organizations (Lee *et al.*, 2022; De Clercq *et al.*, 2022; Xu *et al.*, 2020).

Regarding the mediating effect of EP on the relationship between FSS and BP, the results indicate that the influence generated by FSS on EP affects BP in this type of business, thus coinciding with previous studies that suggest that part of the effect of EFSS on BP is explained by EP (Mei *et al.*, 2022; Lu *et al.*, 2022; Klyver *et al.*, 2020). Specifically, it was found that university students who receive support from their families, including a demonstration of interest and a positive attitude toward the development of their entrepreneurial initiative, strengthen their determination to develop their entrepreneurial career (Saleem *et al.*, 2023; Kar and Ahmed, 2022; Gao *et al.*, 2021) and the emergence of attitudes such as greater risk propensity in decision-making and a positive outlook on the future of the business (Al Issa, 2022; Chen *et al.*, 2021; Adomako, 2020; Ramanust, 2020).

Similarly, the results obtained are consistent with previous studies in showing that part of the effect of IFSS on BP is explained by EP (Fang *et al.*, 2021; Symeonidou *et al.*, 2022). Specifically, it is observed that if family participation or feedback in matters related to business management or operation is greater, university students will also be more committed to the development of their businesses, even in the face of difficulties (Cogan *et al.*, 2022; Powell and Eddleston, 2017).

It should be noted that the findings also allow us to distinguish important differences between the two dimensions of FSS, highlighting that mediation is more relevant in the emotional dimension, while in the instrumental dimension the effect on BP tends to be more direct. In this sense, students who perceive greater emotional support from their families are likely to develop higher levels of EP, which in turn improves the results of their businesses (Mei *et al.*, 2022; Lu *et al.*, 2022). Conversely, although practical and tangible family support directly influences BP (Lee *et al.*, 2022: Edelman *et al.*, 2016), its effect is less dependent on the entrepreneur's persistence.

Finally, the finding of a partial mediating effect of EP on the relationship between EFSS and BP suggests the need to explore other factors that may broaden the explanation of this link (Mei *et al.*, 2022; Lu *et al.*, 2022; Klyver *et al.*, 2020), inviting future studies to consider additional elements that may enrich the understanding of the family impact on the business performance of university businesses.

Conclusions

The results of this study confirm the existence of a positive and significant relationship between FSS, in its emotional (EFSS) and instrumental (IFSS) dimensions, and the BP of companies managed by university students. In addition, it was found that EP acts as a partial mediator in these relationships. However, when analyzing the values of the explained variance indices, mediation is not substantial in the case of instrumental family support but is moderately greater in the case of emotional support. In this line, the emotional support provided by the family (EFSS) is a factor that strengthens the entrepreneur's psychological processes associated with persistence, while instrumental support (IFSS) seems to influence the operational conditions of the business more directly. This distinction in the strength of relationships and in the identification of complementary partial mediation enriches the evidence and theoretical debate on the differentiated role of types of family support in entrepreneurial dynamics. It also highlights the need to delve deeper into how different types of family support differentially influence the individual and organizational mechanisms that explain entrepreneurial performance.

By reaffirming previous findings on the links between family, entrepreneur, and business, these findings contribute empirically to the literature and have practical implications for the field of management, thus underscoring the importance of the family environment for the development of businesses led by university students. In line with the above, it is recommended that students consider their families as potential strategic allies in the creation and development of their business projects, taking advantage of their support to facilitate their adaptation to market dynamics and improve their BP. In addition, it is strategic for entrepreneurs to work on developing their EP as an important factor for the management, sustainability, and long-term growth of their businesses and initiatives in general.

On the other hand, universities, as key players in entrepreneurial ecosystems, can play a central role in strengthening these support networks, highlighting the impact that the family environment has on the sustainability of business projects. Furthermore, although these findings come from the university environment, they could be extrapolated to the field of corporate entrepreneurship or intrapreneurship, understanding that employees who lead innovative projects within organizations can also benefit from the support of their close family networks. Thus, understanding the factors that favor the emergence and consolidation of these initiatives can enrich the field of knowledge and practice of business management and contribute to the sustainability of emerging business models.

Considering the above, it is highly relevant to identify and understand the dynamics of the relationships between university students or intrapreneurs and their close networks, as well as the social and organizational factors that facilitate their consolidation and ultimately help the development and sustainability of the business. Under this orientation, lines of research applicable to both UE and organizational contexts are suggested, delving into the dynamics of the relationship between business initiatives managed, depending on the case, by university students or intrapreneurs and their families, as well as the conditions that facilitate their emergence and development. Questions such as: *How does family support influence the management and decision-making capabilities of these entrepreneurs? Or to what extent do family relationships limit or enhance the transition of entrepreneurial initiatives to sustainable business models?* could guide future studies that incorporate new variables or more integrative and longitudinal approaches.

In the same proactive line, the limitations of this study could lead to new research opportunities. First, the study only analyzed the responses of university entrepreneurs in Colombia, which makes it difficult to generalize its results to other contexts, not only geographical, but also to corporate entrepreneurship. Future research could collect and analyze data in other countries and/or in companies originating from intrapreneur-

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ship processes to obtain a broader geographical overview of the relationships studied. Second, a significant limitation is the partial acceptance of the hypothesis proposing the mediation of EP in the relationship between IFSS and performance. Future research could explore other possible mediators (such as resource management skills or the entrepreneur's educational level) that explain this relationship more deeply, or analyze the role of EP in different phases of the entrepreneurial life cycle, in order to understand at what moments and under what conditions family support translates into concrete improvements in business performance. Third, the data analyzed were collected during a period marked by the COVID-19 pandemic and social unrest in Colombia (March-July 2021), which affected "normal" business and social dynamics. Future research could analyze the proposed relationships in other contexts and time periods, even taking on the challenge of a longitudinal study. Finally, given the defined scope, differences according to sociodemographic factors that could broaden the level of understanding of the relationships analyzed, such as the level of education or gender among university entrepreneurs, were not analyzed. Sociodemographic factors of families, such as their life cycle, business experiences, degree of professionalization, occupation, or socioeconomic status, could also be considered.

Authors' conflicts of interest

The authors declare that they have no financial, professional, or personal conflicts of interest that could inappropriately influence the results obtained or the interpretations proposed.

Authors' contributions

The authors declare that each contributed significantly to aspects such as methodology, literature review, writing, and analysis, both in the research process and in the development of the article.

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Author(s)	Contributions
Edgar Julián Gálvez-Albarracín	Conceptualization, formal analysis, writing. Original draft, writing. Review and editing.
César Arvey Granado-Mandinga	Formal analysis, methodology, writing. Original draft, writing. Review and editing.
Juan David Peláez-León	Formal analysis, methodology, writing. Original draft, writing. Review and editing.

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Corporate Reputation and eWOM: exploring the moderating role of brand love on the automobile industry

Reputación corporativa y eCBO: explorando el rol moderador del amor de marca en la industria del automóvil

Mohamad Hashem
PhD student at University of Valencia, Spain and Business Developer Supervisor at Abu Khader Automotive, Jordania
mokahas@alumni.uv.es
https://orcid.org/0009-0003-1198-0315
https://ror.org/043nxc105

Muhammed S. Alnsour
Associate Professor at Al- Balqa Applied University, Jordan
m.s.alnsour@bau.edu.jo
https://orcid.org/0000-0001-5610-2506
https://ror.org/00qedmt22

Carla Ruiz-Mafe
Professor of Marketing at University of Valencia, Spain
carla.ruiz@uv.es
https://orcid.org/0000-0002-5051-868X
https://ror.org/043nxc105

Rafael Curras-Pérez
Professor of Marketing at Universidad de Valencia, Spain
rafael.curras-perez@uv.es
https://orcid.org/0000-0002-3092-8235
https://ror.org/043nxc105

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Abstract: this study analyzes the relationships between corporate reputation, customer satisfaction, customer brand engagement and electronic word of mouth (eWOM), with a particular focus on the moderating effect of brand love. The data were analyzed using structural equation modeling - partial least squares (SEM-PLS) on a sample of 317 customers who purchased automobiles during 2020-2022. Corporate reputation, mediated by satisfaction, increases customer brand engagement, which in turn drives eWOM for car brands. Brand uniqueness and perceived price fairness are robust predictors of corporate reputation. The impact of this reputation on customer satisfaction with the car dealership is weaker for customers who love the car brand purchased. This work is novel in explaining eWOM through corporate reputation, satisfaction and customer brand engagement. It also provides new insights by unveiling: (i) the negative moderating effect of brand love in the corporate reputation-satisfaction relationship (ii) the mediating effect of satisfaction in linking corporate reputation to customer brand engagement; (iii) how corporate reputation can be explained through the effects of brand uniqueness and perceived price fairness of the car dealership.

Keywords: recomendation, cars, reputation, engagement, satisfaction, brands, price, customers..

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Resumen: este estudio analiza las relaciones entre la reputación corporativa, satisfacción del cliente, compromiso con la marca y comunicación boca-oído (eCBO) con especial atención al efecto moderador del amor a la marca. El análisis de datos se realizó mediante modelos de ecuaciones estructurales con mínimos cuadrados parciales (SEM-PLS) con una muestra de 317 compradores de automóviles durante 2020-2022. La reputación corporativa, mediada por la satisfacción, aumenta el compromiso con la marca del cliente, lo que a su vez impulsa el eCBO para las marcas de automóviles. El carácter distintivo de la marca y la justicia percibida en precios son predictores robustos de la reputación corporativa. El impacto de la reputación corporativa en la satisfacción del cliente con el concesionario de automóviles es menor para los clientes que aman la marca del automóvil adquirido. Este trabajo es novedoso al explicar la eCBO a través de la reputación corporativa, la satisfacción y el compromiso de la marca del cliente. También proporciona nuevos conocimientos al revelar: (i) el papel moderador negativo del amor a la marca en la relación entre la reputación corporativa y la satisfacción (ii) el papel mediador de la satisfacción al vincular la reputación corporativa con el compromiso de la marca del cliente; (iii) cómo se puede explicar la reputación corporativa a través de los efectos del carácter distintivo de la marca y la justicia percibida en precios del concesionario.

Palabras clave: recomendación, automóviles, reputación, compromiso, satisfacción, marcas, precio, clientes.

Introduction

In the digital economy age, digital transformation is regarded as a company strategy important for competitiveness (Chen and Liao, 2024). Consequently, the increasing use of social media, with technological changes, promotes electronic word of mouth (eWOM). When looking for a car, buyers consult eWOM, which influences their purchase intentions. Positive eWOM ratings from customers can also affect their peers´ purchase decisions (Mukhopadhyay *et al*., 2023). Social media offers vast opportunities for the automobile industry. These platforms allow faster and more cost-effective information dissemination, enabling car companies to boost sales and reach revenue targets more quickly. Many marketers leverage eWOM because it comes from trusted sources (Mukhopadhyay *et al*., 2023).

A strong company reputation is decisive for achieving and maintaining competitive advantage in the automobile industry (Quintana *et al.*, 2021). Reputation is built by a company's value-creation activities: the intangibility of reputation makes it difficult for competitors to imitate. A favorable reputation has been shown to be important for achieving success in the automobile marketplace, because it has been proven to be key in clients' buying decisions (Sanchez-Iglesias *et al*., 2024).

In the automobile industry, with its high value brands, signaling theory is important. A car dealership's corporate reputation has a signaling effect on consumers' perceptions of the quality and uniqueness of the car brands it sells. These perceptions reduce pre-purchase uncertainty and influence behavioral intentions (Baumgartner *et al.*, 2022). Prospective customers regard high-value, distinctive brands as indicators of strong company management (Sanchez-Iglesias *et al*., 2024). Similarly, other players in the game, such as current clients and company staff, can also interpret these signals. Automobile customers care deeply not only about brand quality, but also about price fairness. Previous work has examined the effect of Corporate Social Responsibility (CSR) actions on consumers' perceptions of price fairness (Quintana *et al.*, 2021). The present study goes a step beyond this by analyzing the effect of perceived brand uniqueness and price fairness on corporate reputation.

The relevance of customer brand engagement (CBE) has encouraged researchers to explore its antecedents. Customer satisfaction has a complex relationship with CBE. While some studies have suggested that customer satisfaction positively affects CBE, others have indicated they have a more nuanced interaction. The suggestion has been made that cumulative customer satisfaction may not always lead to increased CBE and, indeed, in some cases, high customer engagement levels can, over time, even reduce satisfaction, which implies that the effect of customer satisfaction on CBE can vary due to extent of the engagement, the specific context and individual preferences and behaviors (Sanchez-Iglesias *et al.*, 2024)

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Considerable research has examined brand love (Gumparthi and Patra, 2020); it has been shown to be associated with (i) positive word of mouth (WOM) (ii) forgiveness of brand failures and (iii) brand loyalty. However, a critical knowledge gap remains in the understanding of the moderating effects of brand love on consumer-brand relationships.

The purpose of this study is to analyze the relationships between corporate reputation, customer satisfaction, customer brand engagement and eWOM, paying special attention to the moderating effect of brand love. This study is expected to enrich the body of knowledge of consumer-brand relationships by analyzing the effects of two crucial consumer perceptions (brand uniqueness and price fairness in business transactions) on corporate reputation. The study also adds novel insights by revealing that satisfaction has a full mediating effect on the relationships between corporate reputation and eWOM.

Literature review

Corporate reputation plays a critical role in today's dynamic and competitive business environment, serving as a key driver for long-term sustainability, market differentiation, and strong stakeholder relationships. (Mohd Sofian *et al.*, 2023). Corporate reputation is based on positive consumer perceptions of a company, especially in innovation, managerial leadership, product and service quality and image (Osakwe and Yusuf, 2021). Sales forces/managers should exhibit a range of fundamental values, such as honesty, responsibility, fairness, respect, openness and good citizenship. Company personnel should be seen to be worthy of trust and to be providing good advice. Moreover, corporate reputation is fundamental to a company's success and significantly influences various facets of its operations and results (Nuortimo *et al*., 2024). Corporate reputation has a signaling effect which helps increase customer trust-based relationships. Through these relationships, corporate reputation contributes to increased trustworthiness and the integrity of exchanges (Oghazi *et al*., 2021). Companies that are transparent and open with their consumers and stakeholders about their dedication to sustainable and fair business practices are more likely to build trust and cultivate lasting partnerships (Loke and Chamlal, 2025). A company´s reputation is based on customers' opinions on a range of issues/behaviors, for example, how it operates in the labor, capital and product markets. In this study we analyze general corporate reputation rather than any one dimension of corporate reputation, such as environmental activities, to address the halo effect, a cognition-based bias in which consumers´ perceptions of how a company operates in one field impact on their opinions about the entity in other areas. We regard the corporate reputation of a car dealership as the aggregated perceptions of all its customers in terms of whether it is honest, competent and concerned about its customers.

Hollebeek *et al.* (2014) defined CBE as "a consumer's positively-valenced cognitive, emotional and behavioral brand-related activity during or related to specific consumer–brand interactions" (Hollebeek *et al.*, 2014, p.154).This study adopts Hollebeek *et al.* (2014) approach, that is, we take: the cognitive dimension of CBE as being the client's degree of car brand-based thought processing developed due to his/her exchanges with the car dealerhip; the affective dimension of CBE reflects the positive emotions a client experiences toward the car brand, shaped by their interactions with the salesperson. Meanwhile, the behavioral dimension represents the effort, energy, and time the client invests in engaging with the brand throughout their journey.

Hypotheses development

Perceived brand uniqueness has been described as those brand-related aspects which distinguish one brand from another (Dwivedi *et al*., 2018). This reflects the "differentness" of a brand and its salience, such that it is readily recognized/comes to mind, when compared to competitors. Perceived uniqueness relates to the analysis-based data (signals) that distinguish a brand from its competitors; it lessens the client´s cognitive burden.

Corporate reputation is based on consumers´ judgments of a company´s attributes which, of course, shape the esteem in which they hold the company. Syah and Olivia (2022) argued that product/service quality and interactional experiences are key shapers of consumers´ views of a company´s reputation. In the present study it is argued that consumers´ perceptions of a car brand´s uniqueness can improve the corporate reputation of the car dealership. The basis for this argument is that brand uniqueness offers potential client's analytical information about a brand´s attributes and evokes positive consumption emotions which reduce their cognitive burden when assessing corporate reputation, which can generate a positive assessment of the company. Thus,

H_1: The perception of customers' brand uniqueness increases the corporate reputation of the car dealership.

Perceived price fairness is a vital component for any service provider delivering its product/service to the automotive industry's target market; consumers are ever more interested in enhanced value-for-money (Gupta and Raman, 2022).

The influence of price fairness on corporate reputation can be grounded on attribution theory (Weiner, 2018), which examines consumers' cognition-based processing when making cause and effect judgments. Perceived price fairness influences consumers´ behaviors. Consumers are inclined to respond make favorable purchase decisions when prices are perceived as fair, which makes them develop a positive attitude toward the company. Consumers' perceptions of fairness in pricing can both increase and lessen corporate reputation, depending on several factors (Fitri and Wulandari, 2020). For instance, when consumers perceive a price increase as unfair, it can lead to negative emotions and behavioral intentions, potentially harming the company's reputation. On the other hand, implementing marketing campaigns with transparent pricing strategies can positively influence consumers' perceptions of perceived price fairness, enhancing corporate reputation. Based on attribution theory, we posit that when the consumer has high price fairness perceptions, (s)he will have a positive global opinion of the reputation of the car dealership:

H_2: The greater the consumer´s perceptions of price fairness, the higher will be the corporate reputation of the car dealership.

Consumer satisfaction is an attitude, emotional response assessment made by the consumer about the service supplier (Mairani *et al.*, 2019). Customer satisfaction is defined as the degree to which a customer's expectations are met following their experience with a product or service. It reflects the level of fulfillment or contentment a customer feels as a result of their interaction with a business (Singh *et al.*, 2023). The influence of corporate reputation on satisfaction is grounded in cognitive dissonance theory (Festinger, 1957). Customer satisfaction is based on the consumer's global assessment of the complete purchasing and consumption experience during the whole process (Montazeri, 2024). If a consumer feels (s)he has had a good product-based experience, (s)he will be satisfied. When this same consumer later evaluates the reputation of the product manufacturer (which (s)he hitherto barely knew) (s)he will most probably mark it highly. To do otherwise would result in a state of imbalance/cognitive dissonance. The consumer avoids this disequilibrium and maintains cognitive consonance by adapting his/her views of the firm´s reputation to match his/her feelings of satisfaction.

Customer satisfaction is one of the main dimensions of the extent of a company's relationships with its customers. Galbreath and Shum (2012) argued that company reputation is a key factor in customers´ perceptions/evaluations of companies. A company's reputational signals are used by consumers to increase their feelings of certainty. When a company suffers from a bad reputation, consumers may develop negative opinions of its products/services based on their personal exchanges with the entity, which can reduce satisfaction. When a company enjoys a good reputation, however, the client´s positive opinions and satisfaction are bolstered. On the basis of a review of the

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literature we propose that:

H_3: The corporate reputation of the car dealership positively affects customer satisfaction with the dealership.

It has been argued that the impact of corporate reputation on customer engagement is in line with cognitive appraisal theory (Bagozzi *et al.*,1999), which proposes that people´s subjective assessment of situations evokes (positive and negative) emotional/behavioral responses. It is proposed in this study that corporate reputation, in addition, positively impacts on affective and behavioral CBE. Consumers will, with greater probability, develop affective links with, and come to trust, auto dealerships that always provide fair-priced, high-quality service.

Corporate reputation has been shown to influence customer brand engagement, based on the positive emotions (toward the brand) that it provokes in him/her. The result of repeated positive experiences only strengthens this mutual interaction (Martínez-López *et al.*, 2017). Therefore, we posit the following hypothesis:

H_4: The better the corporate reputation of the car dealership, the higher the customer brand engagement.

Brodie *et al.* (2013) argued that customer brand engagement reflects their inherent motivational, emotional, cognitive and intentional states, and that its intensity is based on brand stimuli (e.g. activities). In addition, they argued that it is generated from deep memories of the brand that evoke thoughts and feelings about the brand. A satisfied consumer attitude toward the brand based on the uniqueness of its products and services creates attachment to the brand.

Customer satisfaction has been related to customer brand engagement, both as an antecedent and as a consequence (Sánchez-Iglesias *et al.*, 2024). Without customer satisfaction, there can be no engagement (Brodie *et al*., 2013). At the same time, when customers are dissatisfied, they either disengage from the organization or engage with it less. Recent research suggests that customer satisfaction affects purchase intentions; satisfied customers display their positivity through their company-focused behaviors (Brodie *et al.*, 2013; Sánchez-Iglesias *et al*., 2024). Therefore:

H_5: Higher customer satisfaction with a car dealership creates higher customer brand engagement.

Brand love is much discussed in the relevant literature. It has been defined as a profound emotional connectivity to a particular brand, characterized by passion and a feeling of naturalness in the relationship that prompts the person to keep it in mind, recommend and use it (Carroll and Ahuvia, 2006). Previous studies seem to agree about the positive outcomes it can provide to businesses. Nonetheless, varying opinions have been published about its moderating effect in the consumer-brand relationships and consumer behavior nexus.

The "love is blind" effect makes parties to a relationship more tolerant of the mistakes other parties make, thus preventing negative emotions. However, the "love becomes hate" effect is based on the proposal that when people undergo a poor product/service interaction with their treasured brand they feel a sense of betrayal, and "turn against" it (Zarantonello *et al.*, 2018).

As previous research has drawn inconsistent conclusions about the role of brand love, the following RQ is posed:

RQ_1: Has brand love a moderating effect on the impact of the corporate reputation of the car dealership on customer satisfaction with the car dealership?

Customer satisfaction has been shown to be an important antecedent of the success of entities and to have a significant impact on behaviors, repurchase intentions and WOM (Sivadas and Baker-Prewitt, 2000).

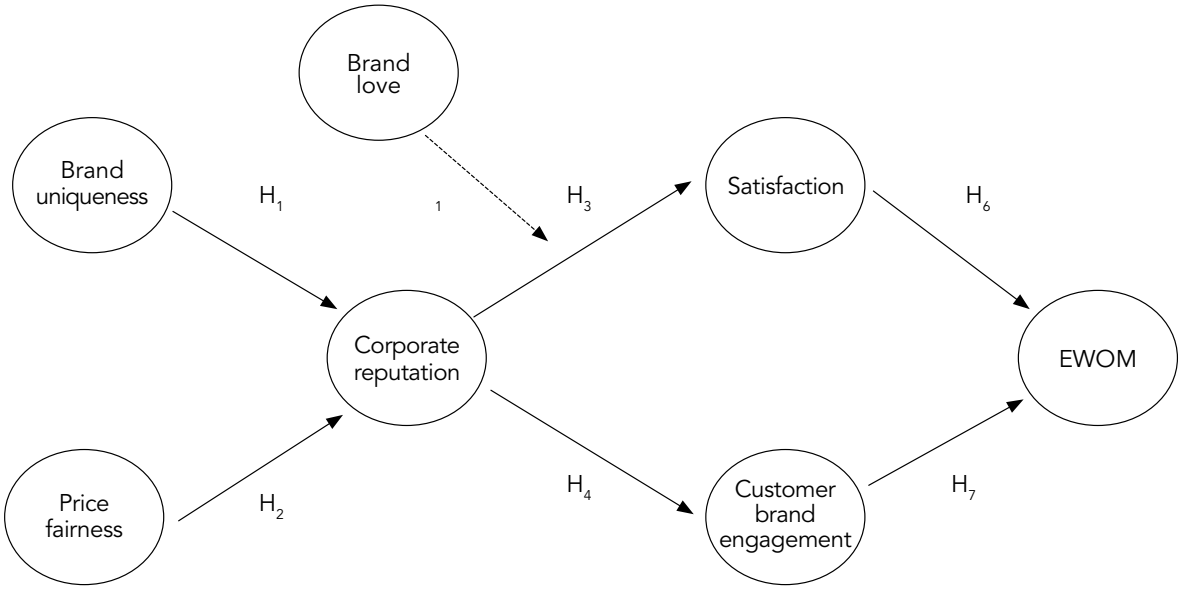
Several studies have demonstrated that customer satisfaction or dissatisfaction plays a crucial role in shaping electronic word-of-mouth (eWOM) behavior (Kim and Hwang, 2022). Pereira *et al.* (2017) argued that satisfied online customers are more likely to shop again and recommend online retailers to others. Therefore,

H_6: The higher the consumer's satisfaction, the higher will be his/her intention to spread positive eWOM about car brands.

Cheung *et al.* (2022) argued that CBE is the extent of the cognitive, emotional and behavioral engagement that people show in their exchanges with brands. Many researchers who have addressed the concept of CBE agree that it leads to positive behavioral outcomes (Lim *et al*., 2022; Prentice *et al*., 2020). Therefore, we propose that car dealerships which prioritize the creation and reinforcement of CBE are likely to generate positive eWOM for their vehicles. Moreover, Knoll (2016) and Ismagilova *et al.* (2017) argued that customers highly engaged with a brand are more likely to participate in eWOM.

H_7: The higher the customer brand engagement, the higher will be consumers' intentions to spread positive eWOM about car brands.

Figure 1
Research model



Materials and methods

The empirical study was undertaken with a very prominent Jordanian car dealership, Abu Khader. This business type is worthy of research because the actual product category (cars) has major customer involvement and significant industrial and economic impacts. The sector is among the world´s most extensive and complex. Some 90.1M cars were registered globally in 2023, up some 11% over 2022 (Research and Markets, 2023). This ramp up was due to various issues, among them greater competition and the move toward greener transport solutions. The automobile sector in Jordan has been growing significantly in recent years, with its expansion being more rapid than most of its regional neighbors (Research and Markets, 2023). With a positive economic prognosis and elevated household buying power, Jordan is forecast to see a significant surge in auto purchases through 2030.

A quantitative study was conducted during March-October 2023. An online questionnaire was sent to 1,300 people who bought a vehicle from the dealer during 2020-2022. A URL was sent to the sample to which they had access for

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one month. The sample was developed using the company´s customer relationship management system. While there are result-generalization issues with data collected from a single source, this method permitted us to undertake an analysis in some detail (Sørensen *et al*., 2020). We used a non-probabilistic convenience sampling procedure.

The survey initially was produced in the English language and thereafter rendered into the Arabic language. Some 317 valid responses were received. We operationalized the study constructs using Likert scales, from 'strongly disagree' (1) to 'strongly agree' (5). The items and sources are listed at Table 1.

