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Design and validation of sustainability scales in business entrepreneurship

Methodology
It is an instrumental type of study, in the sense that the psychometric properties of the proposed instrument are analyzed with a cross-sectional design.

Result or conclusion 1
It was found that the factorial structure is represented by a single factor, as eigen values greater than unity were observed, determining the single factor model.

Objective
The objective is to design and validate the durability scale of business entrepreneurship in entrepreneurs of the Gamarra Commercial Emporium, located in Lima, Peru, being this one of the main commercial emporiums that houses a diversity of entrepreneurs in the country.

Results or conclusion 2
The study enabled to design and validate a sustainability scale of business entrepreneurship in entrepreneurs (EPEE) by obtaining adequate goodness-of-fit indicators for model 4 with 15 items.

Introduction
No instruments have been developed to measure the sustainability of entrepreneurship.

Result or conclusion 3
Model 4 with 15 items is the most appropriate for measuring entrepreneurship sustainability, so the scale can be used to measure endurance in Micro, Small and Medium Enterprises.

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Authors:
Luis Alberto Geraldo-Campos
Sally Paola Moreno-Estelle
Claudia Saray Palacios-Pizarro
Pedro Leonardo Tito-Huamaní

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retos.ups.edu.ec
Diseño: kcarbo@ups.edu.ec

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Design and validation of sustainability scales in business entrepreneurship

Diseño y validación de escalas de perdurabilidad en emprendimiento empresarial

Luis Alberto Geraldo-Campos
Is a researcher and professor at Universidad Privada Peruano Alemana, Peru
luis.geraldo@upal.edu.pe
https://orcid.org/0000-0002-8366-689X

Sally Paola Moreno-Estelle
Is a student at Universidad Nacional Mayor de San Marcos, Peru
sally.moreno@unmsm.edu.pe
https://orcid.org/0000-0003-2511-4023

Claudia Saray Palacios-Pizarro
Is a student at Universidad Nacional Mayor de San Marcos, Peru
claudia.palacios1@unmsm.edu.pe
https://orcid.org/0000-0002-2551-787X

Pedro Leonardo Tito-Huamaní
Is a researcher and professor at Universidad Nacional Mayor de San Marcos, Perú
ptitoh@unmsm.edu.pe
https://orcid.org/0000-0002-2989-9203

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Abstract: new ventures appear in many forms, however, enduring over time is a challenge, due to the various factors involved in their survival. Therefore, the aim of the study is to design and validate an entrepreneurship durability scale (EPEE). The research is instrumental, for these 20 items were elaborated under the literature review, and the items were verified by judges and pilot testing. The instrument was applied to 400 entrepreneurs. After the quality control of the data, descriptive and reliability statistics were obtained to carry out the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The results revealed adequate reliability levels (α=.989; ω=0.99) of the 20 items; furthermore, the AFE reported that all 20 items load on a single factor (λ>0.8), a very good KMO and a significant Bartlett $(KMO = 0.97; \chi^2 = 4674;\ df = 190;\ p < .001)$ with an explained variance of 82.5 %. In contrast, the CFA reported 4