Table 1
Scales used in the research

Construct	Item	Source
Brand Engagement (BE)	**How would you describe your interactions with your favorite car brand purchased from AK Automotive?** **Cognitive engagement** **BE1.** Using car brand x makes me think about car brand x. **BE2.** I think about car brand x a lot when I'm using it. **BE3.** Using car brand x stimulates my interest to learn more about car brand x. **Affective engagement** **BE4.** I feel very positive when I use car brand x. **BE5.** Using car brand x makes me happy. **BE6.** I feel good when I use car brand x. **BE7.** I'm proud to use car brand x. **Behavioral engagement** **BE8.** I spend a lot more time using car brand x than using other car brands. **BE9.** Whenever I use cars, I normally use car brand x. **BE10.** Car brand x is one of the brands I normally use when I use cars	Hollebeek *et al*. (2014)
Price fairness (PF)	**PF1.** The car dealership charged a fair price for the car I bought. **PF2.** I felt I was not taken advantage of by the car dealership. **PF3.** The price I paid for labor in the car dealership was fair. **PF4.** The price I paid for parts in the car dealership was fair. **PF5.** I left the car dealership knowing I was fairly treated	Andaleeb and Basu (1994)
Electronic word of mouth. (eWOM)	**EWOM1.** I will write positive comments on social media regarding my experience in Abu Khader. **EWOM2.** I will recommend buying a car in Abu Khader through social media.	Dwivedi *et al*. (2018)

Corporate Reputation (CR)	**CR1.** The information offered by the car dealership is sincere and honest. **CR2.** The car dealership is concerned with the present and future interests of its customers. **CR3.** The car dealership has the necessary resources to successfully carry out its activities	Doney and Canon (1997)
Brand Uniqueness (BU)	**BU1.** I feel that car brand x really stands out from other automobile brands. **BU2.** I think that car brand x is distinct from other brands of automobile. **BU3.** Car brand x is unique from other automobile brands. **BU4.** Car brand x offers very different products than other automobile brands.	Dwivedi *et al*. (2018)
Satisfaction (SAT)	**SAT1.** This car dealership is one of the best I could have visited. **SAT2.** I am satisfied with my decision to buy a car in this car dealership.	Oliver (1980)
Brand love (LOV)	**LOV1.** Car brand x makes me feel good **LOV2.** Car brand x is awesome. **LOV3.** I do not have neutral feelings about car brand x **LOV4.** Car brand x makes me very happy **LOV5.** I love car brand x!	Carroll and Ahuvia (2006)

Results and discussion

Given the sample size, and the lack of certainty in the normal distribution of the data, we employed the PLS-SEM estimation approach. The parameter estimation was carried out using Smart-PLS 4.0 (Ringle *et al.*, 2023), and we performed bootstrapping with 10,000 samples to determine how significant were the parameters.

A confirmatory factor analysis (CFA) found that the relationships ($p < 0.01$) between the items and their respective factors (Fornell and Larcker, 1981) were significant, as outlined in Table 2. The composite reliabilities of the constructs were above the suggested limit of 0.60 (Bagozzi and Yi, 1988) and their average variance extracted (AVE) values were greater than the 0.50 recommendation.

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Table 2

Reliability and convergent validity of the measurement instrument

Factors	Item	Std loadings	t value (bootstrapping)	Cronbach's alpha	rho_A	CR	AVE
Satisfaction (SAT)	SAT1	0.96	126.65*	0.92	0.92	0.96	0.92
	SAT2	0.96	141.51*				
Corporate reputation (CR)	CR1	0.95	156.90*	0.94	0.94	0.96	0.89
	CR2	0.95	141.10*				
	CR3	0.94	110.76*				
Price Fairness (PF)	PF1	0.93	86.13*	0.95	0.96	0.96	0.84
	PF2	0.91	59.10*				
	PF3	0.93	75.04*				
	PF4	0.91	62.95*				
	PF5	0.91	84.83				
Customer brand engagement (CBE)	CBE1	0.90	81,97*	0.98	0.98	0.98	0.82
	CBE2	0.90	69.33*				
	CBE3	0.90	70.42*				
	CBE4	0.92	95.04*				
	CBE5	0.93	95.00*				
	CBE6	0.92	87.70*				
	CBE7	0.93	117.47*				
	CBE8	0.90	74.49*				
	CBE9	0.90	51.69*				
	CBE10	0.88	43.55				
Brand Uniqueness (BU)	BU1	0.93	131.02	0.94	0.95	0.96	0.86
	BU2	0.93	101.52*				
	BU3	0.93	109.30*				
	BU4	0.91	73.92*				
Electronic word of mouth (EWOM)	EWOM1	0.97	304.90*	0.94	0.94	0.97	0.95
	EWOM2	0.97	257.81*				

Note. rho_A=Dijkstra-Henseler rho; CR=Composite reliability; AVE=Average variance extracted*p<.01

The Fornell and Larcker (1981) and heterotrait-monotrait ratio methods were used to assess the measurement model´s capacity to distinguish between constructs. We found that the square roots of the AVEs were above the inter-construct correlation values (Table 3, above the diagonal); and that the heterotrait-monotrait ratios (Table 3, below the diagonal) demonstrated that the model has discriminant validity.

Table 3
Discriminant validity of the measurement model

Factor	F1	F2	F3	F4	F5	F6
F1. Corporate reputation	0.95	0.78	0.56	0.52	0.70	0.57
F2. Satisfaction	0.84	0.96	0.61	0.58	0.83	0.68
F3. Brand uniqueness	0.60	0.66	0.93	0.85	0.58	0.42
F4. Customer brand engagement	0.54	0.61	0.88	0.91	0.61	0.40
F5. Electronic word of mouth	0.74	0.89	0.61	0.64	0.97	0.67
F6. Price Fairness	0.60	0.72	0.44	0.41	0.70	0.92

Note. The square roots of the AVEs are on the diagonal. The HTMT ratios feature in the lower triangle, the latent variable correlations in the upper.

Table 4 presents the results of the hypothesis testing, including the standardized coefficients for the structural paths and the corresponding t-statistics with their significance levels.

Table 4
Hypotheses testing

Relationship	Std. beta	t value (bootstrapping)	CI	
			2.50	97.5
H1. Brand uniqueness -> Corporate reputation	0.39	7.55	0	0.49
H2. Price fairness -> Corporate reputation	0.41	7.89	0.31	0.51
H3. Corporate reputation -> Satisfaction	0.78	27.86	0.72	0.83
H4. Corporate reputation -> Customer brand engagement	0.18	2.23	0	0.34
H5. Satisfaction -> Customer brand engagement	0.44	5.60**	0.28	0.59
H6. Satisfaction -> EWOM	0.72	15.52**	0.62	0.80
H7. Customer brand engagement -> EWOM	0.20	4.54**	0.11	0

Nota. *= p<.05; **=p<.01
R2: Corporate reputation = .46; Satisfaction = .61; Customer brand engagement = .35; EWOM=.71
PLSPredict Q^2: Corporate reputation = .45; Satisfaction = .53; Customer brand engagement = .39; EWOM=.46

The model estimation demonstrated that brand uniqueness (H1 accepted; β= .39) and perceived price fairness (H2 accepted; β= .41) are two important antecedents of corporate reputation. The role of perceived price fairness in car dealerships' corporate reputations is supported

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by attribution theory (Weiner, 2018). Consumers are more likely to make positive judgments about the reputation of a car dealership when its prices are perceived as being fair. Corporate reputation, in turn, is a powerful predictor of brand satisfaction (H3 accepted; β= .78) and customer brand engagement (H4 accepted; β= .18). The results also showed the impact of corporate reputation on customer satisfaction, highlighting why managers should regard reputation as essential for influencing customer behavior and outperforming competitors (Poan & Verin, 2024). Furthermore, dealership satisfaction positively and significantly influenced customer brand engagement (H5 accepted; β= .44), and it translates into greater eWOM (H6 accepted; β= .72). Finally, customer brand engagement positively influenced eWOM (H7 accepted; β= .2).

To confirm the mediation role of satisfaction in the influence of reputation on brand engagement, we estimated a new model that eliminated the path between satisfaction and engagement. As is shown in the results of the estimation of the models before and after introducing the mediator (Table 5), satisfaction partially mediates the relationship between corporate reputation and customer brand engagement (the indirect effect being greater than the direct).

Table 5
Mediation analysis of satisfaction

Relationship	Direct effect before introducing mediator	Direct effect after introducing mediator	Indirect effect.	Mediation
Reputation -> Engagement	.52**	.18	.34**	

Note. *p<.05; **p<.01.

Finally, we analyzed brand love´s moderating role in the impact of corporate reputation on satisfaction (RQ1). We measured brand love with a 5-item adaptation of the scale proposed by Carroll and Ahuvia (2006). First, we calculated an index of brand love (i.e., BL; a = .98) for the customers of the car dealership, splitting them into two equal sections (using the midpoint of the brand love values = 3.6). Thus, we identified one group of the car dealership customers with more BL (n = 148; M = 4.21) and another with less BL (n =153; M = 2.71), statistically different (t = 21.73; p < .01). To assess the between-groups differences in the specific path coefficients within the model (excluding the global model), the non-parametric permutation-based test was used (Henseler, 2012; Cheah *et al*. 2020). This approach aims to determine whether the coefficients of the structural relationships differ significantly between two or more comparison groups (e.g., consumers with high and low brand love). The procedure involves estimating the PLS model independently for each group and then applying a bootstrapping procedure to calculate the statistical significance, without requiring parametric tests such as Student's t-test. As observed in Table 6, brand love was shown to moderate the effect of corporate reputation on satisfaction, the effect being higher for customers with lower BL. On the other hand, when the affections of the customers for the car brand were higher, the effects of corporate reputation on satisfaction were lower. Consequently, the satisfaction of consumers who have a lower intensity of car brand love seems to be driven more by corporate reputation. This is in line with the "love is blind" effect (Zarantonello *et al.*, 2018). This effect suggests that consumers with a strong emotional attachment to a brand tend to overlook negative or less favorable brand attributes, thus relying less on cognitive evaluations when forming judgments. Our result suggests that when the emotional bond with the brand is weak, consumers place greater emphasis on external, more rational indicators such as corporate reputation to assess their sa-

tisfaction. In contrast, for those consumers who express high levels of brand love, the impact of corporate reputation on satisfaction diminishes substantially. These consumers appear to be less influenced by corporate signals and more guided by their affective attachment to the brand.

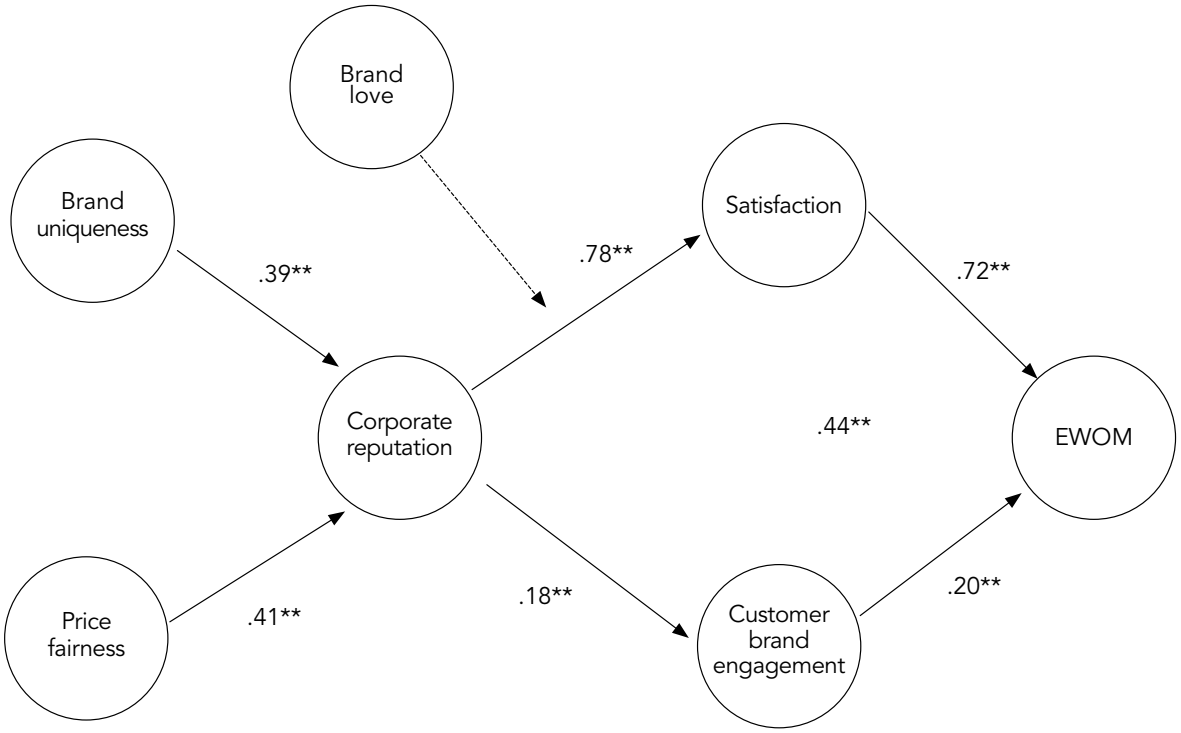
Table 6
Moderation analysis of brand love

Relationship	BL High	BL Low	2.5%	97.5%	Permutation p value
RQ1 Reputation -> Satisfaction	0.67	0.81	-0.11	.10	.00*

Note. *p<.01.

As Figure 2 illustrates the final estimation of .
the model.

Figure 2
Estimated model



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To conclude, the results of this research add valuable insight toward a deeper understanding the impact of corporate reputation on consumers' positive recommendations on social media (a core topic in marketing-focused studies). The study also enhances the understanding of the moderating role of brand love in the corporate reputation-satisfaction relationship.

Conclusions

Recent emotions-focused studies have explained their role in increasing brand love. Understanding how corporate reputation generates satisfaction and brand engagement, and how it relates to positive eWOM, can assist auto dealerships in outperforming their competitors and meeting their customers´ expectations. Corporate reputation and customer brand engagement strongly affect customer´s behavioral decision-making. This research provides four theoretical contributions to relevant literature. In the first instance, we expand the knowledge of the relationships between corporate reputation, customer satisfaction, customer brand engagement, and eWOM, which have previously been the subject of inconclusive findings in the literature. Our assessment of the impact of corporate reputation on customer satisfaction and brand engagement provides new insights into cognitive dissonance theoryby showing that a strong corporate reputation can reduce cognitive dissonance experienced by customers when evaluating brand-related experiences with high involvement products. Specifically, our results suggest that when customers perceive a high corporate reputation, this perception increases the likelihood that their attitudes (satisfaction) and behaviors (brand engagement) with this perception, even in cases where the service encounter may be suboptimal. This suggests that corporate reputation acts as a cognitive anchor that facilitates the resolution of dissonance, thus fostering more stable and consistent evaluative and behavioral responses toward the car dealership.

Second, we explain the impact of consumers´ perceptions of the car dealership (brand uniqueness and perceived price fairness) on corporate reputation, supporting attribution theory. Third, we analyze the impact of customer satisfaction and CBE on the crucial behavioral intention of eWOM, especially since eWOM has emerged as a major source of product-related information for consumers. Fourth, given the limited research into brand love, this study examined the moderation role of brand love in the impact of corporate reputation on satisfaction. Brand consumer relationship-focused studies have substantially addressed the causes and consequences of brand love. The present study provides a real advance in the branding-focused literature by providing new knowledge/understanding about the boundary conditions of brand love's moderation role.

The results show that brand uniqueness positively affects a company's reputation. Automotive companies should work to make sure their brand stands out in a way that matches their core values. One way to do this is through innovation and technological advancement. For example, car dealerships can use new technologies like electric vehicles (EVs) to set themselves apart from competitors. In addition, car dealerships should ensure their prices are fair, both for their vehicles and their services (e.g. repairs). Customers should feel they are getting good value at the dealership, whether it's for the cost of a car or for parts and labor. This sense of fairness helps build a positive reputation, making customers believe the dealership follows ethical standards. Using technology like mobile apps to track services or offer better customer support can also enhance customer's experience.

Our study demonstrates that corporate reputation significantly affects customer satisfaction. Car dealerships can improve their reputation by offering customers honest, clear and transparent information, while focusing always on their current and future needs. Embracing technology and innovation will aid them in this process. For example, implementing digital tools like online car configurators or virtual reality showrooms allows customers to explore their options in a more interactive and convenient way. In addition, adopting innovations such as AI-powered chatbots for customer ser-

vice or predictive maintenance systems helps dealerships meet consumers´ expectations.

It was also shown that CBE has a strong influence on eWOM. Customers with strong engagement with brands will tend to share their experiences online. Car dealerships should invest in tools like mobile apps and connected car technology to help customers stay connected with the brand and share their positive experiences. Offering advanced features like personalized driving experiences and real-time data tracking can further increase engagement and encourage customers to recommend the brand to others. This increased engagement leads to more eWOM, as customers actively share their experiences and influence others.

This study is not without limitations, which also offers valuable directions for future research. First, its cross-sectional design captures a snapshot in time, providing only a limited view of the hypothesized relationships. To gain deeper insight into how these dynamics unfold, future research could adopt a longitudinal approach, offering more robust empirical validation. Second, the study's focus on a single automotive company and exclusively on new car purchases limits the generalizability of the findings. Future studies could test the model using data from second-hand car buyers, contributing to a more comprehensive understanding of consumer engagement across diverse market segments. Additionally, it would be beneficial to replicate the study across different companies and product categories to further validate and strengthen the generalizability of the results. Third, studies conducted in non-Western contexts have also emphasized the role of corporate reputation in shaping post-purchase outcomes. Therefore, we propose conducting a cross-cultural analysis to further explore the relationships between corporate reputation, customer satisfaction, and brand engagement across different international markets.

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Author(s)	Contributions
Mohamad Hashem	Conceptualization, data preservation, formal analysis, research, methodology, writing. Original draft, writing. Review and editing.
Muhammed S. AlNsour	Conceptualization, data preservation, formal analysis, research, methodology, writing supervision. Original draft, writing. Review and editing.
Carla Ruiz Mafé	Conceptualization, data preservation, formal analysis, fundraising, research, methodology, writing supervision. Original draft, writing. Review and editing.
Rafael Currás Pérez	Conceptualization, data preservation, formal analysis, research, methodology, writing. Original draft, writing. Review and editing.

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Influences of transactional and transformational leadership on social, environmental and operational performance

Influencia del liderazgo transaccional y transformacional en el desempeño social, ambiental y operativo

Maribel Mendoza-Solis
Professor and researcher at Universidad Tecnológica de Ciudad Juárez, Mexico
maribel_mendoza@utcj.edu.mx
https://orcid.org/0000-0001-5407-023X
https://ror.org/05fj8cf83

Jorge Luis García-Alcaraz
Professor and researcher at Universidad Autónoma de Ciudad Juárez, Mexico
jorge.garcia@uacj.mx
https://orcid.org/0000-0002-7092-6963
https://ror.org/05fj8cf83

Cuauhtémoc Sánchez-Ramírez
Professor and researcher at Tecnológico Nacional de México / IT Orizaba, Mexico
cuauhtemoc.sr@orizaba.tecnm.mx
https://orcid.org/0000-0002-0344-1966
https://ror.org/05vpj2s72

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Abstract: leadership style influences the organizational performance of the companies that manage it, and the current research relates it to economic and operational performance, disregarding social and environmental variables. This study examines a structural equation model that connects transactional and transformational leadership with social, operational, and environmental performance using six hypotheses that quantify the relationship between these variables. The model's hypotheses were validated, and a questionnaire was designed and administered to production managers in the Mexican maquiladora industry. A total of 156 valid questionnaires were obtained, and the information was entered into SPSS v.24 software for cleaning and validation. The model was evaluated using the partial least squares method to present a sensitivity analysis based on conditional probabilities for high and low situations in the concepts. The results show that both types of leadership influence the three types of performance. However, transformational leadership has a greater influence than transactional leadership on performance. Therefore, it is concluded that due to the nature of the maquiladora industry, it is better to invest resources in developing transformational leaders who have greater vision and inspiration and empower, motivate, and develop their staff.

Keywords: leadership, organizational performance, structural equations, human resources.

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Resumen: el estilo de liderazgo influye en el rendimiento organizacional de las compañías que gestionan y actualmente, hay investigaciones que lo vinculan con el rendimiento económico y operativo, desconsiderando variables sociales y ambientales. Este estudio analiza un modelo de ecuaciones estructurales que relaciona el liderazgo transaccional y transformacional con el desempeño social, operativo y ambiental mediante seis hipótesis para cuantificar la relación entre esas variables. Se procedió a validar las hipótesis del modelo, se diseña y aplica un cuestionario a administradores de procesos productivos de la industria maquiladora mexicana. Se obtuvieron 156 cuestionarios válidos, cuya información fue capturada en el software SPSS v.24 para su depuración y validación. El modelo fue evaluado con el enfoque de mínimos cuadrados y reporta un análisis de sensibilidad basado en probabilidades condicionales para escenarios de ocurrencia altos y bajos en los constructos. Los resultados reportan que ambos liderazgos influyen en los tres desempeños. Sin embargo, el liderazgo transformacional mostró una mayor influencia que el transaccional en cada desempeño, por lo que se concluye que, debido a la naturaleza de la industria maquiladora, es mejor invertir recursos en desarrollar líderes transformacionales que tengan mayor visión e inspiración, empoderen, motiven y desarrollen a su personal.

KPalabras clave: liderazgo, desempeño oganizacional, ecuaciones estructurales, recursos humanos.

Introduction

Leadership is "the ability of an individual to influence, motivate, and empower others to contribute to the effectiveness and success of the companies of which they are a part" (Carreiro and Oliveira, 2019). This definition shows that leadership style affects market performance and that leadership is as essential as any other company resource (AlNuaimi *et al.*, 2021). Leadership is not simply about holding a managerial position; it encompasses a set of skills, behaviors, and strategic vision that influence organizational performance (Jiang and Ali, 2024). Therefore, it is necessary to invest in resources to develop leaders at all levels and thereby achieve organizational transformation. There are two widely documented leadership styles: transactional (TSL) and transformational (TFL) (McClanahan, 2020).

TSL is the foundation of success, as leaders focus on day-to-day operations to achieve organizational goals (Martin, 2017). This style works well when the company is relatively stable (Aga, 2016), and the priority is the supervision and control of followers. In TSL, rewards or punishments are applied to followers based on the results achieved in the activities performed (AlNuaimi *et al.*, 2021). However, if the company is in the process of renewal, this leadership can have negative results because it focuses more on quantitative performance, thus neglecting qualitative performance. This approach adopts conservative, habitual, and reactive attitudes rather than proactive and innovative ones, incentivizing followers through their interests and requirements (Arokiasamy *et al.*, 2015; Laohavichien and Weerasai, 2025).

On the other hand, TFL influences followers through inspiration, motivation, and empathy (AlNuaimi *et al.*, 2021). TFL has a positive impact on organizations and also influences followers on a personal level (Martin, 2017), as the leader's role is to act as a mentor who supports, develops, trains, and nurtures followers, presents a shared vision, and establishes trust and security (Yue *et al.*, 2019). TFL facilitates business renewal because it promotes change, empowers employees, and fosters a relationship based on empathy, charisma, and loyalty. Therefore, they act emotionally, and several studies have linked this type of leadership to emotional intelligence (Chatterjee and Kulakli, 2015). In addition, TFL creates and improves organizational culture, helping followers to put their individual needs aside in favor of the collective and corporate good. In addition, empirical evidence confirms that TFL is more effective for organizations (Park and Pierce, 2020), improving employee satisfaction and organizational culture, which are key factors for productivity and effectiveness (Aferi *et al.*, 2023). Manufacturing companies are key entities for economic development and have an impact on the global economy; however, due to intense competition, product diversity, and market uncertainty, they must focus on strengthening organizational performance.

Leadership style is a critical element in organizational performance, which refers to a company's ability to achieve its objectives effectively and efficiently. This principle includes

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various dimensions that analyze how an organization achieves results in different essential areas, some of which are operational, social, and environmental.

Leaders adopt leadership styles that allow them to create participatory, trusting, and collaborative environments, resulting in more cohesive teams focused on achieving strategic objectives. In addition, these styles facilitate alignment between individual and organizational goals and promote a greater sense of purpose and belonging among employees. Specialized literature has shown that effective leadership has a positive impact on key metrics such as operational efficiency, job satisfaction, and talent retention (López González, 2024).

On the other hand, an inappropriate leadership style generates conflict, low motivation, and an unproductive work environment, and affects organizational performance. For example, autocratic leaders with poor communication skills limit innovation and organizational performance growth and encourage poor decision-making, as they do not seek feedback from other team members and reduce the organization's ability to adapt to dynamic environments (Sharma, 2022). In contrast, leaders who prioritize employee development promote continuous learning and drive short-term performance and resilience in the face of challenges (Deng *et al.*, 2023). Therefore, leadership style positions as a key pillar for achieving and maintaining high levels of performance in organizations.

The impact of leadership style on organizational performance has been thoroughly analyzed in various settings. For example, a recent study reported a systematic review and meta-analysis of the relationship between leadership and performance (Bonini *et al.*, 2024), another study was conducted in the oil and gas production sector in Ghana (Anyigba and Lartey, 2024), and research was conducted on leadership style and sustainable performance in Sierra Leone (Kebe *et al.*, 2024), and another study considered ethical, cultural, and social aspects of leadership and its performance in Jordan (Alkhadra *et al.*, 2023).

Specifically in Mexico, the manufacturing sector is renowned for its highly skilled workers, with 2,702,116 jobs nationwide, 481,786 in Chihuahua, and specifically in Ciudad Juárez, where there are 24 industrial parks and 328 manufacturing companies, generating 322,787 jobs (IMMEX, 2023), many of which are managerial positions that refer to leaders. However, despite the relevance of this industrial sector, there is little research analyzing leadership styles, as they are explored in a general way. For example, the impact of leadership on job satisfaction has been analyzed (Lara Bárcenas *et al.*, 2023), as well as how it can be a factor that generates flexibility and resilience in supply chains (Solis *et al.*, 2023), ignoring leadership styles and how they impact operational, social, and environmental efficiency indices.

This study contributes to covering this area of research, seeking to quantify the influence of TSL and TFL on the operational (DO), social (DS), and environmental (DE) performance of Mexican maquiladora companies. The results of this study will allow managers to know which leadership style favors them in achieving the objectives of the companies they run.

TSL mobilizes human resources through constant control and monitoring to achieve established objectives (Aga, 2016). Specifically, the contingent reward (CR) dimension establishes the exchange of tangible and intangible resources, such as incentives or professional recognition, which improves motivation and creates worker loyalty to the company (Fletcher *et al.*, 2019). On the other hand, leaders who use active management by exception (AME) create an environment of trust to monitor followers' progress in achieving established goals, thereby increasing job satisfaction (Sandstrom and Reynolds, 2020). Thus, because both dimensions of TSL have a positive influence on employees, which helps to create a good working environment and a sense of commitment and loyalty that in turn benefits the organization, the following hypothesis can be established for the Mexican environment:

H_1: TSL directly and positively influences DS in the Mexican manufacturing industry.

For this study, the passive management by exception (PME) dimension is eliminated because the literature review has shown that it has negative results on organizational culture, as it decreases staff satisfaction and contributes negatively to the creation of a safe work environment (Flatau-Harrison *et al.*, 2020).

In recent decades, social responsibility has captured the attention of academics (Soler-Sanchis *et al*., 2025). In TFL, the dimension of intellectual stimulation is present in the CEOs of companies, where it promotes the development of social responsibility strategies, as it focuses on participating in social issues (Waldman and Siegel, 2008). TFL improves satisfaction and increases participatory engagement because the motivation is not economic, but rather personal fulfillment (Jiménez, 2018). In general, leaders who apply for TFL are mentors who go beyond maintaining systems and focus on renewing companies in all areas and creating a shared vision. Therefore, the following hypothesis is proposed in the Mexican context:

H_2: TFL has a direct and positive influence on DS in the Mexican manufacturing industry.

TFL and TSL have been analyzed, along with their impact on innovation and green procurement in the United Arab Emirates, which contribute to promoting sustainable markets (AlNuaimi *et al*., 2021). The results indicate that TSL and TFL do not impact green procurement, but they do impact innovation, which enhances green procurement and improves environmental sustainability. On the other hand, in Pakistan, the effects of ambidextrous leadership (TSL and TFL) on governance mechanisms and social sustainability in manufacturing industries were studied, and it was found that ambidextrous leadership is related to improved environmental sustainability, and special attention should be paid to TSL because its absence significantly affects ecological sustainability (Awan *et al*., 2018).

TSL focuses on routine activities, following procedures, and maintaining the *status quo* (Martin, 2017), and supports compliance with environmental requirements. Therefore, it is established that:

H_3: TSL directly and positively influences DE in the Mexican manufacturing industry.

TFL influences the ecological management and enthusiasm of workers in China with the aim of boosting corporate ecological creativity. The findings indicate that TFL has a positive and significant impact on ecological creativity, ecological human resources, ecological management, and the ecological enthusiasm of workers (Jia, 2018). Furthermore, TFL can influence human resource management, ecological practices and innovation, and environmental performance (Singh *et al.*, 2020). This is because the TFL style can improve employee behavior and, in turn, achieve organizational environmental goals (AlNuaimi *et al.*, 2021). Thus, given that TFL promotes a change in mindset and helps followers achieve high morale, and creates a shared vision in favor of organizational performance, the following hypothesis is proposed for the Mexican environment:

H_4: TFL directly and positively influences DE in the Mexican manufacturing industry.

A study conducted in the construction sector in South Africa investigated leadership styles and project achievement. The findings point to a positive correlation between TFL and TSL and project achievement, in contrast to autocratic and *laissez-faire* leadership styles, which had no relationship (Liphadzi *et al*., 2015). In addition to this, it has been mentioned that DO improves through TSL-AME (İşcan *et al*., 2014), and a study conducted in Ethiopia reported that the CR dimension of TSL is positively related to project success (Aga, 2016). Furthermore, senior management TSL is positively associated with internal integration in companies (Birasnav and Bienstock, 2019).

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In Turkey, leadership and its influence on DO through knowledge management and how it affects organizational innovation and corporate spirit were examined (Uslu *et al.*, 2015). The findings indicate that TSL increases these two variables, and it can be considered that project achievement and innovation are components of a company's DO. For this reason, the following hypothesis is suggested for the Mexican context:

H_5: TSL has a direct and positive impact on DO in the Mexican maquiladora industry.

On the other hand, a study analyzes all the characteristics of TFL and its impact on the adoption and diffusion of innovation, such as new technology and mobile cloud computing. The results indicate that intellectual stimulation and individualized consideration of TFL are strongly related to the adoption of innovation and mobile cloud computing, and make the company more efficient (Carreiro and Oliveira, 2019). Likewise, research was conducted on the relationship between TFL and TSL with internal integration, supplier companies, customers, and the implementation of advanced technology. The results indicate that TFL and advanced manufacturing technology in manufacturing companies are positively related to customer integration (Birasnav and Bienstock, 2019).

In addition to this, another study effectively examines TFL and TSL in relation to process and product innovation, as well as understanding acquisition capacity in China, and reports a positive impact of TFL on product and process innovation (Chang *et al.*, 2015). Furthermore, they pointed out that the components of intellectual stimulation, idealized influence, and inspirational motivation lead to a promotional approach in achieving project objectives, which is associated with a higher quality system and fewer delays. Therefore, the following hypothesis is established in the Mexican environment:

H_6: TFL directly and positively influences DO in the Mexican manufacturing industry.

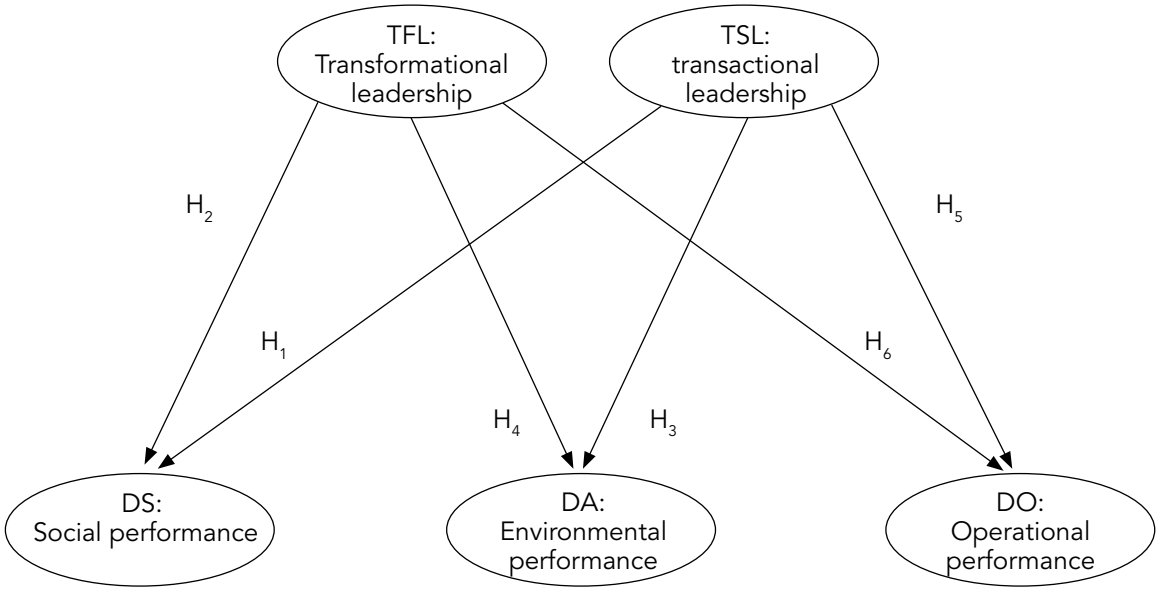
Figure 1 graphically illustrates the six hypotheses established.

Materials and method

A literature review was conducted using keywords such as TSL, TFL, and organizational performance, focusing on articles published from 2015 onwards to identify the items in the latent variables and create the questionnaire, which consists of three sections. The first section is intended to collect demographic data from the respondent, the second section establishes the TFL and TFL items, and finally, the third section inquires about DO, DE, and DS.

The initial questionnaire was validated by eight judges, five maquiladora industry executives, and three academics. After the two stages with the judges, the final instrument was generated, adapted to the geographical context of the Mexican maquiladora industry, and all items were answered on a five-point Likert scale, where one equals never, two is rarely, three is frequently, four is almost always, and five is always. See the appendix for the complete questionnaire.

Figure 1
Proposed model



The online questionnaire was administered via the Google Forms platform to engineering managers and supervisors working in the manufacturing industry who lead work groups and are confirmed leaders. The information was collected from June 20 to October 20, 2024. All respondents had to lead at least three teamwork projects to evaluate their performance.

On October 21, 2024, a database was downloaded and analyzed using SPSS v.25® software. The data was then cleaned, identifying extreme values to avoid bias in the analysis, and the values of each observed variable were standardized. It is important to note that absolute values greater than 4 were considered extreme values because they were distant points, so they were replaced by the median (Kaneko, 2018). Next, uncommitted respondents were identified using the standard deviation of each survey, and values lower than 0.5 were removed from the analysis (García-Alcaraz *et al.*, 2017).

To carry out the descriptive study of the sample, the demographic data from the first part of the questionnaire were examined using cross-tabulation tables, with the aim of understanding the participants' experience and the industrial sector to which they belong. For the items contained in the second and third sections of the data collection instrument, the median was used as a measure of central tendency because the ratings are on an ordinal scale, while the interquartile range, which is determined by subtracting the third quartile from the first quartile, was used as a measure of dispersion (García-Alcaraz *et al.*, 2017).

The variables in Figure 1 were validated before being integrated into the proposed model, and several indices were used, such as (Kock, 2015).

- For internal validation, Cronbach's alpha (CA) and reliability indices were used, both with values greater than 0.7.
- For parametric predictive validity, the R2 and adjusted R2 indices were used, and

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values greater than 0.02 were sought. For non-parametric predictive validity, Q2 was used, and values similar to R2 were sought.

- For convergent validity, the extracted mean variance (EMV) was used with a value greater than 0.5.
- For collinearity, the variance inflation factor (VIF) was used with values lower than 3.3.

In this phase, a structural equation model (SEM) was used to validate each of the hypotheses and measure the relationship between TSL and TFL and the three types of performance analyzed. The analysis used WarpPLS v. 8® software, based on partial least squares (PLS), which is recommended for small samples with non-normal distribution or information obtained on the Likert scale (Kock, 2019). All hypotheses were verified with a reliability level of 95% (significance of 5%).

Prior to interpreting the model, the following measures of model efficiency were established (Kock, 2019):

- The mean trajectory coefficient (MTC) measures the relationship between variables.
- For the predictive validity of the model, the R^2 and adjusted R^2 indices were used, and the aim was for them to exceed a value of 0.2.
- The inflation index of the mean variance of the block (IIVMB) and of complete mean collinearity (IIVMC) were used to measure collinearity between constructs and values below 3.3.
- Tenenhaus GoF was used to measure the fit of the data to the model, with a value greater than 0.36. .

In this study, direct effects (no indirect effects) were analyzed to validate the hypotheses, which are visualized as arrows connecting the latent variables in Figure 1, and a standardized β value is estimated using MCP. The null hypothesis H0: $\beta=0$ is tested against the alternative hypothesis H1: $\beta\neq0$. With a confidence level of 95%, it is statistically evident that $\beta=0$, so there is no relationship between the latent variables, and the hypothesis is rejected; on the other hand, if it is evident that $\beta\neq0$, regardless of the sign, then there is a relationship between the variables, and the hypothesis is accepted.

In addition, for each dependent construct, an R2value is estimated as a measure of the variance explained by the independent constructs. Furthermore, for each projected effect, an effect size (TE) is indicated, which establishes the amount of variance explained by an independent construct in a dependent construct. The sum of TE in an independent variable is equal to R2of that variable.

In addition to the above, for each hypothesis in Figure 1, a sensitivity analysis is reported, where three types of probabilities of occurrence of the constructs at high levels P(Zi>1) and low levels P(Zi<-1) are estimated, where Zi is a standardized variable. The three probabilities calculated are the probability of finding the constructs at high or low levels in isolation, the probability of finding independent and dependent constructs in combination at high and low levels, which are established by & y, and the conditional probability that a dependent construct will occur at a high or low level, given that the independent construct has occurred, which is represented by "IF".

Results and discussions

A total of 178 questionnaires were obtained at the end of the period; however, 22 were eliminated for not meeting the inclusion requirements, leaving a total of 156 valid questionnaires for analysis, of which 41.7% were answered by men and 58.3% by women. Table 1 shows the participants' positions in the survey and the number of years they have been in their positions. It can be noted that engineers and managers gave a response of 76 and 56, respectively. In addition, most of the survey participants had between 2 and 5 years of experience in their position (70.51%), which indicates that the data is reliable.

Table 1
Position and years of experience

Position	Years of experience			Total
	2 to 5	5 to 10	>10	
Director	41	9	6	56
Engineer	52	14	10	76
Supervisor	17	4	3	24
Total	**110**	**27**	**19**	**156**

Note. This table shows the relationship between position and years of experience among respondents.

Table 2 shows the number of employees in the companies and the industrial sector to which they belong. Most of the participants are from large corporations, given that 101 of these have more than 500 workers (64.74%), and the most prominent industrial sectors were automotive and services, with 47 and 46 surveys, respectively, corresponding to 59.61% of the total.

Table 2
Industrial sector and number of employees in the company

Number of employees	Industrial sector								Total
	A	L	P	M	E	M	C	S	
0-50	5	3	0	0	0	2	0	12	22
51-100	2	0	0	0	1	0	0	4	7
101-200	3	4	0	1	0	1	0	3	12
201-500	1	3	2	3	0	0	0	5	14
501 or more	36	16	4	2	1	15	5	22	101
Total	**47**	**26**	**6**	**6**	**2**	**18**	**5**	**46**	**156**

Nota. The table shows the relationship between the number of employees and the industrial sector to which the company where the respondents work belongs. The header shows the letters for each sector. Where: A- Automotive, L- Electricity, P-Plastics, S- Services, M- Metals, E- Packaging, M- Medicine, C- Communications.

Table 3 presents the descriptive analysis of the observed variables in the model. It should be noted that the items eliminated during the CA cleansing process are not indicated.

Table 3
Median and interquartile range of the observed variables in the model

Transactional leadership	Median	RI
Reward systems	2.9222	1,79
Fulfillment of obligations	4.0833	1.6855
Personal recognition	3.233	1.6102
Focus on organizational goals	4.3412	1.4203
Follow-up control	3.9555	1.6015

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Improving development opportunities	3.68	1.6711
Short-term strategies	3.7551	1.6506
Transformational leadership	**Median**	**RI**
Values	4.0636	1.6127
Confidence	4.0625	1.5489
Self-reward	3.4464	1.5933
Satisfaction	3.5892	1.552
Modeling organizational behavior	3.6194	1.5132
Organizational commitment	3.6442	1.6306
Long-term strategies	3.7227	1.6119
Flexibility / Adaptability	3.6813	1.8005
Effectiveness	3.75	1.5853
Social performance	**Median**	**RI**
Implementation of staff motivation campaigns	3.0352	1.7929
Internal staff development / promotion rate	3.5463	1.8
Promote employee commitment to belonging	3.4418	2.0046
Attracting talent	3.2597	2.0988
Operational performance	**Median**	**RI**
Pre-sales service	3.7428	1.5151
After-sales service	3.7641	1.4947
Equipment utilization level / OEE	4.0176	1.4979
Sufficient installed capacity	3.9494	1.5036
The company focuses on innovation	3.8333	1.5339
Environmental performance	**Median**	**RI**
The company sets annual environmental targets.	4.2833	1.54
The company has environmental indicators displayed on the premises.	4.2905	1.6272

Note. This table shows the median and interquartile range of the observed latent variables.

The validation indices of the latent variables are shown in Table 4, and according to these values, the variables are valid and can be integrated into the SEM, as they all comply. It can therefore be concluded that there is sufficient internal, convergent, and predictive validity, and that the collinearity is acceptable (see the "better if" column to compare the value). In addition, the Jarque-Bera (JB) normality test is reported, which indicates that the variables are not normal and justifies the use of the partial least squares approach.

Table 4

Construct validation

Index	TSL	TFL	DO	DA	DS	Better if
R-squared			0.465	0.459	0.626	≥0.2
Adjusted R-squared			0.458	0.452	0.621	≥0.2

Index	TSL	TFL	DO	DA	DS	Better if
Composite reliability	0.9	0.934	0.921	0.96	0.947	≥0.7
Cronbach's alpha	0.779	0.906	0.886	0.918	0.925	≥0.7
Mean variance extracted	0.819	0.78	0.745	0.924	0.816	≥0.5
Total collinearity VIF	2.173	3.6	1.957	1.931	2.711	≤3.3
Q-squared			0.469	0.461	0.627	≤3.3
JB normality test	No	No	No	No	No	

Note. This table shows the validation indices for leadership and the three performances proposed in the hypotheses.

The model efficiency indices are presented in Table 5, and it can be seen that the CMT, RCM, and RCMA indicate acceptable predictive validity, while the IIVMB and IIVMC values indicate the absence of collinearity and the Tenenhaus index indicates a correct fit of the data. The model evaluated in the WarpPLS v.7 program is shown in Figure 2, which presents the normalized β values and the p-value linked to the hypothesis. In addition, the R-squared value corresponding to each dependent variable is specified.

Table 5

Model efficiency indices

Index	Value	Better if
Average trajectory coefficient (CMT)	0.381, P<0.001	p<0.05
Mean R-squared (MRS)	0.517, P<0.001	p<0.05
Adjusted mean R-squared (AMRS)	0.510, P<0.001	p<0.05
BBMean block-wise VIF (IIVMB)	1.966	<3.3
Mean total collinearity VIF (IIVMC)	2.474	<3.3
Tenenhaus GoF (GoF)	0.650	>0.36

Note. This table shows the model's efficiency indices. The first column shows the index, the second column shows the value obtained, and the third column shows the validity indicator.

Figure 2

Model evaluated

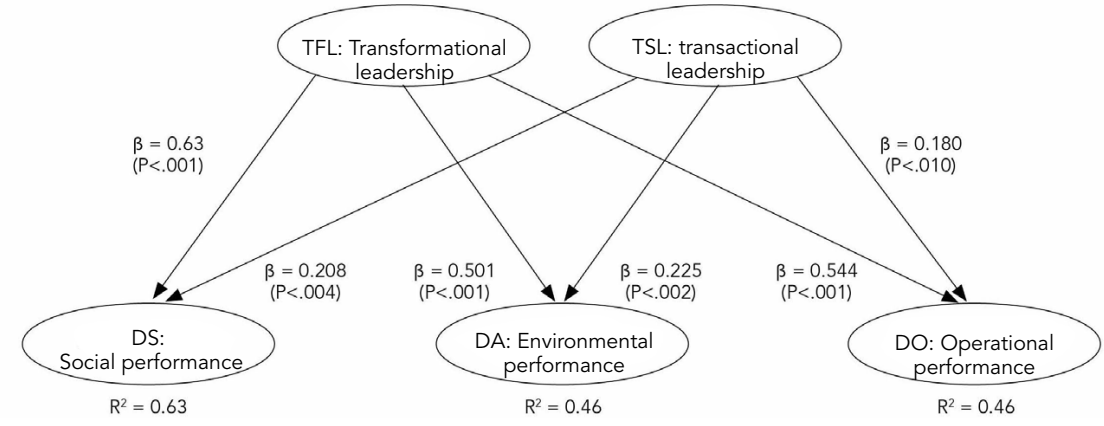

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Table 6 shows the conclusions relating to all the hypotheses, according to the values in Figure 2 of the evaluated model. The β value symbolizes the relationship between the latent variables and is linked to the p-value to evaluate the statistical relevance of the relationships. An illustrative case is the correlation between TFL and DS, which has a relationship of β=0.630 and p<0.001, showing that if the TFL increases its normal deviation by one unit, the DS increases by 0.630.

Table 6

Summary of conclusions on the hypotheses

Hypothesis	Relationship	β	P-value	Decision
H_1	TSL→DS	0.208	=0.004	Not rejected
H_2	TFL→DS	0.630	<0.001	Not rejected
H_3	TSL→DA	0.225	=0.002	Not rejected
H_4	TFL→DA	0.501	<0.001	Not rejected
H_5	TSL→DO	0.180	=0.010	Not rejected
H_6	TFL→DO	0.544	<0.001	Not rejected

Note. *Prepared by the authors using data from WarpPLS.*

In general terms, it can be observed that TFL has greater effects on DS, DA, and DO compared to TSL, as the β values are higher. For example, the effect of TFL on DS is 0.630, while that of TSL is only 0.208, three times lower. In the model presented in Figure 1, six hypotheses were proposed and, based on the results obtained and presented in Figure 2, it can be deduced that:

H_1 . There is sufficient statistical evidence to support the claim that TSL has a direct and positive impact on DS in the Mexican manufacturing industry, given that the former construct increases its standard deviation by one unit, while the latter construct increases it by 0.208 units. This finding implies that this leader focuses on offering a reward system, recognizing staff, improving growth opportunities for employees by increasing motivational campaigns and the internal promotion rate, and increasing worker satisfaction and commitment to belonging. This work contradicts the study conducted in Malaysia, in which no significant relationship was found (Saeidi *et al.*, 2021), which may be due to the specific environment of the Mexican maquiladora industry.

H_2 . There is sufficient statistical evidence to support the claim that TFL has a direct and positive impact on DS in the Mexican manufacturing industry, since TFL increases the standard deviation by one unit, DS also increases by 0.630 units. This finding implies that leaders who possess ethics, values, and adaptability will increase the attraction and development of internal talent and promote loyalty to the company, which will help create a good working environment and stability. This study coincides with research conducted in Malaysia, which showed that TFL offers a better result for DS compared to TSL (Saeidi *et al.*, 2021).

H_3 . There is sufficient statistical evidence to support that TSL has a direct and positive impact on DE in the Mexican manufacturing industry, because when TSL increases the standard deviation by one unit, DE increases by 0.225 units. These findings imply that this leader is oriented toward compliance with obligations and focuses on organizational goals, which will impact compliance with the environmental indicators disseminated in the company and supports legal compliance with environmental requirements. This study coincides with the one conducted in the United Arab Emirates, where a significant relationship between TSL and DS was also found (AlNuaimi *et al.*, 2021).

H_4 . There is sufficient statistical evidence to support the claim that TFL directly and positively influences DE in the Mexican manufacturing industry, as TFL increases the standard de-

viation by one unit, DE increases by 0.501 units. This means that this leader focuses on modeling organizational behavior and implementing long-term strategies, which will help establish annual environmental goals and promote the company's green image. A study conducted in China showed that there is a positive relationship between TSL and DE (Chen *et al.*, 2021), which coincides with this research. However, the study conducted in the United Arab Emirates revealed that TSL does not directly influence green hiring, but it does so through the mediating variable of innovation capacity; i.e., the effect is not direct (AlNuaimi *et al.*, 2021), which differs from the results obtained. This may be due to regional issues.

H_5 . There is sufficient statistical evidence to support the claim that TSL has a direct and positive impact on DO in the maquiladora industry, because if TSL increases the standard deviation by one unit, DO increases by 0.180 units. This finding implies that this leader establishes control over followers, short- and medium-term strategies, and focuses on organizational goals, which will help utilize equipment and installed capacity, impacting customer service. A study conducted in China showed that TSL significantly affected DO (Chen *et al.*, 2021), which coincides with the results shown in this research.

H_6 . There is sufficient statistical evidence to support the claim that TFL has a direct and positive impact on DO in the Mexican manufacturing industry, because when TFL increases the deviation by one unit, DO increases by 0.541 units. This finding implies that leaders with effectiveness, flexibility, and self-reward will help improve innovation in the company and the level of pre- and post-sales service, as well as improve customer loyalty. The study conducted in China found that TFL had a significant effect on DO (Chen *et al.*, 2021), which coincides with this research.

The sensitivity analysis in Table 7 shows the probabilities of each variable in the four possible scenarios when they occur in isolation in their high (+) and low (-) scenarios, jointly (&) or conditionally (IF). For example, the probability of TFL+ and DS+ is 0.567; if TFL occurs only at its high level, it is 0.141, and at its low level, it is 0.173; SD is 0.192 at its high level and 0.186 at its low level; and jointly, these two variables are 0.109 at their high level.

Table 7
Sensitivity analysis

Latent variables			TSL		TFL	
Level			+	-	+	-
DO	+	0.160	&=0.064	&=0.013	&=0.083	&=0.006
			SI=0.400	SI=0.080	SI=0.520	SI=0.040
	-	0.147	&=0.013	&=0.083	&=0.006	&=0.090
			SI=0.087	SI=0.565	SI=0.043	SI=0.609
DS	+	0.192	&=0.083	&=0.006	&=0.109	&=0.000
			SI=0.433	SI=0.033	SI=0.567	SI=0.000
	-	0.186	&=0.000	&=0.115	&=0.000	&=0.128
			SI=0.000	SI=0.621	SI=0.000	SI=0.690
DA	+	0.000	&=0.000	&=0.000	&=0.000	&=0.000
			SI=0.537	SI=0.397	SI=0.635	SI=0.623
	-	0.224	&=0.006	&=0.122	&=0.000	&=0.128
			SI=0.029	SI=0.543	SI=0.000	SI=0.571

Note. The table shows a sensitivity analysis of dependent and independent constructs at their high and low values.

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TFL+ shows higher probabilities of generating positive performance in the three dimensions analyzed (social, operational, and environmental). In particular, the conditional probability of a DS+ under a TFL+ (IF(DS+ | TSFL+)) is 56.7%, reflecting that this style can inspire employees to align with important social goals. Likewise, DO+ (IF(DO+ | TSFL+) =52.0%) and DA+ (IF(DA+ | TSFL+) =63.5%) are also positively influenced. This indicates that TFL fosters a work environment in which workers feel valued and motivated to give their best, promotes creativity and the search for innovative solutions, a key factor in improving operational processes and adapting to dynamic environments.

For its part, TSL+ has a lower impact on the occurrence of high-performance levels compared to TFL+. For example, for DS+ to occur within the framework of TSL+, there is only a 43.3% chance, while DO+ is 40% and DE+ is 53.7%; however, even so, they can still occur.

Nevertheless, it is important to mention that a balanced leadership style is required. Although TFL has a stronger positive impact overall, transactional leadership (TSL+) can also contribute to positive results if combined appropriately. For example, the conditional probability of a DO+ under TSL+ is 40.0%, indicating that this style can be useful for maintaining stability and efficiency in certain areas. In other words, TSL provides the structure necessary for efficient operations, while TFL inspires innovation and commitment, so managers must adapt to their own organizational needs.

It is observed that low levels of leadership in any style are a strong organizational risk. For example, the presence of TSL can generate a DS in 62.1%, a DO in 56.35%, and a DE in 54.3%, reflecting that an absence of structure, clear reinforcement, or effective communication can lead to a deterioration in organizational cohesion and effectiveness. In addition, the occurrence of TFL is also an organizational risk, as it can generate a DS in 69%, a DO in 60.9%, and a DE in 57.1%. In other words, low levels of any type of leadership represent organizational risks.

These low levels of leadership and performance may be due to a lack of clear objectives, in which there is no clear guidance for employees, thereby creating confusion and decreasing productivity, as well as a lack of adequate structure to manage expectations that generate tension and demotivate work teams.

Finally, it is important to mention that due to the increased environmental awareness of customers and the general public, TFL+ offers better results that allow organizations to comply with government regulations and standards, providing a green and socially responsible image that differentiates them from their competitors and gives them a competitive advantage.

Conclusions

The results obtained show that both TSL and TFL have a direct and positive impact on social, operational, and environmental performance; however, the impact of TFL was always greater in the three types of performance analyzed. The main contribution of this study is the demonstration that TFL has more than twice the impact of TSL on organizational performance (DS, DE, DO), which sets the standard for companies to develop this type of leadership among administrative staff and thereby obtain greater benefits in their organizational culture, productive and environmental operations. It should be noted that both types of leadership had a positive impact and that the application of each should be analyzed, considering the context of the company and the desired results. Applying TSL is very useful in supervisory and coordination positions, or in structured jobs that allow employees to understand their roles, the actions they must take, and the scope of the goals they must meet. It is also recommended when the company needs to make rapid changes, increase agility in its operations, and adapt quickly to market changes. However, TFL focuses on achieving better long-term market positioning, so it may work better in senior management positions in companies where long-term corporate strategies are developed.

On the other hand, it should be noted that the data comes from a sample obtained in the manufacturing industry in Ciudad Juárez (Mexico), which has specific cultural, social, and governmen-

tal characteristics due to its location on the border with the United States of America and refers only to maquiladora companies, so the results reported here may differ from other regions. Furthermore, it is based on only 156 responses, which represents a limitation. Future research may focus on replicating the study in other regions of the country or other countries, and/or in different industrial sectors, as well as including financial performance as a response variable.

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Author(s)	Contributions
Maribel Mendoza-Solís	Conceptualization, formal analysis, fundraising, research, methodology, supervision, writing. Original draft, writing. Review and editing.
Jorge Luis García-Alcaraz	Conceptualization, research, methodology, visualization, supervision, writing, and final draft.
Cuauhtémoc Sánchez-Ramírez	Formal analysis, validation, visualization, software.

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Impact of working capital on the profitability of SMEs in Ecuador

Incidencia del capital circulante en la rentabilidad de las microempresas en Ecuador

María Estefanía Sánchez-Pacheco
Professor and researcher at Universidad de Guayaquil and Tecnológico Superior Life College International, Ecuador
maria.sanchez@ug.edu.ec
https://orcid.org/0000-0002-2469-9018
https://ror.org/047kyg834

María del Carmen Valls-Martínez
Professor and researcher at Universidad de Almería, Spain
mcvalls@ual.es
https://orcid.org/0000-0002-9250-717X
https://ror.org/003d3xx08

Fernando José Zambrano-Farías
Professor and researcher at Universidad Internacional del Ecuador UIDE and de la Universidad de Guayaquil, Ecuador
fezambranofa@uide.edu.ec
https://orcid.org/0000-0001-6384-3353
https://ror.org/04xf2rc74

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Abstract: the management of a company's working capital is important in the current scenario, especially because of its impact on operational efficiency. Business sustainability can only be achieved by organizations that maintain a balance between profitability and liquidity. The purpose of this research is to examine its impact on the performance of microenterprises engaged in wholesale and retail activities in Ecuador. To this end, secondary data from 1,634 companies registered with the Superintendency of Companies, Securities, and Insurance for the year 2023 were used. Through a statistical prediction technique, it was possible to identify the elements of working capital that are related with the performance of the selected firms. The results show that variables such as leverage, company age, equity strength, and operating profitability have a positive relationship with profitability. In contrast, the average collection period and asset turnover did not reflect significant effects, while higher customer turnover was negatively associated with financial performance. These findings show that efficient management of the elements that make up working capital favors not only profitability but also stability and the creation of business value. In a competitive environment with limited access to financing, these practices are crucial for strengthening the permanence of microenterprises in the Ecuadorian business structure.

Keywords: profitability, micro-enterprises, efficiency, leverage, enterprises, Ecuador, age, management.

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Resumen: la gestión del capital circulante de una empresa es de gran importancia en el escenario actual, especialmente por su incidencia en la eficiencia operativa. La sostenibilidad empresarial solo puede ser alcanzada por las organizaciones que mantienen un equilibrio entre rentabilidad y liquidez. El propósito de esta investigación fue examinar su impacto en el rendimiento de las microempresas que realizan sus actividades comerciales al por mayor y menor en Ecuador. Para ello, se utilizaron datos secundarios procedentes de 1634 compañías inscritas en la Superintendencia de Compañías, Valores y Seguros correspondientes al año 2023. A través de una técnica estadística de predicción se pudo identificar los elementos del capital circulante que están asociados al rendimiento de las firmas seleccionadas. Los resultados muestran que variables como el apalancamiento, la edad de la empresa, la solidez patrimonial y rentabilidad operativa mantienen una relación positiva con la rentabilidad. En contraste, el periodo medio de cobranza y la rotación de activos no reflejaron efectos relevantes, mientras que una mayor rotación de clientes se asoció negativamente con el desempeño financiero. Estos hallazgos evidencian que una administración eficiente de los elementos que componen el capital circulante favorece no solo la rentabilidad, sino también la estabilidad y la creación de valor empresarial. En un entorno competitivo y con limitaciones de acceso al financiamiento, estas prácticas resultan determinantes para fortalecer la permanencia de las microempresas en la estructura empresarial ecuatoriana.

Palabras clave: rentabilidad, microempresas, eficiencia, apalancamiento, empresas, Ecuador, antigüedad, gestión.

Introduction

Working capital plays an integral role in short-term financial management and is key to profitability, liquidity, and shareholder value creation. The investments made by the company in current assets and current liabilities represent an important item within the economic and financial structure of the company. According to Hossain (2021), every company, regardless of the size and nature of its business, needs efficient working capital management to maintain liquidity and profitability levels in order to avoid scenarios of financial insolvency and business failure. Ahmeti and Balaj (2023) argue that the basic objective of working capital management is to provide adequate support for the efficient functioning of the company's commercial operations, achieving a balance between its three dimensions, namely profitability, liquidity, and risk.

Previous studies (Korent and Orsag, 2023; Madhou *et al.*, 2015) agree that efficient management of working capital components will enable both small and large companies to achieve financial flexibility and reduce their dependence on external sources of financing. On the other hand, poor management of both current assets and current liabilities reduces the profitability of investments in the short term (Mardones *et al.*, 2024). This element is particularly relevant in companies engaged in trade, where cash flow is essential for long-term sustainability (Ngwenya, 2010).

Working capital management is particularly important for microenterprises due to the restrictions they face in accessing external financing, lack of raw materials, and scarcity of customers. These organizations expand thanks to factors such as entrepreneurship and the quality of their products in relation to demand. Therefore, proper management of their economic structure becomes a necessary condition for maintaining their operations. In this context, Zambrano-Farías *et al.* (2023) state that, due to these limitations, microenterprises must periodically evaluate their financial policies to ensure adequate levels of profitability and liquidity.

In an emerging economy such as Ecuador's, these enterprises play a key role in job creation and economic growth (Rifai *et al.*, 2024). Defined as owner-managed organizations typically created by a marginalized member of the population, these enterprises take various organizational forms to address barriers to entry and capital constraints (Ghosh and Guha, 2015). However, because they are small, microenterprises are much more flexible and responsive to market and customer demand, allowing them to progress despite limited support from government, civil, and financial organizations (Ruiz López *et al.*, 2023).

In this context, it is imperative to understand how working capital elements influence the performance of microenterprises in order to develop financial strategies that strengthen their sustainability in the medium term. This research contributes to the literature through an empirical analysis that takes into account the at-

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tributes of the commerce sector in Ecuador, providing evidence that allows for both academic and business decisions to be made.

The rest of the study is organized as follows: Next, a brief literature review of the relationship between working capital and business profitability is presented. Section 2 describes the sample used, the variables included in the model, and the empirical method. Section 3 presents the results, and section 4 concludes with the study's findings, limitations, and possible avenues for future research.

Literature review and research hypotheses

The study of working capital and its impact on the financial performance of companies has become increasingly relevant in recent years. This interest stems from its close relationship with the ability of companies to invest large sums of money in current assets, relying on current liabilities as a source of financing (Susilo *et al.*, 2020). For Wichitsathian (2019), working capital management is a type of liquidity management of current assets and liabilities that deals with the interrelationships between accounts receivable, accounts payable, inventory, and cash flow. Priharta and Gani (2024) state that the main objective of working capital is to meet operational needs while reducing the risk of being unable to meet payment commitments and avoiding unnecessary investments in this area. In this way, efficient resource management not only ensures the company's ability to meet its short-term obligations, but also influences its potential to create value in the medium and long term.

The financial literature presents various approaches to this relationship: Durrah *et al.* (2016) point out that achieving a balance between profitability and liquidity allows financial resources to be used efficiently without jeopardizing the fulfillment of obligations. Authors such as Hossain (2021) and Wichitsathian (2019) agree that the constant generation of cash flows is essential for the company to make investments that guarantee its growth and allow it to meet its short-term obligations. On the other hand, poor management of working capital elements causes sharp variations in the company's cash level which, in the case of microenterprises, compromises their stability and permanence in the market.

Previous studies (Hersugondo *et al.*, 2025; Spitsina *et al.*, 2022; Yazdanfar, 2013) recognize that variables such as company size, cash conversion cycle, and macroeconomic market conditions have a direct impact on working capital investment. In the case of emerging economies, companies are forced to rely on their own resources due to financing constraints, which increases the need for efficient management to avoid scenarios of financial stress and subsequent business failure (Anton and Afloarei Nucu, 2020).

According to Syaharani and Chalid (2021), working capital management strategies can be aggressive or conservative. Aggressive policies aim to minimize current asset levels in order to increase profitability; however, this strategy increases the likelihood of the company experiencing financial insolvency. In contrast, the conservative approach prioritizes high levels of cash flow by increasing short-term resources, thereby seeking to reduce financial risk with more moderate returns (Afza and Nazir, 2008). In countries such as Jordan (Al-Shubiri, 2010) and Pakistan (Afza and Nazir, 2008), the implementation of aggressive working capital management policies has negatively affected profitability. Conversely, studies conducted in Croatia (Korent and Orsag, 2023) and Poland (Anton and Afloarei Nucu, 2020) show that working capital management through conservative policies has a positive effect on financial performance. Specifically, the effectiveness of these financial strategies depends on the economic context and access to financing in each country.

Additionally, the efficiency of working capital management is also evaluated using financial indicators such as inventory turnover, accounts receivable turnover, and accounts payable turnover, as well as the components of the cash conversion cycle. For Binsaddig *et al.* (2023), these indicators allow opportunities for improvement in resource management to be identified, while Kasozi (2017) asserts that

higher inventory and portfolio turnover improve profitability. However, Vicente-Ramos *et al.* (2020) conclude that there is a negative relationship between profitability and the average collection period (ACP conclude that the impact of accounts payable turnover may vary depending on the terms of negotiation with suppliers and the associated financial costs.

Based on the theoretical review presented, the following research hypotheses are proposed:

H_1 : The age of microenterprises has a direct relationship with the financial profitability of companies in the commerce sector in Ecuador.

H_2 : Leverage has a positive effect on the financial performance of microenterprises in the commerce sector in Ecuador.

H_3 : The average collection period does not have a significant influence on the financial profitability of the companies under study.

H_4 : Equity strength has a direct impact on the financial performance of microenterprises in the commerce sector in Ecuador.

Materials and method

Sample selection

The sample obtained and used in this research consisted of microenterprises grouped in sector G (according to the National Classification of Economic Activities: wholesale and retail trade; repair of vehicles, motor vehicles, and motorcycles) that reported their financial and accounting information through their financial statements to the Superintendency of Companies, Securities, and Insurance in 2023.

To ensure the quality and representativeness of the data in the context of the study, the following selection criteria were established: (i) only micro-enterprises incorporated as corporations or limited liability companies were included; (ii) the selected companies had sales of less than USD 100,000; (iii) organizations with equity greater than or equal to USD 800 were included; (iv) companies whose results for the 2023 fiscal year showed profits were included; and (v) companies with incomplete information were eliminated. Once the aforementioned processing was carried out using the STATA 18 statistical package, the sample for this study consisted of 1,634 companies.

Description of variables

The study focused on examining the variables that are considered part of working capital management and that, according to financial theory, affect profitability. To evaluate financial performance, ROA (*return on assets)* and ROE (*return on equity)* indicators are commonly used, as they allow for effective measurement of the return on investments based on assets and shareholder contributions (Rifai *et al.*, 2024). In line with previous studies (Endri *et al.*, 2020; Islam and Ullah, 2020), fixed asset turnover (FATO), this research has used financial profitability as a quantitative continuous dependent variable.

Although Romero Espinosa (2013) confirms the usefulness of the financial information provided by the type of companies under analysis. To achieve this end, the accounting records of all companies required to report to the Colombian Superintendency of Companies for the years 2005 to 2011 were taken, from these, 40 financial ratios and 5 structural ratios (independent variables) were calculated. The explanatory variables are classified into internal factors, environmental factors, and factors related to the management of the company's owner or shareholder. This study focuses only on internal factors due to the quantitative nature of the (cross-sectional) analysis and the availability of reported financial data. The selected variables are based on previous studies widely recognized in the literature on working capital and profitability.

Table 1 describes the variables used in the research.

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Table 1
Definition of variables

Abreviation	Variable	Definition	Authors
ROE	Financial profitability	Net profit divided by equity	Shahnia *et al.* (2020); EL-Ansary and Al-Gazzar (2020)
Apalanc	Leverage	Total assets divided by equity	Susanti *et al.* (2020)
PPC	Average collection period	(Accounts receivable * 365) divided by sales	Wichitsathian (2019); Ahmeti *et al.* (2022)
RotActTotal	Total asset turnover	Sales divided by total assets	Alarussi y Alhaderi (2018); Ceylan (2021)
RotCxC	Accounts receivable turnover	Sales divided by accounts receivable	Kasozi (2017); Phuong and Hung (2020)
Fort	Equity strength	Share capital divided by equity	Freyre (2018)
RentOper	Operating profitability	Operating profit divided by equity	Endri *et al.* (2020)
Edad	Age	Time the company has been in the market	Syaharani and Chalid (2021); Yazdanfar (2013)

Note: Prepared by the authors based on the cited literature.

Financial profitability

Authors such as Shahnia *et al.* (2020) highlight that ROE is a solid indicator for evaluating performance and efficiency in business management. This financial indicator reflects the ratio between after-tax profit and the company's equity, allowing for analysis of the organization's ability to generate profits from the capital contributed by shareholders (EL-Ansary and Al-Gazzar, 2020; Guragai *et al.*, 2019).

Leverage

Defined as the ability of equity to obtain assets (Susanti *et al.*, 2020), leverage is a financial indicator widely used in empirical studies to analyze its influence on business profitability . Companies whose profitability is sustainable over time react by leveraging themselves as a result of the positive relationship between these variables.

Average collection period

This is recognized as one of the key elements in working capital management (Wichitsathian, 2019). According to the financial theory linked to this area, business profitability tends to increase when the recovery period for accounts receivable is reduced, indicating an inverse relationship between the two variables (Ahmeti *et al.*, 2022; Kasozi, 2017).

Total asset turnover

Total asset turnover is an activity ratio that assesses the level of efficiency with which a company uses its resources to generate income. Most previous research, on which this study is based (Alarussi and Alhaderi, 2018; Ceylan, 2021), agrees that there is a direct and statistically significant relationship between this indicator and business profitability.

Accounts receivable turnover

Previous studies (Binsaddig *et al.*, 2023; Wichitsathian, 2019) conclude that this financial indicator is one of the most important elements in working capital management and has been frequently used in models that aim to predict corporate profitability, financial stress, and business failure. Like the previous indicator, it has a positive relationship with financial performance, positioning itself as a key tool for evaluating the economic performance of organizations. This indicator shows how many times the company manages to recover its credit sales during a given period, which allows it to measure whether credit policies are effective (Kasozi, 2017; Phuong and Hung, 2020).

Equity strength

This ratio measures the percentage of capital contributed by shareholders in relation to the company's total equity, which is a key factor in assessing the financial structure and level of dependence on shareholder contributions in the development of the company's operations (Freyre, 2018).

Operating profitability

In financial literature, this indicator is fundamental to financial performance analysis, as it allows for estimating the firm's ability to create value from its own funds, focusing on operating results without taking into account non-operating expenses incurred by the company.

Age

As in previous research (Orazalin *et al.*, 2019; Ruiz López *et al.*, 2023), this study defines the age of the company as the number of years it has been in the market since its creation or incorporation. Due to its importance, the relationship between the age of the company and its profitability has been widely studied in financial theory. Authors such as Syaharani and Chalid (2021) and Yazdanfar (2013) indicate that there is a negative relationship between the two variables, i.e., the longer the company has been in the market, the lower its ability to generate profits. In contrast, studies such as those by Balasubramanian *et al.* (2019) and Takon and Atseye (2015) argue that this relationship is direct because companies with a longer track record tend to develop specific advantages that contribute positively to their financial performance, such as experience and economies of scale.

Methodology

This research adopted a quantitative approach, with a descriptive, correlational, and explanatory scope, based on a non-experimental cross-sectional design. A linear regression model was used to analyze the relationship between working capital components and the financial profitability of microenterprises in the commercial sector in Ecuador. This type of analysis allows the average value of the dependent variable—financial profitability—to be estimated based on a set of independent variables.

Prior to estimating the model, an analysis of the data distribution was performed to validate the assumptions of normality required for parametric methods. To this end, the Jarque-Bera (JB) test was applied, which allows evaluating whether the data follow a normal distribution, considering the asymmetry and kurtosis of the sample. The formula used is as follows:

$$JB = \frac{n}{6}\left(S^2 + \frac{(K-3)^2}{4}\right)$$

Where n is the sample size, S is the skewness, and K is the kurtosis. The resulting value of the JB statistic is compared with the chi-square distribution with two degrees of freedom. This research confirmed that the variables used do

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not show a significant deviation from normality, which validates the application of the linear regression model under the classical assumptions.

The equation of the econometric model used is presented below, which describes the relationship between the factors associated with working capital and the financial performance of the microenterprises analyzed:

$$RentFinanc = \beta\_0+\beta\_1\ Apalanc+\beta\_2\ PPC+ \beta\_3\ RotActTotal+\beta\_4\ RotCxC+\beta\_5\ Fort+ \beta\_6\ RentOper+\beta\_7\ Edad+ \phi$$

In this equation, the dependent variable represents financial profitability. The explanatory variables included in the model are , which corresponds to financial leverage; , the average collection period; , which represents total asset turnover; , accounts receivable turnover; , equity strength; , operating profitability; and , which refers to the number of years from the company's incorporation to 2023. Finally, the coefficients quantify the effect of each explanatory variable on financial profitability and correspond to the random error term that captures the influence of unobserved factors.

Results and discussion

The results in Table 2 present the descriptive analysis of the main financial variables considered in the model, together with complementary indicators that allow for a broader interpretation of the behavior of microenterprises in the commercial sector in Ecuador. In this study, the size of the company was evaluated based on the total value of its assets, an indicator that directly reflects its operational capacity and economic structure. On average, the companies analyzed reported assets amounting to USD 715,422.98, with values ranging from a minimum of USD 3,814.65 to a maximum of USD 19.04 million.

Indicators frequently used in the literature were also added. Regarding short-term solvency, measured by the current liquidity ratio, an average of USD 6.25 was obtained. Although this figure generally shows a solid capacity to meet liabilities immediately, the analysis revealed considerable variability, with values ranging from USD 0 to USD 9,332.14. This range reflects the marked financial dynamism of the commercial sector and the diversity in resource management among Ecuadorian microenterprises.

As for leverage, another indicator frequently used in the literature and defined as the ratio of share capital to total equity, the average was USD 12.04, with values ranging from USD 0.84 to USD 563. At the same time, equity strength averaged 17.52%, with values ranging from -11.84% to 742%, suggesting that in Ecuador's commercial sector there are, on the one hand, companies with negative equity and, on the other, companies with highly leveraged structures.

Indicators related to working capital management also show relevant results. Thus, portfolio turnover and total asset turnover averaged 35.21 and 5.48 times, respectively. Meanwhile, the average collection period was 82.31 days, indicating that companies took, on average, just over three months to recover credit sales.

Finally, the average economic return of the microenterprises analyzed was 8%, ranging from 0% to 65%, while the financial return, selected as the dependent variable in this study, averaged 21.38%, with minimum and maximum values of 1.93% and 69.25%, respectively. These results showed significant financial performance and highlighted the role of these companies within the Ecuadorian business structure, demonstrating their ability to generate attractive returns despite the restrictions inherent to the sector.

Table 2
Descriptive analysis of the sample

Variables	Mean	Standard deviation	Minimum	Maximum
Size	715,422.98	928,214,0.5	3,814.65	19,041,000.63
Current liquidity	6.25	107.81	0	5,322.14
Leverage	12.04	19.62	0.84	563.18
Equity strength	0.1752	0.43	-0.1184	7.42
Accounts receivable turnover	35.21	230.12	0	2,741.02
Total asset turnover	5.48	3.92	0	102.35
PPC	82.31	117.38	0	1,176.27
Financial profitability	0.2138	0.18	0.0193	0.6925
Economic profitability	0.08	0.11	0	0.65

The correlation matrix, shown in Table 3, revealed statistically significant associations between the explanatory variables and the financial performance of the companies selected for this study. As seen, leverage, total asset turnover, and operating performance have a positive and significant relationship ($p<1$ %) with financial performance, suggesting that these factors have a favorable impact on the economic performance of organizations. In contrast, average collection period and company age showed a considerable inverse correlation ($p<1$ %) indicating that longer account recovery times and a longer track record in the market could be related to lower levels of financial performance.

Similarly, accounts receivable turnover showed a positive and statistically significant correlation at the 10% level ($p<10$ %), suggesting a slight direct association with financial profitability. On the other hand, equity strength showed a negative and significant relationship at 5% ($p<5$ %), indicating that a higher level of equity capital may not necessarily translate into better financial performance. Based on these correlations, and once the magnitude and direction of the relationships between the independent variables and financial profitability had been determined, the econometric model was estimated, the purpose of which was to identify the effect of working capital components on the financial performance of the companies analyzed.

Table 3
Pearson correlation matrix

Variables	ROE	Leverage	PPC	RotActTotal	RotCxC	Fort	RentOper	Age
ROE	1.0000							
Leverage	0.1786***	1.0000						
	(0.000)							
PPC	0.1454***	0.0478	1.0000					
	(0.0021)	(0.7961)						
RotActTotal	0.2594***	-0.0147	0.0478**	1.0000				
	(0.000)	(0.6742)	(0.0325)					
RotCxC	0.3712*	-0.0875	0.0814***	0.2416***	1.0000			
	(0.0526)	(0.4127)	(0.0000)	(0.0000)				

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Fort	-0.0952**	0.0014***	0.1246***	-0.0097	-0.1175*	1.0000		
	(0.0318)	(0.0000)	(0.0000)	(0.56314)	(0.0684)			
RentOper	0.4357***	-0.2056**	0.2598	0.2145	0.0119	-0.3314	1.0000	
	(0.0000)	(0.0248)	(0.3952)	(0.5137)	(0.1537)	(0.2371)		
Edad	-0.3148***	-0.1452***	0.1487	-0.2281	-0.0098*	0.0627	-0.4581	1.0000
	(0.0000)	(0.0072)	(0.7268)	(0.3714)	(0.8296)	(0.4731)	(0.4472)	

Note. *Significant at 10%; **Significant at 5%; ***Significant at 1%.

Table 4 below shows the results of the estimated regression model, which found a statistically significant relationship at 1% ($p<0.01$) between financial profitability and the explanatory factors included in the analysis. In line with previous research (Ilaboya and Ohiokha, 2016; Pervan *et al.*, 2019; Takon and Atseye, 2015), a direct and significant relationship was identified between leverage, firm age, equity strength, and operating profitability. These findings confirm hypotheses 1, 2, and 4 formulated in this study, highlighting the importance of these variables in generating sustainable financial results within microenterprises in the commerce sector in Ecuador.

Regarding the elements that are part of working capital, it can be observed that both the average collection period and total asset turnover have an inverse relationship with financial performance; however, these coefficients were not significant. These findings confirm hypothesis 3, which states that the average collection period does not have a significant impact on financial performance. This result is consistent with those obtained by Akoto *et al.* (2013) and Nurhayati *et al.* (2017), who indicate that flexible credit policies in terms of maturity do not have a significant effect on financial profitability, especially in economies where sales growth is prioritized. In line with the results obtained by Sehgal *et al.* (2021), the customer turnover ratio in this study shows a direct and significant relationship, indicating that higher recovery of accounts receivable has a positive impact on financial performance and thus improves the company's liquidity.

The statistical model used in this research explains 52.70% of the financial profitability of the companies studied. Although this coefficient of determination suggests that there are other factors not included that also influence financial performance, the variables considered provide a solid and representative basis for understanding the dynamics of profitability in the context of micro-enterprises in the commerce sector, highlighting the importance of strategic working capital management and financial structure in generating business value..

Table 4

Estimated regression

Variable	Abbreviation	Coefficient	t-value	P-value
Leverage	Leverage	0.0151***	5.814	0.0000
Average collection period	PPC	-0.0435	-0.72	0.6873
Total asset turnover	RotActTotal	-0.0745	-0.61	0.3257
Accounts receivable turnover	RotCxC	0.0087*	2.57	0.0647
Equity strength	Fort	0.0275***	-3.54	0.0000

Variable	Abbreviation	Coefficient	t-value	P-value
Operating profitability	Operating Profitability	2.248***	18.59	0.0000
Age	Age	0.1462	-12.68	0.0000
	F	98.27		0.0000
	R^2	0.5270		

Note. *Significant at 10%; **Significant at 5%; ***Significant at 1%.

In order to verify the absence of multicollinearity among the independent variables, a variance inflation factor (VIF) analysis was applied, a widely recognized tool in econometrics for detecting possible correlations between predictors in regression models. As shown in Table 5, the average VIF value was 1.09, considerably lower than the critical threshold of 5, indicating that there are no relevant levels of multicollinearity between the explanatory variables included in the model.

Table 5
Variance inflation factor

Variable	Abbreviation	Coefficient	t-value
Leverage	Leverage	1.9	0.526
Average collection period	PPC	1.6	0.625
Total asset turnover	RotActTotal	1.75	0.571
Accounts receivable turnover	RotCxC	1.45	0.689
Equity strength	Fort	1.55	0.645
Operating profitability	RentOper	1.4	0.714
Age	Age	1.5	0.666
	Average VIF	1.59	

Conclusions

The objective of a company is to maximize shareholder profits by investing in assets that are profitable and generate value for the company. For this reason, business success depends on management's ability to effectively manage its resources. The objective of this research was to examine the relationship between the components of working capital and the financial profitability of micro-enterprises operating in the commercial sector in Ecuador. To this end, a model was constructed to identify the factors that explain financial profitability behavior.

The findings confirm that indicators related to the financial and operational structure of microenterprises have a significant impact on profitability. In other words, in developing economies such as bbEcuador's, financial performance does not depend on macroeconomic factors but can also be managed through internal decisions related to the efficient administration of resources, capital structure, and budget.

One of the main conclusions drawn from this research is that financial managers of microenterprises should adopt a comprehensive approach to working capital management. Beyond the importance of maintaining adequate

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levels of liquidity, it is essential that short-term decisions be linked to the company's profitability objectives. This implies the ongoing review of credit policies, the strengthening of the company's social capital, and the optimization of operating cycles.

It was also determined that age is not only an indicator of market positioning, but it also allows microenterprises to consolidate efficient practices that affect their financial performance. In other words, microenterprises should innovate in production processes that strengthen their financial performance as they gain experience in the market.

The results of this study allow us, from a strategic perspective, to consider the role that the sector in which the microenterprise operates, and the economy plays in its financial performance. Although the research focused on variables specific to the company, the findings suggest that the country's structural conditions, such as limited access to credit or the informality of certain commercial activities, can increase or reduce the effects of business decisions. Therefore, it opens up a space for debate on the need to design public policies aimed at strengthening this business conglomerate, in which working capital is considered a key factor in improving the sector's competitiveness.

The contribution of this research to financial theory lies in proposing an empirical analysis that integrates factors related to financial structure and working capital, applied to a specific sector. This broadens the understanding of the determinants of corporate profitability in developing economies and provides useful tools for decision-making at both the business and institutional levels.

Like other studies, this research is not without limitations; however, these limitations give rise to opportunities for future studies. First, the results are limited to companies in a specific sector, such as the commercial sector, which prevents these findings from being extrapolated to other sectors or types of companies. Second, the use of cross-sectional data prevents the observation of changes over time or the establishment of definitive causal relationships. Finally, categorical and macroeconomic variables such as GDP growth or inflation, which can offer a comprehensive view of how working capital affects company profitability, were not considered.

Based on these limitations, several avenues for future research are proposed. It is suggested that longitudinal studies be conducted to analyze the behavior of financial profitability in response to changes in working capital policies over time. Second, it would be relevant to replicate the model in other economic sectors, such as industry or services, to compare the effects on different operational dynamics. It is also recommended to incorporate qualitative variables related to the composition of the board of directors, the level of digitization, or organizational culture, in order to identify whether there are internal capabilities that enhance or limit the impact of working capital on profitability. Finally, comparative research between countries in the region could offer relevant findings on the role that institutional frameworks play in the effectiveness of short-term financial strategies.

The existence of working capital is closely linked to the company's liquidity situation. In this sense, proper working capital management prevents imbalances that cause liquidity situations and force the suspension of payments or even jeopardize the company's survival due to lack of credit. The survival of the company, understood as its ability to meet its short-term obligations, or the probability of being declared technically insolvent, depends on proper working capital management.

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Author(s)	Contributions
María Estefanía Sánchez-Pacheco	Conceptualization, project management, original draft.
María del Carmen Valls-Martínez	Research, resources, software, supervision, validation, review, and editing.
Fernando José Zambrano-Farías	Methodology, visualization, data imputation, review, and editing.

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Impulsive buying behavior on Instagram among generations Y and Z in Indonesia

Comportamiento de compra impulsiva en Instagram entre las generaciones Y y Z en Indonesia

Yanto Azie Setya
PhD student of management at Universidad Padjadjaran, Bandung, Indonesia
yanto17001@mail.unpad.ac.id
https://orcid.org/0009-0002-1113-4090
https://ror.org/00xqf8t64

Arief Helmi
Professor and researcher at Universidad Padjadjaran, Bandung, Indonesia
arief.helmi@unpad.ac.id
https://orcid.org/0000-0003-3781-4852
https://ror.org/00xqf8t64

Dwi Kartini
Professor and researcher at Universidad Padjadjaran, Bandung, Indonesia
dwi.kartini@fe.unpad.ac.id
https://orcid.org/0009-0004-1019-8177
https://ror.org/00xqf8t64

Yevis Marty Oesman
Professor and researcher at Universidad Padjadjaran, Bandung, Indonesia
yevis.marty@fe.unpad.ac.id
https://orcid.org/0009-0004-0662-8058
https://ror.org/00xqf8t64

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Abstract: Instagram has become a major platform for online shopping, especially among the younger generation. Understanding the factors that influence impulsive buying on social media has become increasingly relevant for marketers. This study examines the influence of Instagram usage intensity, extroversion, and positive shopping emotions on impulsive buying behavior, with a particular focus on generational differences between Generation Y and Generation Z. Data were collected from 442 respondents through a structured questionnaire and analyzed using SmartPLS 3.3.2 to test six hypotheses. Validity and reliability were assessed using Cronbach's alpha, composite reliability, and average variance extraction (AVE). Findings reveal that for Generation Z, frequent Instagram use and positive emotions significantly drive impulsive purchases. In contrast, for Generation Y, extroverted personality traits have a stronger influence on buying decisions. These results highlight distinct psychological patterns across generations in online shopping behavior. The study provides practical insights for marketers seeking to tailor their strategies to meet generational preferences. By identifying different behavioral drivers, it contributes to the growing literature on digital consumer behavior and guides brands operating in social media environments.

Keywords: behavior, emotional, consumption, generation Y, generation Z, Instagram, impulsivity, personality.

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Resumen: Instagram se ha convertido en una importante plataforma para las compras en línea, especialmente entre la generación más joven. Comprender los factores que influyen en las compras impulsivas en las redes sociales resulta cada vez más importante para los profesionales del marketing. Este estudio examina la influencia del uso de Instagram, la extroversión y las emociones positivas relacionadas con las compras en el comportamiento de compra impulsiva, con énfasis en las diferencias generacionales entre la Generación Y y la Generación Z. Se recopilaron datos de 442 encuestados mediante un cuestionario estructurado y se analizaron con SmartPLS 3.3.2 para comprobar seis hipótesis. Se evaluaron la validez y la fiabilidad mediante el alfa de Cronbach, al igual que la fiabilidad compuesta y la extracción de la varianza media (AVE). Los resultados revelan que, para la Generación Z, el uso frecuente de Instagram y las emociones positivas impulsan significativamente las compras impulsivas. Por el contrario, para la Generación Y, los rasgos de personalidad extrovertida tienen una mayor influencia en las decisiones de compra. Estos resultados muestran los patrones psicológicos entre generaciones en el comportamiento de compra online. El estudio ofrece información práctica a los profesionales del marketing que buscan adaptar sus estrategias para satisfacer las preferencias generacionales. El poder identificar los diferentes factores que impulsan el comportamiento contribuye a la creciente bibliografía sobre el comportamiento del consumidor digital y sirve de guía a las marcas que operan en entornos de redes sociales.

Palabras clave: comportamiento, emoción, consumo, Generación Y, Generación Z, Instagram, impulsividad, personalidad.

Introduction

Among the many social media today, Facebook and Instagram are widely used platforms for promoting products and conducting online sales. This is influenced by the number of active users of these two social media which is quite a lot compared to others, making them social activities with the highest number of online business accounts (Lajnef, 2023). In Indonesia, the adoption of these platforms is particularly striking. By 2024, Instagram is projected to have 90 million active users in Indonesia (Rizaty, 2024), reflecting significant growth from 22 million in 2016. This rapid increase underscores Instagram's role as a dominant space for consumer interaction and commercial activities. Moreover, Indonesian consumers spend an average of 3 hours and 16 minutes per day on social media, with a notable portion of this time dedicated to browsing and shopping (Mustikasari, 2018), making social media a fertile ground for influencing consumer behavior.

There is an important factor that influences impulsive online purchases, namely the presence of positive consumer shopping emotions (Zhao *et al.*, 2022). This positive shopping emotion can be influenced by several factors such as online sales promotions, the intensity of use of Instagram (social media), the value of hedonic spending, and extraversion personality (Helmi *et al.*, 2023). Internal stimulus factors predominantly influence consumer emotions which ultimately lead to impulsive online purchases (Lee and Wu, 2017). These internal factors are the hedonic and utilitarian values of the consumer. A hedonistic lifestyle often emphasizes pleasurable experiences and the avoidance of unpleasant or painful ones. Hedonic influences consumer emotions in making online (Giovanni and Handriana, 2024). However, utilitarian motives do not always affect impulsive online purchases, although they always result in customer satisfaction with the products they buy and this is different from hedonic motives that always encourage impulsive buying (Lee and Wu, 2017).

Lajnef (2023) said that social media networks can increase the self-esteem of individual users and the assessment of high self-esteem in social media can reduce the level of consumer self-control which will ultimately encourage impulsive purchases. One benefit of advertising on Instagram is the ability to collaborate with popular users or influencers who have a strong follower base to promote a company's products. Instagram users who have many followers will give a big influence on people impression (Kristi and Aruan, 2023). Another researcher suggested that the artists used to endorse products influence the buying behavior of young women (Djafarova and Rushworth, 2017). Individuals with lower self-esteem on social media are more likely to be influenced by the opinions of others.

In their research Turkyilmaz *et al.* (2015) revealed the results that agreeableness, openness to change, and extraversion are directly proportional and have a positive influence on online consumer shopping attitudes. Helmi *et*

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al. (2023) suggested that open attitude towards new things influences adventure motivation and consumer ideas, extraversion is closely related to social motivation, neuroticism is related to lack of social motivation, and caution is related to motivation to obtain comfort. The influence of personality in this study will ultimately encourage the emergence of positive emotions in consumers when making online purchases and then imply impulsive buying online. This study aims to analyze Buying Behaviors Y and Z Different. Where comparative studies between generations are rarely carried out, especially on buying behavior, so this is a novelty that needs to be explored. The findings of this study can serve as a useful reference in the practical world in evaluating the purchasing behavior of each generation and the steps for making decisions more appropriately.

This study examines Instagram as a central platform shaping purchasing behavior in Generation Y and Z, focusing on how usage intensity and interaction with content influence online impulse buying. Instagram's visual and trend-driven nature makes it an ideal context for this exploration. The novelty of this research lies in its comparative approach, analyzing how psychological traits like extraversion and emotional responses to shopping mediate the impact of Instagram use across generations. While prior studies have separately explored social media, personality, emotions, and impulsive buying, few have integrated these elements into a unified model. This study fills that gap by revealing how the interplay of Instagram engagement, personality traits, and emotional responses drives impulsive purchases differently in Gen Y and Gen Z.

The aim of the research is: 1.) Does Instagram intensity have a positive effect on positive shopping emotions? 2.) Does extraversion personality have a positive effect on positive shopping emotions? 3.) Do positive shopping emotions have a positive effect on impulsive online purchasing? 4.) Does Instagram usage have a positive effect on impulsive online purchases? 5.) Does extraversion personality have a positive effect on impulsive buying online? 6.) Are generation y and z moderate intensity of Instagram usage, extraversion personality to positive shopping emotion and impulse buying online?

Methodology

Theoretical model and hypotheses

Web browsing initiates online purchasing by providing information and selecting websites (Solberg Söilen, 2024). Consumer browsing time positively correlates with purchases (Sun *et al*., 2024). Facebook usage intensity is measured by time spent, number of friends, and group memberships (Li, 2020). Personality traits like neuroticism, agreeableness, and openness significantly influence online purchasing decisions, with emotions playing a key role (Bosnjak *et al*., 2007; Turkyilmaz *et al*., 2015).

Emotions influence impulsive buying, driven by factors like arousal and comfort (Weinberg and Gottwald, 1982). Impulsive purchases are often unplanned and driven by emotions, which can be influenced by web browsing and social media (Singh *et al*., 2023). Positive emotions from online shopping increase unplanned purchases (Verhagen and Van Dolen, 2011). Social media platforms such as Instagram have been found to boost users' self-esteem while also diminishing self-control, potentially encouraging impulsive purchasing behavior (Jin and Phua, 2014).

Zhang *et al*. (2018) found that browsing behavior and website quality affect impulsive online purchases, with personality traits acting as moderators. Extraversion tends to increase impulsiveness, while neuroticism shows inconsistent effects (Hendrawan and Nugroho, 2018).

As digital adopters, Generation Y is comfortable navigating e-commerce platforms, shaped by their early exposure to the internet and social networking sites. Both generations interact with social media differently, influencing their impulsive buying tendencies. Generation Y often values authenticity and experience, making them responsive to influencer recommendations and perceived website quality, fac-

tors previously noted in the literature (Jin and Phua, 2014; Verhagen and Van Dolen, 2011). In contrast, Generation Z, grew up immersed in a digital environment, is more accustomed to fast-paced, visually rich platforms like TikTok and Instagram Reels. They tend to seek instant gratification and are more reactive to visual cues and flash promotions. Beyond general usage and emotional responses, elements like algorithm-driven content and short-form video engagement may reduce self-control and intensify impulsive buying among Gen Z. Their rapid browsing patterns and constant exposure to personalized content set them apart from Gen Y in the online shopping context.

H_1: The intensity of Instagram usage tends to enhance positive emotions in shopping.

Extroverts feel energized when interacting with others. The bustling retail environment and interactions with salespeople give them the opportunity to socialize and connect with others. For extroverts, the shopping experience is an adventure (Alves Gomes *et al*., 2022). For them, shopping is a dynamic experience, an opportunity to explore products, enjoy engaging displays, and immerse themselves in various atmospheres (Dwivedi *et al*., 2021). Both Generation Y and Z are generally receptive to new products or unfamiliar brands, and technologies like shopping apps or social media enhance interaction between consumers and brands (Dobre *et al*., 2021). These patterns suggest that extraversion positively influences emotional responses during shopping.

Although extroversion generally enhances positive shopping emotions, the way these emotions emerge can differ between Generation Y and Z. Extroverted Gen Y individuals may derive enjoyment from social shopping experiences —whether interacting in physical stores or sharing purchases on platforms like Facebook or Instagram, often valuing peer recommendations and social approval. In contrast, Gen Z, as digital natives, are more responsive to real-time, visually rich content on platforms like TikTok and Instagram Reels. Their positive emotions may be sparked by viral trends, unboxing videos, or interactive shopping challenges that allow for self-expression and broader social validation. These differences suggest that while the underlying premise is the same, the way extroversion triggers positive shopping emotions is highly dependent on each generation's digital environment and habits.

H_2: Extraversion personality tends to enhance positive emotions in shopping.

When people feel happy, satisfied, or entertained while shopping, they tend to be more impulsive. Positive emotions can reduce rational considerations and encourage spontaneous actions (Listriyani, 2019). Emotions such as joy or surprise can create a sense of urgency, making consumers feel the need to buy a product immediately before the opportunity is lost. Online shopping is often associated with a pleasant and satisfying experience. When consumers feel happy, they are more likely to buy a product without careful consideration (Setiawan and Ardani, 2022). Social media and product reviews can influence consumer emotions. When they see others enjoying a particular product, they may feel compelled to buy it too. Promotions that emphasize the experience and benefits of the product can attract consumers' attention and encourage impulsive purchases (Sun *et al*., 2024). Attractive website design, entertaining content, and friendly customer service can increase consumers' positive emotions. Thus, it can be said that Shopping Emotions have a positive effect on Impulsive Online Purchasing.

Gen Y (millennials), who grew up alongside the early e-commerce boom, tend to experience a surge in impulse buying when positive shopping emotions are triggered by factors such as nostalgia, exclusive offers, or familiar brand recognition. For them, impulse buying is often a form of instant gratification that complements a lifestyle already familiar with online shopping. On the other hand, Gen Z, who are true digital natives, are more responsive to positive shopping emotions that come from engaging

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visual content, relevant influencers, or interactive, gamified shopping experiences. Their impulsivity is often triggered by a sense of FOMO (fear of missing out) about the latest trends or the urge to express identity through products that are trending on social media.

H_3 : Positive Emotions in Shopping tend to enhance Impulsive Online Purchases.

Instagram is often used to showcase new and exciting products. The more a person uses Instagram, the more likely they are to see products that can tickle their fancy. Instagram can create a feeling of FOMO (Fear of Missing Out), where a person feels worried about missing out on a popular or limited product (Kristi and Aruan, 2023). This can encourage impulse buying. Instagram can be a place to compare yourself to others. When someone sees someone else owning a particular product, they may feel compelled to buy the same product to increase their social status. By understanding the relationship between Instagram usage and impulse buying, online businesses can develop more effective strategies to increase sales and build customer loyalty.

The intensity of Instagram usage does have a positive effect on impulsive online purchases, but the manifestation is different for Gen Y and Gen Z. For Gen Y (millennials), the intensity of Instagram usage in driving impulsive purchases is often related to exposure to targeted promotions, convincing product reviews from fellow users, or endorsements from figures who are considered authentic and credible in a particular niche. They may spend more time comparing products, reading in-depth reviews, and weighing value before finally being driven to buy impulsively by limited offers or curiosity. Meanwhile, Gen Z, as digital natives who grew up with Instagram as an integral part of their daily lives, shows impulsiveness that is more quickly triggered by highly engaging and immersive visual content (e.g. Reels or Stories), the influence of viral trends, and direct recommendations from influencers or peers they follow. They are more susceptible to the FOMO (fear of missing out) phenomenon and the urge to immediately own a product that is being talked about or shown off on their feed, making Browse intensity a direct trigger for impulsive purchases.

H_4 : The intensity of Instagram usage tends to enhance Impulsive Online Purchases.

Outside, is one of the main dimensions of Big Five's theory, which can affect the purchase of online pulse. The rich people who are superior often have features such as excellent energy, social communication and trends to find stimulation and new experiences. Outsiders often seek stimulation and excitement. They are generally more responsive to external stimuli and social cues, which can increase the likelihood of impulsive online purchases (Yulianto *et al*., 2021). For instance, eye-catching advertisements or limited-time promotions may easily capture their attention and trigger spontaneous buying decisions. Their tendency to value others' opinions and engage actively in online communities makes them more susceptible to product recommendations or trending items shared by peers (Noviantari and Rahardja, 2022). In some cases, impulse buying may serve as a form of virtual social interaction, allowing extroverts to feel more connected to the broader online environment (Nahai, 2012). Although extraversion is positively associated with online impulse buying, it does not act in isolation. Other contributing factors such as financial literacy, website design, and personal context also influence this behavior. Therefore, while a positive relationship exists, its strength and expression can vary among individuals.

Although extroversion is generally associated with online impulse buying in both Generation Y and Generation Z, the underlying motivations differ. For extroverted millennials (Gen Y), impulsive purchases are often driven by a desire to maintain social relevance, follow peer trends, or affirm identity through socially approved products. Their decisions tend to be shaped by familiar influencers or recommendations within their personal network. Conversely, extroverted Gen Z consumers display more spontaneous behavior, influenced by vi-

ral trends, online challenges, and the urge to share experiences instantly on platforms like TikTok or Instagram. Their impulse buying is tightly linked to real-time digital engagement and the influence of widely followed online personalities.

H_5 : Extraversion personality tends to enhance on Impulsive Online Purchases.

For Generation Y, Instagram is not just a place to share personal moments with friends, but also a means to expand their network and even promote their business or professional activities. Generation Z is known as "digital natives" and tends to spend more time on Instagram for a variety of content types, including short videos, memes, and interactions with influencers. Generation Y tends to use a variety of channels to shop, including brick-and-mortar stores, e-commerce, and mobile apps. They value the convenience of shopping online but still visit a physical store for an in-person experience. Furthermore, Generation Y Values an integrated and enjoyable shopping experience, with an emphasis on good customer service. Meanwhile, Generation Z Shops more often online, especially through mobile apps (Dobre *et al.*, 2021). They are very familiar with shopping directly in apps and often use features like live shopping. Generation Z also tends to Prioritize speed and convenience in the purchasing process. They may be less patient with long or complicated processes (Sudirjo *et al*., 2023).

Extraversion, or the tendency to be social, energetic, and open to new experiences, influences how Generation Y (Millennials) and Generation Z behave when shopping online. Generation Y wants a balance between online and offline shopping and values good customer service. Generation Z prioritizes speed, convenience, and a fully digital and interactive shopping experience (Brand *et al*., 2022). Generation Y tends to feel regret after impulse purchases and is budget conscious (Gupta *et al*., 2023). Generation Z is more influenced by aesthetics and social engagement, with impulse purchases often triggered by visual factors and current trends. Generation Y's emotional response to offers is often related to excitement and FOMO (fear of missing out) which can motivate impulse purchases (Kristi and Aruan, 2023). Generation Z, on the other hand, has a quicker emotional response and is stimulated by the latest trends and interactive content that piques their interests and emotions. To examine whether the structural relationships in the research model differ between Generation Y and Generation Z, the following hypotheses are proposed:

H_{6a}: The effect of Instagram usage intensity on positive shopping emotions differs substantially between Generation Y and Generation Z.

H_{6b}: The effect of extraversion on positive shopping emotions differs substantially between Generation Y and Generation Z.

H_{6c}: The effect of Instagram usage intensity on online impulse purchases differs substantially between Generation Y and Generation Z.

H_{6d}: The effect of extraversion on online impulse purchases differs substantially between Generation Y and Generation Z.

H_{6e}: The effect of positive shopping emotions on online impulse purchases differs substantially between Generation Y and Generation Z.

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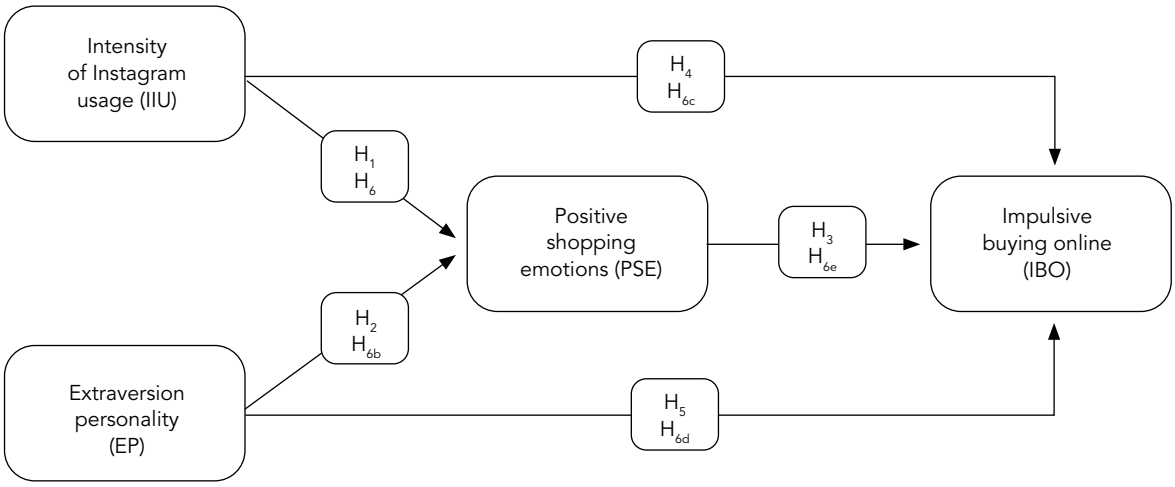
Figure 1
Conceptual framework



Data collection and sample description

This study employs a quantitative research approach to investigate the effects of variables such as Intensity of Instagram Usage (IIU), Extraversion Personality (EP), Positive Shopping Emotions (PSE), and Impulsive Buying Online (POI) among Generation Z and Generation Y consumers. The sample of this study is 229 consumers as Z Generation and 213 Y Generation in, Indonesia. These respondents used data taken from e-commerce users whose ages were classified into Generation Z and Generation Y respectively.

The sampling method used in this study is convenience sampling, which was selected due to its practicality and effectiveness in reaching the target population of Instagram users. Convenience sampling allows for the collection of data from readily available respondents who meet the inclusion criteria, thus facilitating the timely completion of the research.

The sample size was determined based on power analysis to ensure sufficient statistical power for hypothesis testing. A power analysis was conducted to estimate the minimum sample size needed to detect significant effects with a desired level of confidence (typically 0.80) and a significance level (α) of 0.05. The sample sizes of 229 Generation Z and 213 Generation Y were chosen to ensure adequate representation and robust results while accommodating the data collection constraints.

Methods

An online questionnaire survey was conducted to explore the relationships among the intensity of Instagram usage, extraversion personality, positive shopping emotions, and impulsive buying online. The questionnaire was divided into two sections: the first section collected demographic information about the respondents. The questionnaire contains items with a Likert scale approach that are selected directly by respondents. In contrast, the second section included 18 questions related to the research constructs, as detailed in Table 2. Respondents were asked to rate these questions using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Demographic control questions (age, gender, education, using Instagram, and online buying frequency) help researchers understand the profile of participants. This is important for generalizing findings to a broader population or identifying specific groups that may respond differently.

The questionnaire was distributed via Google Forms, with a response period of approximately two months. For hypothesis testing, Structural Equation Modeling (SEM) using SmartPLS was employed. SmartPLS was chosen due to its flexibility in handling non-normally distributed data and its ability to accommodate various indicators (categorical, ordinal, interval, and ratio scales) within the same model.

Table 1
Summary of respondent's background

		Total (n= 442)		Y Generation (n=213)		Z Generation (n=229)	
				Frequency	%	Frequency	%
Gender	Males	185	41,86	105	49,29	80	34,93
	Females	257	58,14	108	50,71	149	65,07
Educations	Elementary school	3	0,68	1	0,47	2	0,87
	Junior high school	5	1,13	0	0	5	2,18
	Senior high school	87	19,73	19	8,92	68	29,69
	Diploma	26	5,89	11	5,16	15	6,55
	Undergraduate	281	63,72	142	66,67	139	60,70
	Postgraduated	38	8,62	38	17,84	0	0
	Doctoral	2	0,23	2	0,94	0	0
Using Instagram (year)	< 1 tahun	32	7,24	19	8,92	13	5,68
	1-3 tahun	111	25,11	56	26,29	55	24,02
	>3-5 tahun	141	31,90	68	31,92	73	31,88
	>5 tahun	158	35,75	70	32,87	88	38,42
Online buying frequency	Maximum	200		200		200	
	Minimum	1		1		1	

Results and discussion

The results of the data analysis, including reliability, construct validity, PLS regression, and multi-group analysis, are presented below.

First, the reliability and validity of the measurement model were examined. All the indicators of Generation Y are reported in Table 2, along with their means, standard deviations, and factor loadings. The scores of Cronbach's Alpha, Average Variance Extracted (AVE), and Construct Reliability (CR) are higher than acceptable levels, as presented in Table 3. Two items (IIU5 and IIU6) had factor loadings lower than the cut-off point of 0.70 (Figure 2) and were then excluded from the modified model (Figure 3).

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Table 2

Mean, standard deviation, and factor loading of each measurement item Z Generation

	Measured Item	Mean	Std. Deviation	Factor Loading
The intensity of Instagram usage (IIU)				
IIU1	Open longer Instagram accounts in a day	3.21	0.987	0.863
IIU2	Access more Instagram accounts in a day	3.239	0.966	0.868
IIU3	Access Instagram to make product purchases	3.784	0.904	0.788
IIU4	Open longer Instagram accounts in a day	3.981	0.883	0.774
Extraversion Personality (EP)				
EP1	Often greet other people first	4.061	0.719	0.857
EP2	High level of socialization	3.845	0.861	0.801
EP3	The level of communication attractiveness	3.681	0.846	0.745
EP4	High level of activity	3.831	0.805	0.803
Positive Shopping Emotions (PSE)				
PSE1	Happyness when shopping online	3.545	0.741	0.864
PSE2	Feeling satisfied when shopping online	3.366	0.749	0.896
PSE3	Feel a different passion when shopping online	3.441	0.727	0.887
Impulsive Buying Online (IBO)				
IBO1	Spur on spontaneous purchases	2.911	0.977	0.798
IBO2	Difficult to stop buying	2.366	0.996	0.859
IBO3	Always buy online	2.573	1.017	0.868
IBO4	Tendency of buying right away	2,549	0.956	0.890
IBO5	Tendency to buy without planning	2.427	1.003	0.843

Table 3
Reliability, validity, correlations and square roots of AVE's Y Generation

	Cron-bach's Alpha	AVE	CR	Fornell-Lacker Criterion				Heterotrait-Monotrait Ratio			
				IIU	EP	PSE	IBO	IIU	EP	PSE	IBO
Intensity of Instagram usage (IIU)	0.842	0.679	0.894	0.824	0.323		0.442		0.385		0.508
Extraversion Personality (EP)	0.820	0.644	0.878		0.802						
Positive Shopping Emotions (PSE)	0.858	0.779	0.913	0.330	0.249	0.882	0.449	0.385	0.283		0.503
Impulsive Buying Online (IBO)	0.905	0.726	0.930		0.239		0.852		0.253		

Figure 2
Research model of Y Generation

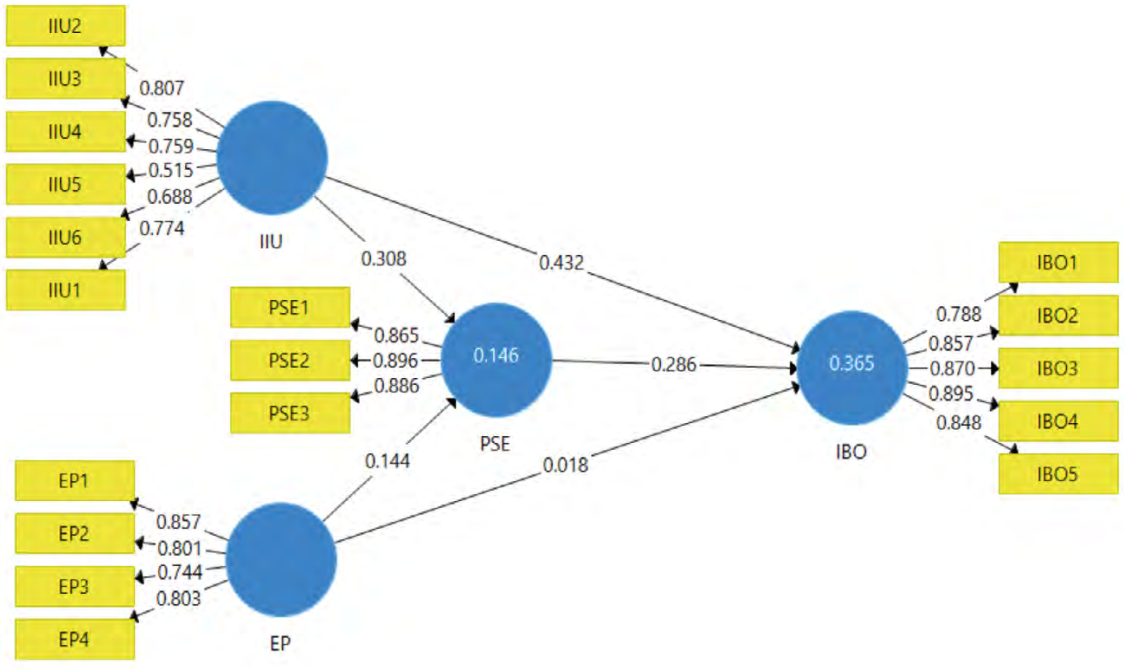

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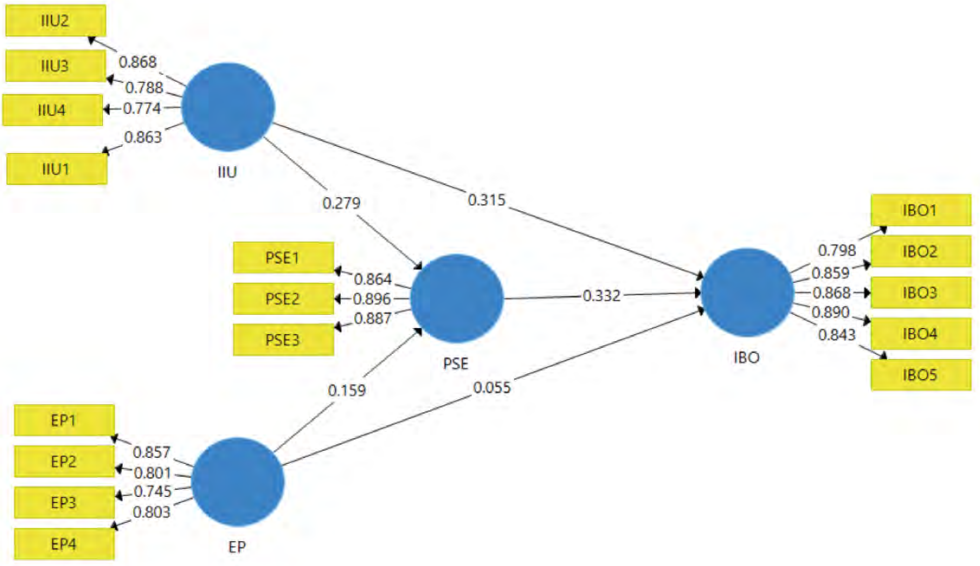
Figure 3
Revised research model of Y Generation



Likewise, upon analyzing the first-stage model for Gen Z (Figure 4), three items (IIU4, IIU5, IIU6) had loadings less than 0.70 and were removed. The modified model is presented in Figure 5. Tables 4 and 5 provide descriptive statistics and reliability and validity results for Generation Z. The revised model, with weak indicators removed, demonstrated good psychometric properties.

Figure 4
Research model of Z Generation

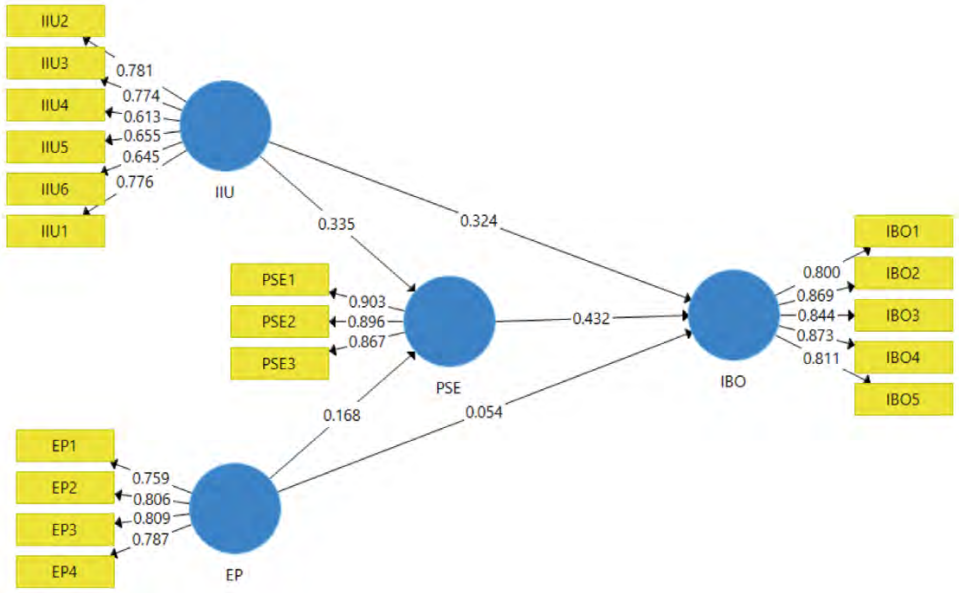


Figure 5

Revised research model of Z Generation

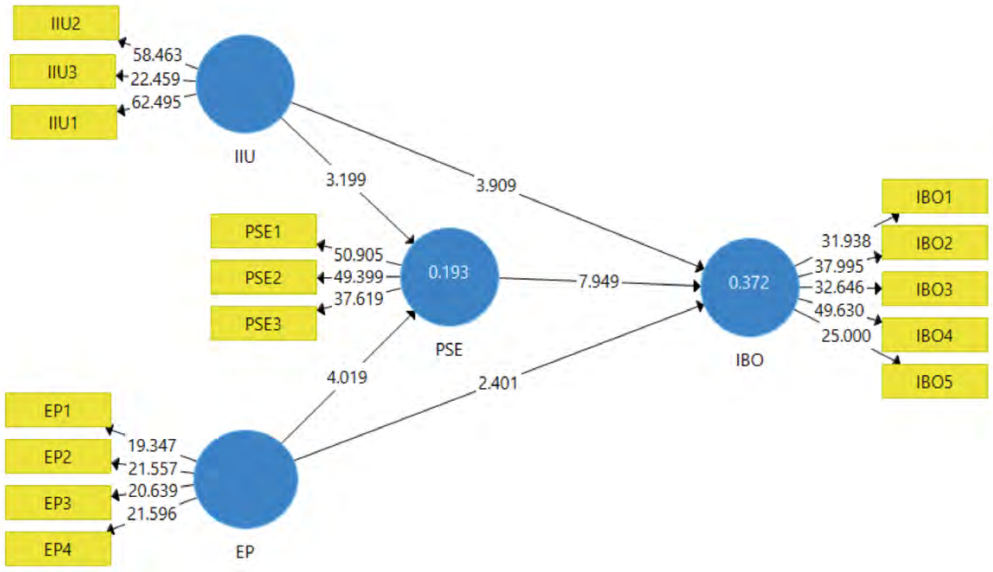


Table 4

Mean, standard deviation, and factor loading of each measurement item Z Generation

	Measured Item	Mean	Std. Deviation	Factor Loading
The intensity of Instagram usage (IIU)				
IIU1	Open longer Instagram accounts in a day			
IIU2	Access more Instagram accounts in a day	3	1.176	0.918
IIU3	Access Instagram to make product purchases	3.349	1.186	0.927
IIU4	Open longer Instagram accounts in a day	3.707	0.942	0.806
Extraversion Personality (EP)				
EP1	Often greet other people first	3.830	0.777	0.759
EP2	High level of socialization	3.773	0.877	0.806
EP3	The level of communication attractiveness	3.576	0.896	0.809
EP4	High level of activity	3.568	0.872	0.787
Positive Shopping Emotions (PSE)				
PSE1	Happyness when shopping online	3.546	0.917	0.904
PSE2	Feeling satisfied when shopping online	3.371	0.900	0.896
PSE3	Feel a different passion when shopping online	3.528	0.904	0.866

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Impulsive Buying Online (IBO)				
IBO1	Spur on spontaneous purchases	3.087	1.054	0.805
IBO2	Difficult to stop buying	2.598	1.084	0.867
IBO3	Always buy online	2.624	1.015	0.842
IBO4	Tendency of buying right away	2.616	1.058	0.873
IBO5	Tendency to buy without planning	2.467	1.096	0.810

Table 5

Reliability, validity, correlations and square roots of AVE's Z Generation

	Cronbach's alpha	AVE	CR	Fornell-Lacker Criterion				Heterotrait-Monotrait Ratio			
				IIU	EP	PSE	IBO	IIU	EP	PSE	IBO
Intensity of Instagram usage (IIU)	0.860	0.784	0.916	0.885	0.283		0.399		0.344		0.454
Extraversion Personality (EP)	0.801	0.625	0.869		0.790						
Positive Shopping Emotions (PSE)	0.867	0.790	0.919	0.326	0.293	0.889	0.579	0.373	0.343		0.641
Impulsive Buying Online (IBO)	0.896	0.705	0.923		0.302		0.840		0.346		

The last analyzed model based on a structural equation was run on the total number of 442 people (185 men and 257 women) with 213 representatives of Generation Y and 229 of Generation Z. Their educational levels were from elementary school to doctorate, and Generation Z used Instagram for over 5 years rather than Generation Y. Both generations showed a broad variety in their purchased products, with the maximum value of 200 and the minimum value of 1.

PLS analysis indicated significant variations between the younger and older generations. In the case of Generation Y, H1 to H4 received support, and H5 did not. On the contrary, all five hypotheses were supported for Generation Z. That is aligned with the work of Khan *et al*. (2016), who found that gender is a significant demographic dimension associated with impulsive buying behavior among Generation Y, while other factors, such as income, social influence, and extraversion personality, were not significant.

A more detailed breakdown among those in Generation Y by gender yields some interesting findings, however. For male participants, Hypotheses 1 and 5 were nonsignificant, whereas Hypotheses 2, 3, and 4 were significant. For women, there was no significant support for Hypotheses 2 and 5. Notably, extraversion did not directly contribute to impulsive online purchases in either subgroup. Extraversion, however, indirectly affected positive emotion shopping in males, whereas it did not in females. In contrast, the intensity of Instagram use is associated with positive emotion shopping among females, but not among males. These leading/trailing differences are highlighted as potentially distinct psychological or behavioral tendencies in those of the same generation..

Table 6
Path coefficients of Y Generation

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
EP ⟶ IBO	0.055	0.057	0.061	0.903	0.367
EP ⟶ PSE	0.159	0.164	0.059	2.709	0.007
IIU ⟶ IBO	0.315	0.317	0.063	5.021	0.000
IIU ⟶ PSE	0.279	0.281	0.064	4.354	0.000
PSE ⟶ IBO	0.332	0.335	0.065	5.096	0.000

Table 7
Path coefficients of Z Generation

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
EP ⟶ IBO	0.139	0.138	0.058	2.401	0.017
EP ⟶ PSE	0.308	0.315	0.077	4.019	0.000
IIU ⟶ IBO	0.214	0.214	0.055	3.909	0.000
IIU ⟶ PSE	0.238	0.234	0.075	3.199	0.001
PSE ⟶ IBO	0.431	0.434	0.054	7.949	0.000

A multivariate analysis was conducted according to the study's comparative purpose using SmartPLS. As presented in Table 8, there is no significant difference between Hypotheses H6a-H6e at 5% level. At the 10% level, however, the impact of positive emotion shopping on impulsive online buying was found to be significantly different (H6e). It suggests that emotional cues may contribute to impulsive behavior to a greater extent in one generation relative to the other.

Table 8
Multi group analysis Y and Z Generation

	Generation Y (n=213)		Generation Z (n=229)		PLS-MGA	
	R-square		R-square			
Positive Shopping Emotion	0,132		0,193			
Impulse Buying Online	0,301		0,372			
	Coefficient	t-value	Coefficient	t-value	Coeff. diff	p-value
Intensity of Instagram Use ⟶ Positive Shopping Emotion	0.279	0.903	0.238	3.199	0.015	0.876

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	Coefficient	t-value	Coefficient	t-value	Coeff. diff	p-value
Extraversion Personality ⟶ Positive Shopping Emotion	0.159	0.059	0.308	4.019	-0.047	0.635
Intensity of Instagram Use ⟶ Impulsive Buying Online	0.315	0.063	0.214	3.909	0.068	0.421
Extraversion Personality ⟶ Impulsive Buying Online	0.055	0.064	0.139	2.401	-0.023	0.784
Intensity of Instagram Use ⟶ Positive Shopping Emotion	0.332	0.065	0.431	7.949	-0.140	0.078

This study's findings highlight several key insights into impulsive online buying behavior among Instagram users in Indonesia, particularly when comparing Generation Y and Generation Z. These findings contribute to the understanding of the interplay between social media usage, personality traits, emotional responses, and generational factors in shaping consumer behavior.

Generational differences in the behavior of impulsive shopping

The results indicate significant generational differences in the factors influencing impulsive buying behavior. For Generation Z, the intensity of Instagram usage and positive shopping emotions exert a stronger influence on impulsive purchases. As explained in the research of Hidayat *et al.* (2023), the characteristics of Generation Z as digital natives who are accustomed to quick, visually engaging online interactions and are more emotionally driven in their consumption behaviors. In contrast, while Instagram usage intensity also influences impulsive buying for Generation Y, their behavior is more moderated by practical considerations, and extraversion personality traits do not directly lead to impulsive purchases.

The findings of this study make a meaningful contribution to the literature on online impulsive buying, offering empirical insights that distinguish the behavioral drivers of Generation Y and Generation Z. In contrast to Hidayat *et al*. (2023), which discuss Gen Z more broadly as digital natives, this study provides specific evidence that Instagram usage intensity and positive shopping emotions are key predictors of impulsiveness among Gen Z consumers, likely due to their sensitivity to visually and emotionally engaging content. For Generation Y, the study reveals a more nuanced pattern: extroversion does not directly drive impulsive buying behavior. Instead, practical considerations appear to play a moderating role, suggesting that prior research may have overstated the uniform influence of personality traits across age groups. These distinctions help clarify the generational differences in the psychological mechanisms underlying online impulsive behavior, providing a more targeted understanding for both academics and practitioners.

From a practical standpoint, the study's findings offer valuable insights for marketers and brands utilizing Instagram as a digital marketing platform. Recognizing generational differences in shopping behavior enables more targeted and effective communication strategies. For Generation Z, marketing efforts should prioritize visually engaging content, emotionally resonant influencer collaborations, and time-sensitive promotions that align with their tendency toward spontaneous, emotion-driven purchases. In contrast, strategies targeting Generation Y may benefit from emphasizing functional value, credible product reviews, and informative content that support more deliberate decision-making processes. While Instagram can still function as an initial point of engagement for Gen Y, their purchasing behavior may be more influenced by rational evaluation than emotional immediacy.

The role of Instagram usage

The results indicate that the intensity of Instagram use has a significant positive effect on shopping-related emotions for both Generation Y and Generation Z. This suggests that Instagram serves as more than just a promotional platform, but contributes to shaping consumers' emotional experiences, which can, in turn, drive impulsive purchasing behavior. These findings are consistent with the study by Djafarova and Rushworth (2017), which highlights how social media platforms, such as Instagram, foster emotional engagement through visual aesthetics and interactive features. Such engagement strengthens the emotional connection between users and products, increasing the likelihood of spontaneous purchases.

Although both generations are influenced by Instagram in their shopping behavior, they engage with the platform in different ways. Generation Z, having grown up in a fully digital environment, tends to respond more strongly to content that is visually appealing, interactive, and practical. For them, Instagram serves as a source of quick and stimulating shopping experiences, often triggering impulsive buying behavior. This aligns with Brand *et al*. (2022), who noted that Gen Z is particularly responsive to digital content that conveys a sense of trendiness and exclusivity.

In contrast, Generation Y typically views Instagram as a supplementary tool that enhances their decision-making process. Rather than using the platform as a primary shopping channel, they rely on it to gather product information, read reviews, and find relevant promotions. Gonzalez *et al.* (2013) support this view, showing that Generation Y appreciates shopping experiences that combine online convenience with offline assurance, thus valuing Instagram more for its informational than emotional appeal.

These findings offer a valuable extension of prior research on social media's role in consumer behavior. While previous studies such as Djafarova and Rushworth (2017) emphasize the emotional influence of visual social media platforms, this study contributes further by uncovering generational nuances. It confirms that for Gen Z, emotional and impulsive responses are driven by visually stimulating and trend-driven content. Meanwhile, Gen Y approaches the platform more deliberately, using it to support informed, planned purchases. This contrast offers a more refined understanding than previous studies that tend to generalize online shopping behavior across age groups.

From a practical perspective, these insights are highly relevant for marketers seeking to design generation-specific strategies. To effectively engage Gen Z, brands should focus on creating immersive, visually rich, and trend-sensitive content that evokes immediate emotional responses and encourages fast purchasing actions. For Gen Y, marketing efforts should prioritize trustworthy product information, detailed reviews, and time-sensitive promotions that support more rational and research-based shopping behavior. By tailoring content to each group's unique motivations and shopping patterns, marketers can better allocate their resources and improve their effectiveness in driving online impulse purchases across generational segments.

The impact of personality traits

The results of this study indicate that extraversion personality traits significantly influence positive shopping emotions in both Generation Y and Generation Z. However, the direct effect of extraversion on impulsive buying behavior appears limited, particularly among Generation Y. This finding aligns with Bosnjak *et al*. (2007), who suggested that while extroverted individuals tend to enjoy the emotional and social aspects of shopping, their actual purchase decisions are often shaped by additional factors such as financial awareness or the desire for social approval.

Among Generation Z, the stronger link between extraversion and positive shopping emotions may reflect how their expressive and socially driven nature enhances their engagement in online shopping environments. This observation is supported by Alves Gomes *et al*. (2022), who found that highly extroverted youth are more

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responsive to interactive and socially stimulating digital shopping experiences. Similarly, Dwivedi *et al*. (2021) noted that extroverts within digitally native cohorts are more emotionally immersed in online shopping, often perceiving it not just as a transactional activity but as a socially engaging and enjoyable experience.

The mediating role of positive shopping emotions

Positive shopping emotions have been found to mediate the relationship between Instagram usage intensity and impulsive buying behavior. This mediating effect appears to be more pronounced among Generation Z, suggesting that emotional responses are more deeply embedded in their shopping experience. These results support Verhagen and Van Dolen (2011), who observed that emotions such as joy and satisfaction can enhance the link between visual exposure and impulsive purchasing tendencies.

Furthermore, Jin and Phua (2014) noted that visual and interactive platforms like Instagram can foster strong emotional involvement while diminishing self-control, creating favorable conditions for unplanned purchases. Their research also highlights how social media can elevate self-confidence and strengthen emotional reactions, which in turn affect purchasing decisions.

From a marketing perspective, these findings suggest the value of designing emotionally engaging content, such as endorsements from relatable influencers, visually striking advertisements, and interactive shopping features. This approach tends to resonate more with Generation Z, whose responses are often driven by emotionally stimulating digital experiences.

The role of positive emotions as a mediating factor between Instagram engagement and impulsive buying is especially notable given the demographic composition of the sample, which included a higher proportion of female respondents. Since women generally express and experience emotions more vividly in social settings, including online interactions, this emotional pathway may be more active. Instagram's visually rich environment, supported by influencer content and interactive tools, naturally evokes stronger emotional engagement, reinforcing the association between emotional arousal and impulse buying. This observation aligns with the findings of Verhagen and Van Dolen (2011), reinforcing the view that emotional involvement plays a central part in online consumer behavior. The more dominant presence of women in this study sample strengthens the findings of Jin and Phua (2014) that social media can reduce self-control and increase self-confidence which ultimately triggers impulsive buying. This indicates that women, especially Gen Z, may be more responsive to marketing strategies that emphasize emotional involvement through attractive visuals and strong narratives. Therefore, for marketers, creating content that targets emotional resonance, through relatable influencers, engaging visual aesthetics, and immersive shopping experiences, will be highly effective, especially as these strategies resonate strongly with the more emotional and actively engaged Gen Z female demographic on Instagram.

Conclusions

The analysis results highlight generational differences, particularly between Generation Y and Z, in online impulsive buying behavior. Extraversion does not directly influence impulsive purchases but acts through positive shopping emotions. In contrast, Instagram usage intensity affects impulsive buying both directly and indirectly via emotional engagement.

For marketers, especially those using Instagram, these findings offer practical insights. Generation Z, with higher Instagram activity, is more responsive to visual and emotional stimuli, despite having lower purchasing power.

To address the practical implications, companies should:

1. **Enhance Visual Appeal:** Use engaging product displays and interactive content to attract Gen Z.
2. **Build Trust:** Ensure transparent product info, secure transactions, and responsive service.

3. **Segment by Generation**: Tailor strategies to each group's preferences, Gen Z values experience and emotion, while Gen Y is more rational and information-driven.

Beyond age and income, understanding Generation Z requires deeper insight into their distinct values, preferences, and buying patterns. Understanding these generational traits helps marketers craft more targeted messages. By segmenting audiences based on personality, such as impulsive, frugal, or social types, strategies can be better aligned with consumer behavior. Generation X, shaped by economic instability, tends to be cautious and price-focused, even in spontaneous purchases. In contrast, Generation Z seeks emotionally engaging, unique shopping experiences, often driven by social influence rather than practicality. Though both groups are price-aware, Gen X makes more rational decisions, while Gen Z leans toward emotion-driven and spontaneous buying. Recognizing these differences allows marketers to tailor approaches that resonate with each group's values and preferences.

This study recognizes several limitations. The analysis focused on only three variables, which may not fully reflect the complexity of online impulse buying. Additionally, the sample was limited to Indonesian consumers, which may restrict the broader applicability of the findings. Future research should consider incorporating other factors, such as hedonic motivation, promotional influences, or higher-value product categories, to provide a deeper understanding of impulsive behavior. Cross-platform comparisons could also reveal how different digital environments shape buying decisions, especially for electronic products. While Indonesia offers important insights into emerging markets, further studies should explore how these results may translate to similar contexts by identifying shared patterns in digital engagement and consumer demographics. Moreover, although this research examined extraversion, it did not include introversion, which may drive different or opposing behaviors. Introverted individuals, who tend to be more reflective and less influenced by social stimuli, may be less prone to impulsive purchases. Including both traits would offer a more comprehensive view of personality's role in digital consumer behavior.

In summary, understanding the behavioral differences between Generation Y and Generation Z enables businesses to develop more targeted and effective marketing strategies. By addressing these generational preferences and leveraging Instagram's unique features, companies can better align their promotional efforts with consumer behaviors, ultimately enhancing their marketing effectiveness.

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Author(s)	Contributions
Yanto Azie Setya	Conceptualization, formal analysis, fundraising, research, methodology, supervision, writing. Original draft, writing. Review and editing.
Arief Helmi	Conceptualization, formal analysis, fundraising, research, methodology, supervision, writing. Original draft, writing. Review and editing.
Dwi Kartini	Conceptualization, formal analysis, fundraising, research, methodology, supervision, writing. Original draft, writing. Review and editing.
Yevis Marty Oesman	Conceptualization, formal analysis, fundraising, research, methodology, supervision, writing. Original draft, writing. Review and editing.

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Financial socialization and well-being: the mediating role of psychological factors in Mexican adults

Socialización financiera y bienestar: el papel mediador de factores psicológicos en adultos mexicanos

Duniesky Feitó-Madrigal
Professor and researcher at Universidad Autónoma de Baja California, Mexico
duniesky.feito.madrigal@uabc.edu.mx
https://orcid.org/0000-0001-7225-2598
https://ror.org/05xwcq167

Malena Portal-Boza
Professor and researcher at Universidad Autónoma de Baja California, Mexico
mportal@uabc.edu.mx
https://orcid.org/0000-0002-4237-1534
https://ror.org/05xwcq167

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Abstract: this study explores the direct impact of financial socialization on financial well-being and also evaluates the mediating effect of financial trust, degree of control, and optimism as psychological factors, drawing on theories of family financial socialization, social learning, and behavioral finance. Using structural equation modeling for an adult sample, the results indicate that financial socialization has a positive, but weak, direct effect on financial well-being. However, this effect is intensified when psychological factors, particularly financial trust, intervene. The analysis revealed complementary partial mediation, suggesting that, overall, indirect effects outweigh the direct effect. These findings emphasize the importance of individual beliefs, perceptions, and attitudes in strengthening the relationship between formative experiences in childhood and financial well-being in adulthood. In the Mexican context, characterized by high levels of informality and limited access to formal financial services, the results highlight the importance of consolidating homes as spaces for economic education. It is recommended that financial education strategies simultaneously integrate socio-emotional skills and practical financial management tools to optimize the use of public resources and amplify the social impact of regional financial inclusion and well-being policies.

Keywords: Financial socialization, financial well-being, psychological factors, structural equations, mediation.

Resumen: el estudio explora el impacto directo de la socialización financiera sobre el bienestar financiero y a su vez se evalúa el efecto mediador de la confianza financiera, el grado de control y el optimismo como factores psicológicos, tomando como referencia las teorías de la socialización financiera familiar, el aprendizaje social y las finanzas conductuales. A través de un modelo de ecuaciones estructurales para una muestra en población adulta los resultados indican que la socialización financiera tiene un efecto directo positivo, pero débil sobre el bienestar financiero. No obstante, este efecto se intensifica cuando intervienen los factores psicológicos en particular la confianza financiera. El análisis reveló una mediación parcial complementaria, lo que sugiere que, en general, los efectos indirectos superan en magnitud al efecto directo. Estos hallazgos enfatizan la relevancia de las creencias, percepciones y actitudes individuales para reforzar la relación entre las experiencias formativas en la infancia y el bienestar financiero en la edad adulta. En el contexto mexicano, caracterizado por altos niveles de informalidad y acceso limitado a servicios financieros formales, los resultados resaltan la importancia de consolidar los hogares como espacios para la educación económica. Se recomienda que las estrategias de educación financiera integren de manera simultánea habilidades socioemocionales y herramientas prácticas de gestión financiera, a fin de optimizar el uso de recursos públicos y amplificar el impacto social de las políticas de inclusión y bienestar financiero regional.

Palabras: socialización financiera, bienestar financiero, factores psicológicos, ecuaciones estructurales, mediación.

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Introduction

Financial well-being has become a priority for both individuals and families in a global environment marked by economic uncertainty. According to the World Bank (2025), the next 25 years will be particularly complex for developing economies due to volatile macroeconomic conditions, represented by adverse factors such as high debt burdens, low investment and productivity growth, and increased trade tensions, which could slow global growth. For its part, persistent inflation could delay planned interest rate cuts, painting a challenging picture for citizens. Added to this situation are the structural weaknesses of social protection systems, where only 47% of the world's population has at least one benefit (Organización Internacional del Trabajo [ILO], 2022), as well as the imperfect enforcement of regulations, which makes it easy for many companies to evade social security costs, promoting recurring informal labor practices (Organización para la Cooperación y el Desarrollo Económicos [OECD], 2024). These constraints have hindered the possibility of building a sustainable financial future, affecting the economic stability of many households.

Recent measures reinforce this scenario of vulnerability. According to the World Bank, only 20% of the population in Latin America has emergency funds available to cover expenses within 30 days. Furthermore, the main factors causing financial stress in the region are medical costs (43%), expenses associated with old age (21%), debt (19%), and education (15%) (Global Findex, 2021). In Mexico, the National Financial Health Survey (ENSAFI, 2023) reveals that 50.8% of the population has a low or medium-low level of financial well-being, while 36.9% experiences a high degree of financial stress. Likewise, 45.9% of respondents reported that they barely have any money left at the end of the month, and 34.6% said they do not have the necessary resources to cover unexpected expenses.

Given this situation, there is a clear need to strengthen household financial stability through strategies that promote better planning and resource management. At the same time, there has been greater academic and institutional interest in studying the determinants of financial well-being from different perspectives. Traditionally, financial well-being has been examined from an objective dimension, based on indicators related to access to goods and assets, liquidity calculations, indebtedness, savings, job stability, and financial knowledge (Brüggen *et al.*, 2017). However, in recent years, the exploration of its subjective dimension has become more relevant, incorporating psychological factors such as self-confidence, sense of control, emotional responses, levels of perception, and financial satisfaction.

Despite these advances, some authors agree that objective and subjective approaches are not sufficient to fully explain individuals' financial decisions and behaviors because there is a learning process known as financial socialization, which includes experiences in childhood and adolescence, family interaction, and the role of parents in their children's financial education, as elements that significantly influence how they face and manage their financial reality in adulthood. This learning process consists of the progressive development of responsible financial behaviors, which are consolidated through the formation of positive attitudes toward money and the application of appropriate financial norms and values (Mendes *et al.*, 2023; Garcés *et al.*, 2021; Fan and Henager, 2022; Netemeyer *et al.*, 2018; Gudmunson and Danes, 2011).

In this context, financial socialization has gained relevance within the behavioral approach to financial well-being, as it allows for the modeling of patterns of thought and response to similar economic scenarios, influencing the decision-making process and the application of financial habits throughout life. From this perspective, this research explores the relationship between financial socialization and financial well-being, both directly and through the mediation of psychological factors. Specifically, it analyzes the impact of financial confidence, the degree of control over economic decisions, and optimism as influen-

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tial elements in the consolidation of financial habits and perceptions in adulthood.

The document offers several contributions. First, it addresses the issue from an integrative approach by combining the subjective component of financial well-being with financial socialization, overcoming the fragmented approach of previous research that analyzed these aspects in isolation. Furthermore, it broadens the understanding of the mechanisms that underpin individual financial stability by considering the influence of psychological processes and social learning acquired in childhood and adolescence on individuals' economic decisions. Finally, the research offers empirical evidence to support the behavioral approach to financial well-being, highlighting the role of financial socialization as a determining factor in economic decisions over time.

Theoretical review and hypothesis formulation

The literature review reveals a wide range of research on the importance of financial well-being from different approaches, which has allowed for its analysis in disciplines such as economics, psychology, and consumer decision-making. Its conceptualization has been extended in different contexts, notably the proposal by the U.S. Consumer Financial Protection Bureau (CFPB), which defines financial well-being as the ability to manage finances on a daily basis, overcome economic crises, achieve financial goals, and enjoy economic freedom. Within this framework, financial behaviors, knowledge, and personal traits of the individual are identified as significant factors (CFPB, 2017).

Similarly, the OECD (2022) considers financial well-being to be a cross-cutting issue in consumer protection policies, emphasizing its importance for individual stability and economic resilience. It has been measured using indicators such as accessibility, use, and quality of financial services; ability to manage resources; perception of economic security; and autonomy to make both present and future financial decisions.

These elements are related to the subjective approach to financial well-being that has been studied in recent decades. However, early research involved indicators that govern in terms of calculation, such as income, savings, debt, and stable employment as determinants of financial stability. Based on this approach, metrics such as liquidity, debt-to-income ratio, and the proportion to be allocated to retirement funds were used (Brüggen *et al.*, 2017). However, Netemeyer *et al.* (2018) point out that these objective metrics are not sufficient to explain the individual perception of financial stability.

Based on this conceptual evolution, various studies have sought to identify the determinants of financial well-being by incorporating sociodemographic variables, psychological factors, and behavioral factors. Lusardi and Mitchell (2014) analyzed the influence of gender, ethnicity, age, income level, type of housing, marital status, and education on the perception of financial well-being. At the same time, the literature has identified relevant behavioral and psychological factors that have been analyzed in isolation, including financial skills and competencies, resilience to unexpected economic shocks, security and confidence, perceptions of financial inclusion and protection, degree of control over finances, and optimism.

Nam (2023) examined the relationship between empowerment, self-confidence, and financial well-being, concluding that people with higher levels of self-confidence and empowerment report higher well-being. Similarly, self-confidence showed a stronger effect compared to empowerment, indicating that the subjective perception of one's own abilities may be more important than objective skills in this dimension.

Similarly, Carton *et al.* (2022) found that financial confidence and attitudes toward saving and credit significantly affect people's ability to meet their financial commitments and feel comfortable with their economic situation. Financial confidence has been identi-

fied as an important factor in closing gender gaps in financial literacy (Blaschke, 2022) and, beyond technical knowledge, financial confidence has been shown to play a decisive role in day-to-day money management (Palameta *et al.*, 2016). Additionally, Arya *et al.* (2023) demonstrated that emotional and cognitive states such as optimism predict positive financial behaviors in crisis contexts. This trait has been defined as the generalized expectation that favorable outcomes will occur, which stimulates goal-oriented behaviors, objectives, and proactive decision-making (Dean and Wilson, 2023). In the financial sphere, high levels of optimism are associated with more detailed planning and timely fulfillment of debts and other obligations. Likewise, it has been documented that attachment and socialization with parental figures during childhood can foster the development of dispositional optimism in adulthood (Escobar *et al.*, 2024), suggesting an interrelationship between early affective factors and financial skills.

These psychological factors are supported by the criteria of organizations such as the CFPB and the Development Bank of Latin America (CAF), which promote the measurement of financial well-being based on subjective factors. Their scales include four dimensions, among the degree of control over finances, understood as the ability to manage economic decisions, meet financial commitments on time, and maintain stability without constant worries about lack of resources. A person's ability to exercise self-control in the present and make sound decisions will determine their potential financial well-being in the future (Angela and Pamungkas, 2022; Adiputra, 2021). This highlights the importance of establishing plans and trying to stick to them without postponing goals for later. It is a matter of setting achievable deadlines and understanding one's actual financial capabilities. People who lack control over their income spend more money on their immediate needs rather than saving for retirement and other future needs (Bai, 2023) and are more prone to compulsive buying, materialism, and debt (Novokmet and Vuković, 2024). Furthermore, Sabri *et al.* (2023) identified a significant correlation between financial knowledge, locus of control, and financial well-being in low-income young adults, reinforcing the idea that subjective perceptions of control influence financial behavior.

Other dimensions proposed by the CFPB and CAF include the ability to absorb economic shocks associated with financial resilience and access to support networks, savings, or insurance; financial freedom, understood as the ability to enjoy life without being hindered by economic concerns; and goal attainment, linked to planning and levels of confidence and optimism.

The literature also suggests that financial well-being is a consequence of the interaction between available opportunities and individual actions, which are influenced by the economic and social environment (Nam, 2023). In these spaces, financial socialization is set as a mechanism that promotes well-being in which people learn to manage their personal finances through lessons acquired in the family context, educational environments, and the media (Jorgensen and Savla, 2010). However, within the family environment, parental influence stands out from an early age in individuals' relationship with money (Vosylis *et al.*, 2020; Lanz *et al.*, 2020). Some statistics indicate that approximately 45% of our daily decisions are based on acquired habits rather than conscious choices)McNeal, 2007), reinforcing the idea that early interactions with money can influence the development of lasting financial habits. Lu and Park (2021) assert that early financial socialization experiences are directly and positively associated with the financial knowledge of young adults.

From a theoretical perspective, Gudmunson and Danes (2011) propose a model that incorporates financial socialization in the family environment within the context of personal finance. They distinguish between implicit and intentional socialization, the latter being the result of conscious efforts to transmit financial knowledge and values, particularly to children. This type of socialization has also been identified by other authors as the primary me-

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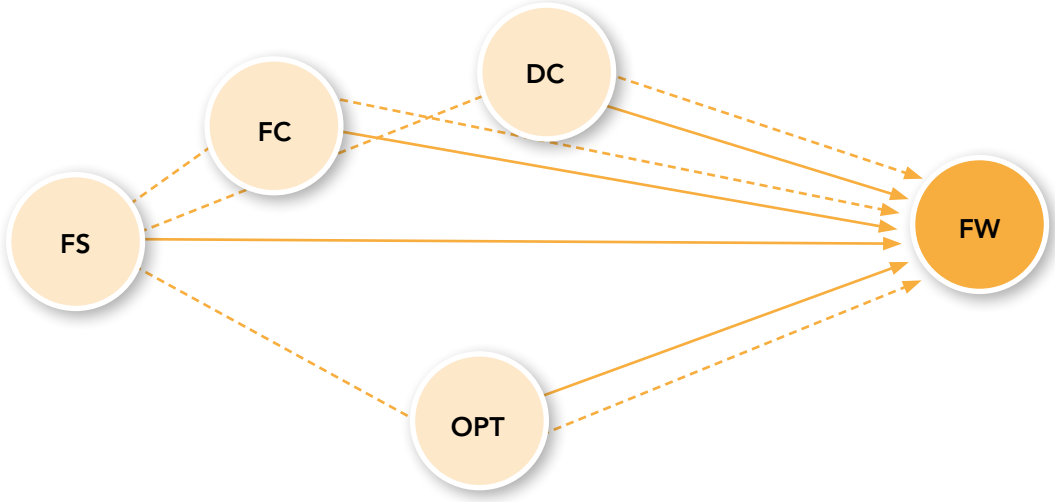
chanism used through direct instruction for the explicit teaching of concepts and ideas related to money, saving, spending, and other financial activities (Agnew and Sotardi, 2025; Alodya, 2021; Deenanath *et al.*, 2019; Furrebøe *et al.*, 2023; Zhu, 2020). They also highlight the use of positive and negative reinforcement as mechanisms for shaping beliefs, roles, and values related to money. This learning is reinforced through behavioral modeling, when parents give regular allowances, children develop consumption, planning, and self-regulation skills (Hudson *et al.*, 2022). These experiences foster internal and external motivations, such as social approval, tangible rewards, and increased family interaction, recognized as an experiential learning mechanism (Ammerman and Stueve, 2019).

The theoretical and empirical review allows us to identify conceptual links between financial socialization, certain psychological factors, and financial well-being. Dimensions such as financial confidence (FC), degree of control (DC), and optimism (OPT) have been recognized in the literature as relevant psychological constructs in this experience. Based on this approach, a hypothetical relationship framework is proposed (see Figure 1), which allows for the analytical structuring of the possible impact of financial socialization (FS) on financial well-being (FW), both directly and mediated by psychological variables. This approach is based on the assumption that formative experiences acquired in the family environment from an early age encourage financial practices and influence the construction of beliefs, attitudes, and perceptions that influence economic decision-making in adulthood. In this sense, early access to knowledge and the internalization of appropriate habits around money can increase the likelihood of achieving greater financial stability and exercising greater economic autonomy (LeBaron *et al.*, 2023).

Figure 1
Conceptual diagram of relationships between variables



Note: direct effect (——►); indirect effect (·····►)

The model incorporates three mediating constructs: financial confidence (confidence in one's

ability to manage resources), degree of control (autonomy in economic decisions), and optimism (positive attitude toward the financial future). These factors, enhanced by active financial socialization, act as channels that amplify their impact on financial well-being. Therefore, four hypotheses are proposed regarding the direct effects of FS on FW, and three additional hypotheses regarding indirect effects, mediated by the aforementioned psychological factors.

H_1. Financial socialization positively affects financial well-being.

H_2. Financial confidence has a positive impact on financial well-being.

H_3. The degree of control has a positive impact on financial well-being.

H_4. Optimism positively affects financial well-being.

H_{1a}. Financial socialization has a positive indirect effect on financial well-being through financial confidence.

H_{1b}. Financial socialization has an indirect positive impact on financial well-being through the degree of control.

H_{1c}. Financial socialization has a positive indirect impact on financial well-being through optimism.

Materials and method

The research was conducted using a quantitative, non-experimental, cross-sectional, and correlational approach. The database from the National Survey on Financial Health (ENSAFI, 2023) was used for the analysis because this instrument was designed to collect detailed information on the determinants that affect the financial well-being of the Mexican population. Unlike other traditional surveys, ENSAFI incorporates subjective dimensions such as financial behavior, personality traits, and various psychological factors, allowing for a more comprehensive analysis of the phenomenon under study. The unit of analysis corresponded to adults (over 18 years of age) residing in Mexico. From the total number of cases available, a data cleaning process was carried out, which consisted of eliminating records with missing information in the study variables, thus obtaining a final sample of 20,448 individuals. Of this sample, 44.9% are men and 55.1% are women. By region, 18.5% came from the north, 31.25% from the north-central region, 25.21% from the central region, and 25.04% from the south. In addition, 60% of the participants resided in urban areas and 40% in rural areas.

Measurement of latent constructs

To structure the theoretical model, five constructs were defined: four exogenous (financial confidence, degree of control, optimism, and financial socialization) and one endogenous (financial well-being), integrating a total of 18 indicators extracted from ENSAFI (see Table 1). The scales used have been previously validated and are based on recommendations from organizations such as UNCDF, MetLife Foundation, the PFRC at the University of Bristol, and the World Bank. They also draw on instruments used in international surveys conducted in Canada, Australia, and the United States, allowing for a comparative view of financial well-being (INEGI, 2023).

Table 1
Latent variables and indicators used for structural analysis

Construct	Indicators	Scale	References
Financial socialization (FS)	When you were a child, did your parents or guardians talk to you about the importance of proper money management? (Q9)	Yes (1) No (0)	Gudmunson and Danes (2011) Deenanath *et al.* (2019); Furrebøe *et al.* (2023); Vosylis *et al.* (2020); LeBaron *et al.* (2023)

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Construct	Indicators	Scale	References
Financial socialization (FS)	When you were a child, did your parents or guardians talk about the importance of proper money management? (Q9)	Yes (1) No (0)	Gudmunson and Danes (2011) Deenanath *et al.* (2019); Furrebøe *et al.* (2023); Vosylis *et al.* (2020); LeBaron *et al.* (2023)
	When you were a child, did your parents or guardians talk to you about the importance of saving? (Q10)		
	As a teenager, did your parents or guardians give you money (allowance) for your expenses, and did you manage it? (Q11)		
	During adolescence, did your parents or guardians talk to you about necessary and unnecessary expenses? (Q12)		
Financial confidence (FC)	How confident are you in your ability to manage your money on a day-to-day basis? (P1)	Very much (1) Not very much (2) Somewhat (3) Not at all (4)	Agnew and Sotardi, (2025); LeBaron and Kelley, (2021); Blaschke, (2022) Palameta *et al.* (2016)
	How confident are you in your ability to plan your financial future? (Q2)		
	How confident are you in your ability to make decisions about products from banks or financial institutions? (P3)		
Degree of Control (DC)	You can control what happens in your life fairly well (P4)		Adiputra, (2021); Bai, (2023); Novokmet, and Vuković, (2024)
	When you make plans, you do everything possible to succeed (P5)		
Optimism (OPT	You believe that you will achieve your main goals in life (P6)		Dean and Wilson, (2023); Arya *et al.* (2023) (Escobar *et al.* 2024)
	More good things happen to you than bad things (P7)		
	You are confident that you will overcome your problems (P8)		
Financial well-being (FW)	Can cope with a significant unexpected expense (P13)	Completely ly (1) Very well (2) Somewhat (3) A little (4) Not at all (5)	Consumer Financial Protection Bureau, CFPB, (2017) Nam (2023); Netemeyer *et al.* (2018)
	You are securing your financial future (P14)		
	Given your financial situation, do you feel that you will have the things you want (P15)		
	You can enjoy life because of the way you manage your money (P16)		
	You have enough money to cover your expenses (P17)		
	He/she feels confident that his/her savings are sufficient. (P18)		

Note. Prepared by the author based on ENSAFI (2023).

The model was evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM), applying SMARTPLS, version 3.2.9. According to Henseler (2016), PLS-SEM allows for maximizing the variance explained in dependent variables within complex models, which is useful when the data does not have a normal distribution. This methodology is suitable for analyzing relationship structures between latent and observed variables, especially in contexts with asymmetric or non-normal data, facilitating a robust and detailed estimation of the links proposed in the theoretical model.

Results and discussion

This section presents the results of the model applied based on the analysis of its three phases:

first, the reliability and validity of the measurement model were evaluated; then, the significance of the direct and indirect effects was examined using bootstrapping; finally, it focuses on the discussion of the findings with respect to the literature, providing a comprehensive view of their implications.

Measurement model

The analysis of the measurement model began with the reliability evaluation of the indicators using factor loadings, all of which were above 0.7 and with no values below 0.4, which supports their internal consistency (Hair *et al.*, 2011; see Table 2). The reliability of the constructs was validated using Cronbach's alpha and composite reliability (CR), both with values above 0.8. Subsequently, convergent validity was tested using Extracted Mean Variance Explained (EMVE) analysis, whose values exceeded 0.5, in accordance with the criteria of Fornell and Larcker (1981).

Table 2
Reliability and convergent validity

Construct/Indicator	Factor loadings	CR	AVE
FS		**0.875**	**0.636**
P9	0.802		
P10	0.831		
P11	0.73		
P12	0.829		
FC		**0.851**	**0.61**
P1	0.787		
P2	0.877		
P3	0.761		
DC		**0.844**	**0.73**
P4	0.867		
P5	0.842		
OPT		**0.828**	**0.617**
P6	0.701		
P7	0.792		
P8	0.857		
FW		**0.904**	**0.61**
P13	0.742		
P14	0.748		
P15	0.826		
P16	0.805		
P17	0.798		
P18	0.764		

Note. Prepared by the author based on the results of processing with SMART PLS.

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Finally, the discriminant validity of the model was evaluated, following the criteria established by Fornell and Larcker (1981), which indicates that the square root of the mean variance extracted from each construct must be greater than the correlation between the constructs. In addition, it was verified that the HTMT (heterotrait-monotrait) matrix remained below 0.900. Both tests confirmed the discriminant validity of the constructs represented in the model, indicating that each construct uniquely measures its own dimension and does not overlap significantly with others, thus ensuring the clarity and accuracy of the analysis performed (see Table 3).

Table 3
Discriminant validity

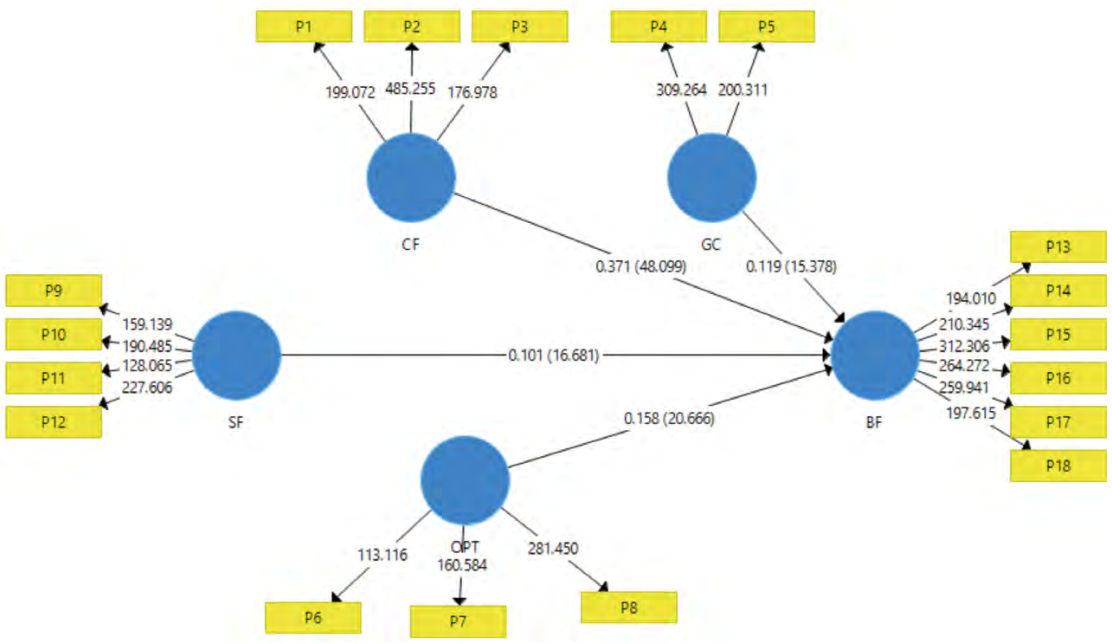
Construct	BW	FC	SF	DC	OPT
Fornell and Larcker (1981)					
FW	0.781				
FC	0.540	0.810			
SF	0.272	0.284	0.798		
DC	0.430	0.539	**0.244**	**0.854**	
OPT	0.427	0.482	0.242	0.557	0.786
Heterotrait-monotrait ratio					
HTMT					
BF					
CF	0.667				
SF	0.319	0.361			
GC	**0.574**	**0.790**	**0.340**		
OPT	0.520	0.646	0.297	0.828	

Note. Prepared internally based on the results of processing with SMART PLS.

Assessment of the structural model

Once the measurement model had been validated, the structural model was estimated following the methodology of Hair *et al.* (2011). To evaluate the statistical significance of the "path" coefficients, the bootstrapping technique was used with 5,000 subsamples. This analysis allowed us to explore the relationships between the latent constructs through the path coefficients (β), which provide information on the magnitude and direction of these relationships (see Figure 2).

Figure 2
Structural model of direct relationships



Note. Prepared by the author using SMARTPLS software, version 3.2.9.

The results reveal that family FS has a positive and significant effect on FW (coef. = 0.101), confirming hypothesis H1. This finding supports the theory that early experiences, such as autonomous money management through allowances, strengthen skills for adequate financial management in adulthood. Furthermore, it aligns with the principles of family financial socialization theory and is consistent with the findings of previous research (Kaur and Singh, 2024; Béres *et al.*, 2024; Boto *et al.*, 2022; Farooq *et al.*, 2021; Zhao and Zhang, 2020; Yue and Zhu, 2020; Deenanath *et al.*, 2019; Jorgensen and Savla, 2010), which highlight the lasting influence of the family environment and financial socialization on the formation of financial habits and attitudes in adulthood. However, structural analysis reveals that the direct effect of socialization is relatively weak compared to the effects of psychological factors. Financial confidence (FC), degree of control (DC), and optimism (OPT) showed stronger direct associations with financial well-being, all of which were significant, confirming hypotheses H2, H3, and H4 of the structural model and reinforcing the relevance of internal factors in the perception of economic stability.

Among the psychological factors, financial confidence was the strongest predictor of financial well-being (coef. = 0.371). This finding indicates that greater confidence in one's ability to manage money, make decisions, and plan for the financial future is associated with a significantly higher perception of well-being. This is followed by optimism, with a coefficient of 0.158, which acts as a psychological resource that drives people to maintain a positive outlook on their economic future. This factor, like the degree of control (coefficient = 0.119), shows a moderate but equally relevant effect. Those who perceive greater control over their financial decisions tend to organize their resources better and act more effectively in changing economic contexts, which reinforces their financial stability.

Since a weak relationship was found in the direct impact of FS on FW, this could suggest that its influence also operates through indirect

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mediating effects. In this sense, mediation, according to Cepeda *et al*. (2017), involves the intervention of a third variable that connects the independent variable with the dependent variable. There are two types: complete mediation, when only the indirect effect is significant, and partial mediation, when both are significant. The latter can be complementary, if the effects are oriented in the same direction, or competitive, if they are in opposite directions.

When analyzing the results in the proposed model (see Table 4), the presence of complementary partial mediation is identified, in which financial socialization influences financial well-being through psychological factors that act as mediators: financial confidence, degree of control, and optimism.

Table 4

Results of the indirect and total effect in the structural model

Hypothesis	Effect	Coefficients path	t-statistic (bootstrapping)	Confidence interval [2.5 % -97.5 %]	Supported
FS ⟶ FC ⟶ FW	+	0.105*	34.73	[0.100-0.112]	Yes
FS ⟶ FS ⟶ FW	+	0.029*	13.64	[0.024-0.033]	Yes
FS ⟶ OPT ⟶ FW	+	0.038*	18.75	[0.035-0.042]	Yes
FS ⟶ FW (total effect)	+	0.272*	42.35	[0.259-0.284]	Yes

Note. *($p < 0.05$).

The model results show that the total effect of financial socialization on financial well-being reaches a coefficient of 0.272, with a t-statistic of 42.35, confirming its significant contribution when direct and indirect effects are considered together. This finding reinforces the idea that the impact of financial socialization is substantially amplified when incorporating the psychological mechanisms that mediate this relationship. In particular, three mediating paths with positive and statistically significant effects are identified: first, financial confidence has the highest indirect coefficient (0.105; t = 34.73), followed by optimism (coefficient = 0.038; t = 18.75), and finally, the degree of control (coefficient = 0.029; t = 13.64). These results confirm hypotheses H1a, H1b, and H1c, and show that psychological factors act as transformative channels for formative experiences in the family environment, turning them into internal perceptions that strengthen financial well-being in adulthood.

Discussion

Based on the analysis of the results, the first relevant finding is the direct but weak positive effect between FS and FW. This relationship can be explained by the limited financial capabilities of the Mexican population, which is reflected in the decisions made in the family environment. In terms of financial behavior, only 2 out of 10 people draw up a budget, 4 out of 10 keep track of their debts, and barely half distinguish between money allocated to expenses and debt repayment. At the same time, the limited use of formal financial services limits the building of family wealth, as only 30% of the population that saves does so through formal mechanisms. In addition, those who save formally allocate most of their savings to emergencies, while informal savings are directed toward personal expenses (ENIF, 2024). These figures, which have varied little in recent years, reflect the weak consolidation of structured habits, a situation that limits intergenerational learning, reducing the direct impact of socialization (Gudmunson and Danes, 2011).

A second relevant finding is that the impact of FS on FW is significantly strengthened by indirectly incorporating the psychological factors of trust, control, and financial optimism. This result can be interpreted based on the postulates of behavioral economics and behavioral finance, which integrate psychological and economic principles to deepen the understanding of decisions related to personal finance management. Based on this line of analysis, financial well-being takes on an eminently subjective character, conditioned by emotional, social, and cognitive factors that influence the way individuals interpret, evaluate, and execute their economic decisions (Vlaev *et al.*, 2019; Miller, 2021; Abellán and Jiménez, 2020).

Finally, financial confidence was identified as the strongest predictor in the relationship between financial well-being and the psychological factors analyzed, suggesting that a person's ability to trust their financial skills contributes more to shaping subjective experiences of well-being than other factors. From a social psychology perspective, this dimension is understood as a specific form of self-efficacy (Bandura, 1986), related to the belief in one's ability to effectively manage economic resources. This perception strengthens motivation to act and perseverance in the face of financial challenges, while also promoting behaviors focused on planning and informed decision-making. In addition, people with greater confidence tend to develop an internal locus of control, which implies taking responsibility for their financial situation rather than attributing it to external factors (Bai, 2023).

Likewise, financial optimism showed a relevant mediating effect, albeit with less weight. People with this willingness tend to maintain positive expectations about the economic future, which favors and stimulates a resilient attitude oriented toward problem solving (Seligman, 1998). These results can be understood based on social learning theory, which posits that people acquire behaviors and attitudes through direct instruction and by observing significant role models such as parents or other members of the family environment (Bandura, 1986). In the context of this research, the influence of financial socialization is expressed not only in the explicit transmission of knowledge, but also in the internalization of patterns observed since childhood. Early economic experiences shape visible habits and form deep-seated beliefs about the ability to manage resources, cope with adverse situations, and plan for the future. These behaviors contribute to understanding the influence of financial confidence, which, in addition to being acquired knowledge, acts as an internalized belief that significantly mediates the relationship between early learning and financial well-being in adulthood.

Conclusions

The study contributes empirical evidence on the relationship between financial socialization and financial well-being, from an approach focused on the individual's experience. The results confirm that the indirect effect through psychological factors exceeds the direct effect of socialization, which underscores the relevance of these factors, particularly financial confidence as a determining component in shaping well-being.

In the case of Mexico, characterized by high levels of informality, restricted access to formal financial products, and limited economic planning, the socialization process occurs implicitly from a very early age through observation and imitation of family behaviors. This environment also favors the development of adaptive psychological resources such as resilience, self-efficacy, and optimism, which help individuals cope with adverse economic situations and maintain a positive attitude toward well-being. In this sense, evidence shows that strengthening these mediating factors can enhance the effect of financial socialization, underscoring the importance of fostering psychological skills related to planning, decision-making, and self-regulation.

On a practical level, the results obtained provide evidence in favor of promoting thinking skills and attitudes related to control and intelligent financial management that can be promoted through financial education initiatives in families. This approach is highly relevant in ini-

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tiatives targeting young people or populations at risk of vulnerability.

In theoretical terms, the work contributes to the research literature by connecting behavioral economics magnitudes with financial socialization propositions based on evidence provided from a Latin American perspective that has been scarcely studied to date. However, it is worth mentioning several limitations, specifically that the cross-sectional design restricts the possibility of establishing causal relationships and that the use of perception variables may imply certain biases in the analysis. Likewise, some of the constructs used could benefit from more extensive validation processes depending on the cultural context.

In view of these limitations, future research could adopt longitudinal approaches to examine the evolution of these relationships throughout the life cycle, as well as explore the sociodemographic differences that intervene in socialization mechanisms and their impact on financial well-being.

The results have relevant implications for designing public policies and training programs that encourage the reformulation of learning processes currently focused on the transmission of technical content to migrate to a combination of educational and governmental institutions complemented by actions aimed at strengthening the family environment. In this regard, it is important to promote open dialogue about money, encourage shared responsibility in economic decision-making, and foster daily practices that actively involve parents and children in household financial management.

This intervention model would allow the public administration to implement financial education strategies aimed at families, simultaneously integrating socio-emotional skills and practical financial management tools. In this way, the use of public resources is optimized and the social impact of inclusion and financial well-being policies at the regional level is amplified.

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Declaration of Authorship - CRediT Taxonomy

Author(s)	Contributions
Dr. Duniesky Feitó Madrigal	Software processing and data curation, methodology validation and development, presentation and formal analysis of results, contribution to the conclusions section.
Dra. Malena Portal Boza	Writing, Reviewing, and Editing of the Summary, Introduction, Literature Review, Formal Analysis, and Discussion of Results sections. Writing - Original Draft.

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Infographics

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VOL. 15 NO. 30 - OCTOBER 2025/MARCH 2026

SUSTAINABLE CONSUMPTION HABITS AND FUTURE GENERATIONS'AWARENESS IN LATIN AMERICA

Authors: Leonardo Ortegón-Cortázar Marina Santucci David Iglesias-Pina Ángel Acevedo-Duque Christiam Méndez-Lazarte

Justification

AI is a strategy for digital, economic, and social transformation in Spain, but there is a lack of specific empirical studies on its evolution.

Objective

To analyze how awareness of future generations can promote sustainable consumption habits and drive the purchase of eco-friendly products among consumers in developing countries: Mexico, Colombia, Peru, Chile, and Argentina. In addition, to investigate the mediating role of sustainable consumption habits in the relationship between awareness of future generations and the purchase of eco-friendly products.

Methodology

A survey was conducted among 1,466 consumers in the aforementioned countries. The data collected was analyzed using the partial least squares structural equation modeling (PLS-SEM) to explore the direct and indirect relationships between awareness of future generations, responsible consumption habits, and the purchase of environmentally friendly products.

Results

The integrative model revealed that awareness of future generations strongly drives sustainable habits, which in turn explain a substantial part of the decision to purchase eco-friendly products, confirming the proposed mediation.

The multigroup analysis showed national nuances, without compromising the overall validity of the model.

Conclusion

Even in contexts marked by structural inequality and economic informality, this causal relationship remains valid, highlighting the transformative power of intergenerational ethics.

These findings suggest that campaigns based on intergenerational responsibility, combined with incentives that facilitate daily practice, can accelerate the mass adoption of sustainable consumption behaviors in emerging economies.

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SPAIN AND ARTIFICIAL INTELLIGENCE: INSTALLED CAPACITIES, CHALLENGES, AND OPPORTUNITIES

Authors: José Luis Ros-Medina José Manuel Mayor-Balsas Thiago Ferreira-Dias Elias Jacob de Menezes-Neto

Justification

AI is a strategy for digital, economic, and social transformation in Spain, but there is a lack of specific empirical studies on its evolution.

Objective

To analyze the current and future situation of AI capabilities in Spain by adapting the Latin American Artificial Intelligence Index (ILIA).

Methodology

A combination of secondary data analysis, interviews with eight experts, and methodological adaptation of the ILIA was used.

Results

Spain outperforms Latin America in enabling factors, R&D&I, and governance, ranking well above Chile and the regional average.

Weaknesses are identified in territorial coordination, citizen participation, and risk regulation.

Conclusion

Spain has the potential to be an international benchmark in AI if it strengthens institutional capacities and promotes public-private cooperation.

The development of AI must ensure an ethical framework aligned with human rights and promote inclusive governance.

pp. 225-240

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DETERMINANTS OF THE QUALITY OF ACCOUNTING INFORMATION AT BRAZILIAN FEDERAL UNIVERSITIES

Authors: Joelma Viviane de Paula Mendes · Henrique Portulhak · Luciana Klein · Patrik Donizetti Rodrigues da Silva

Justification

Understanding the contingent factors that influence the quality of accounting information in universities can improve financial transparency and decision-making in public higher education.

Objective

To examine the internal and external determinants of the quality of accounting information in Brazilian federal universities from the perspective of contingency theory.

Methodology

Explanatory and quantitative study with secondary data analysis and application of multiple regression by ordinary least squares (OLS).

Results

Administrative efficiency, measured by the current cost per student, has a positive impact on the quality of accounting information.

The presence of a female president, a greater number of accounting professionals, and better institutional management positively influence the quality of accounting information.

Conclusion

Internal contingency factors are more decisive than external factors in the quality of accounting information at Brazilian federal universities.

This finding is useful for university administrators and supervisory bodies to focus on improving the internal characteristics of universities to produce useful information for decision-making.

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VOL. 15 NO. 30 - OCTOBER 2025/MARCH 2026

ESTIMATING ACCOUNTING OPERATING PERFORMANCE IN BUSINESS SECTORS IN ECUADOR: ADAPTATION OF THE CAPM MODEL

Authors: Iván Felipe Orellana-Osorio · Luis Gabriel Pinos-Luzuriaga · Marco Antonio Reyes-Clavijo · Luis Bernardo Tonon-Ordóñez

Justification

The traditional CAPM model has limitations for valuing companies in emerging economies with under developed stock markets, justifying adaptation with accounting data.

Objective

To estimate the required accounting operating return by Ecuadorian business sector using an adapted version of CAPM based on operating return on equity (OROE).

Methodology

We analyzed 374,340 financial observations from the period 2013-2023 using ordinary least squares (OLS) regression to calculate accounting beta coefficients and estimate rates of return.

Results

The Transportation and Storage sector was identified as having the minimum required accounting return (9.69%), while the Arts, Entertainment, and Recreation sector had the maximum (15.16%).

Accounting beta coefficients proved to be a robust and replicable alternative for measuring systematic risk in markets with limited stock market information, such as Ecuador.

Conclusion

The CAPM model adapted with accounting data overcomes the limitations of the traditional CAPM in emerging economies, facilitating more accurate financial decisions for unlisted companies.

Most of the sectors analyzed added value in 2023, except for three sectors that showed value destruction, demonstrating the practical usefulness of the adapted model for evaluating sector performance.

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UNIVERSITY ENTREPRENEURSHIP IN COLOMBIA: FAMILY SUPPORT, ENTREPRENEURIAL PERSISTENCE, AND PERFORMANCE

Authors: Edgar Julián Gálvez-Albarracín · César Arvey Granado-Mandinga · Juan David Peláez-León

Justification

University entrepreneurship has been shown to contribute to the development of regions and countries. Therefore, delving deeper into key factors for its survival and growth, such as family support and entrepreneurial persistence, can generate lessons that help strengthen the entrepreneurial ecosystem and the field of management in general.

Objective

To understand how family support, entrepreneurial persistence, and the performance of organizations created by university students in Colombia are related.

Methodology

Partial least squares structural equation modeling (PLS-SEM) is used to analyze data from 1,287 university student entrepreneurs covered in the GUESSS Colombia 2021 Report.

Results

Emotional and instrumental family social support has a positive influence on the performance of Colombian university students' businesses.

The mediation of entrepreneurial persistence is more relevant in the case of emotional family social support than in the case of instrumental support.

Conclusion

The study confirms the role of the family as an important factor in the support network of entrepreneurs. Therefore, it should be considered in the construction and management of business projects.

Entrepreneurial persistence enhances the performance of companies managed by university students and acts as an intermediary mechanism in the positive effect that family support, mainly of an emotional nature, has on that performance. Therefore, it is necessary to promote the strengthening of this personality trait.

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VOL. 15 NO. 30 - OCTOBER 2025/MARCH 2026

CORPORATE REPUTATION AND eWOM: EXPLORING THE MODERATING ROLE OF BRAND LOVE ON THE AUTOMOTIVE INDUSTRY

Authors: Mohamad Hashem, Muhammed S. Alnsour, Carla Ruiz-Mafe, Rafael Curras-Pérez

Justification

Corporate reputation, word-of-mouth communication (eWOM), and brand love are key to competitiveness in the automotive sector, but their relationship remains understudied.

Objective

To analyze how corporate reputation, satisfaction, and brand commitment affect eWOM, considering the moderating role of brand love.

Methodology

Quantitative study using a structural equation model (PLS-SEM) applied to 307 car buyers from Abu Khader Automotive (Jordan).

Results

Customer satisfaction mediates the relationship between corporate reputation and brand commitment.

Brand love negatively moderates the relationship between corporate reputation and customer satisfaction.

Conclusion

Corporate reputation drives customer satisfaction and engagement, which in turn generates higher eWOM.

Brand distinctiveness and perceived fair pricing are key determinants of corporate reputation.

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INFLUENCE OF TRANSACTIONAL AND TRANSFORMATIONAL LEADERSHIP ON SOCIAL, ENVIRONMENTAL, AND OPERATIONAL PERFORMANCE

Authors: Maribel Mendoza-Solis | Jorge Luis García-Alcaraz | Cuauhtémoc Sánchez-Ramírez

Justification

The research analyzes leadership styles in organizational performance, covering social and environmental dimensions that are often ignored in the Mexican manufacturing context.

Objective

To quantify, using structural equations, how transactional and transformational leadership influence social, environmental, and operational performance in Mexican manufacturing companies.

Methodology

A questionnaire was administered to 156 managers and engineers, evaluating the model using partial least squares and conditional probability analysis.

Results

Transformational leadership has a greater influence than transactional leadership on the three types of performance (social, environmental, and operational). The probability of achieving high social performance with transformational leadership is 56.7%, while with transactional leadership is 43.3%.

Conclusion

It is recommended to develop transformational leaders who inspire and empower teams to improve multidimensional organizational performance in the maquiladora industry. Each style has its optimal space: transactional for supervision and structured work; transformational for management positions where corporate strategies are developed.

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IMPACT OF WORKING CAPITAL ON THE PROFITABILITY OF SMEs IN ECUADOR

Authors: María Estefanía Sánchez-Pacheco · María del Carmen Valls-Martínez · Fernando José Zambrano-Farías

Justification

The research addresses how working capital management affects the profitability of SMEs, a key aspect for their sustainability in an environment with limited access to financing.

Objective

To analyze the effect of working capital components on the financial profitability of commercial SMEs in Ecuador using a robust statistical model.

Methodology

A quantitative approach was used with data from 1,634 SMEs in the commercial sector registered with the Superintendency of Companies, Securities, and Insurance, applying multiple linear regression.

Results

It was found that leverage, equity strength, business seniority, and operating profitability have a positive and significant impact on profitability.

It was found that portfolio turnover has an inverse effect on profitability, highlighting the risk of lax credit policies in contexts of restricted liquidity.

Conclusion

Efficient working capital management is essential to enhance the profitability and competitiveness of SMEs, even in adverse economic scenarios.

The study provides evidence applicable to financial policies and training programs that promote the sustainability of SMEs and guides future lines of research.

pp. 327-340

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IMPULSIVE BUYING BEHAVIOR ON INSTAGRAM AMONG GENERATIONS Y AND Z IN INDONESIA

Authors: Yanto Azie Setya · Arief Helmi · Dwi Kartini · Yevis Marty Oesman

Justification

It is essential to understand generational differences in impulsive online shopping in order to design effective digital marketing strategies.

Objective

To examine how Instagram usage, extroversion, and positive emotions influence impulsive online shopping among Generations Y and Z.

Methodology

Quantitative survey of 385 Indonesian Instagram users was analyzed using a multigroup structural equation model.

Results

The intensity of Instagram use significantly influences impulsive buying behavior, especially among Generation Z.

Positive emotions related to shopping mediate the effect of extroversion and Instagram use on impulse buying.

Conclusion

Generation Z is more emotionally driven and receptive to visual content, making them more prone to impulse buying.

Marketing strategies should be differentiated by generation: Generation Z responds to emotional engagement, while Generation Y prefers practical value.

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FINANCIAL SOCIALIZATION AND WELL-BEING: THE MEDIATING ROLE OF PSYCHOLOGICAL FACTORS IN MEXICAN ADULTS

Authors: Duniesky Feitó-Madrigal - Malena Portal-Boza

Justification

Financial socialization at an early age influences financial well-being as a mechanism that shapes beliefs, roles, and values related to money.

Objective

To analyze the relationship between financial socialization and financial well-being directly and through the mediation of psychological factors.

Methodology

Quantitative study with a structural equation model applied to a national sample of Mexican adults.

Results

The impact of financial socialization on well-being is significantly strengthened by incorporating the psychological factors of trust, control, and financial optimism.

Confidence in the ability to effectively manage economic resources is the factor that most strongly transforms the impact of financial socialization on well-being in adulthood.

Conclusion

Promoting open dialogue about money, encouraging shared responsibility, and daily practices between parents and children in household financial management improves financial well-being in adulthood.

Educational interventions should integrate adaptive psychological resources such as resilience, self-efficacy, and optimism to maximize the impact of financial socialization on well-being.

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"Retos" is a bilingual scientific publication by the Universidad Politécnica Salesiana de Ecuador, which has been edited on a bi-annual basis since January 2011. The journal focuses on Development and transdisciplinary issues including Public Administration, Social Economics, Marketing, Tourism, Entrepreneurship, Management, Administrative and Economic Science, etc.

It is an arbitrated Scientific Journal that uses an external evaluation system known as *peer-review*, employing *double-blind review*, in accordance with the American Psychological Association (APA) style rules. By using this system, the authors have access to an objective, impartial and transparent review process, which facilitates their publication being included in databases, repositories, and international indexed references.

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Scope and policies

Themes

Original contributions in Development issues, as well as related fields: Public Administration, Social Economics, Marketing, Tourism, Entrepreneurship, Management...and all other disciplines related to the central thematic issue.

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"Retos" preferably publishes the results of empirical research about Development, written in Spanish and/or English, while reports, studies, and proposals are also accepted, as well as reviews of state-of-the-art literature.

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Papers are to be presented with Arial 10 typeface, single line spacing, all justified, without indentation or blank spaces between paragraphs. A space is only to be included between the major sections (title, authors, abstracts, keywords, credits, and epigraphs). All margins on each page must be 2 cm.

The papers are to be presented in Microsoft Word format (.doc or .docx), and the file is to be anonymous in the File Properties such that the author(s) is(are) not identified.

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For papers that are empirical research, the manuscripts are to follow IMRDC structure, while Notes and Contributions epigraphs are optional. Papers that constitute reports, studies, proposals, and reviews are afforded greater flexibility in terms of epigraphs, especially in relation to Materials and Methods, Analysis and Results, and Discussion and Conclusions. All types of papers are required to include References.

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3. **Abstract (Resumen, Spanish) / Abstract (English):** This section can contain a maximum of 230 words, first in Spanish and then in English. The abstract shall concisely contain the following, and in this order: 1) Justification of the theme; 2) Objectives; 3) Methods and sample; 4) Main results; 5) Main conclusions. It should be written impersonally "This paper analyzes..." In the abstract, automatic translation is not accepted due to its poor quality.
4. **Keywords (descriptores, Spanish) / Keywords (English):** Six keywords are to be included for each language, and must be directly related to the paper's theme. This requirement shall be scored based on whether the keywords can be found in the UNESCO Thesaurus.
5. **Introduction and State of the Question:** The section proposes the question, the context of the issue surrounding it, justification, basis, and proposal for the study, using bibliographic references, including the most important up-to-date literature on the theme, both nationally and internationally.
6. **Material and Methods:** This is to be composed in such a way that the reader can easily understand how the research was performed. As appropriate, describe the method, sample, sampling, and refer to the type of statistical analysis used. If it is an original method, present the reasons for applying it, and describe any possible limitations.

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Rules for references

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Journal article (up to six authors): Ospina, M.C., Alvarado, S.V., Fefferman, M., & Llanos, D. (2016). Introducción del dossier temático "Infancias y juventudes: violencias, conflictos, memorias y procesos de construcción de paz" [Introduction of the thematic dossier "Infancy and Youth: Violence, Conflicts, Memories and Peace Construction Processes"]. *Universitas, 25*(14), 91-95. https://doi.org/10.17163/uni.n25.%25x

Journal article (more than six authors): Smith, S.W., Smith, S.L. Pieper, K.M., Yoo, J.H., Ferrys, A.L., Downs, E.,... Bowden, B. (2006). Altruism on American Television: Examining the Amount of, and Context Surronding. Acts of Helping and Sharing. *Journal of Communication, 56*(4), 707-727. https://doi.org/10.1111/j.1460-2466.2006.00316.x

Journal article (with no DOI). Rodríguez, A. (2007). Desde la promoción de salud mental hacia la promoción de salud: La concepción de lo comunitario en la implementación de proyectos sociales. *Alteridad, 2*(1), 28-40. (https://goo.gl/zDb3Me) (2017-01-29).

Books and chapters of books

Complete books: Cuéllar, J.C., & Moncada-Paredes, M.C. (2014). *El peso de la deuda externa ecuatoriana*. Quito: Abya-Yala.

Chapters of a book: Zambrano-Quiñones, D. (2015). *El ecoturismo comunitario en Manglaralto y Colonche.* En V.H. Torres (Ed.), Alternativas de Vida: Trece experiencias de desarrollo endógeno en Ecuador (pp. 175-198). Quito: Abya-Yala.

Electronic media

Pérez-Rodríguez, M.A., Ramírez, A., & García-Ruíz, R. (2015). La competencia mediática en educación infantil. Análisis del nivel de desarrollo en España. Universitas Psychologica, 14(2), 619-630. https://doi.org.10.11144/Javeriana.upsy14-2.cmei

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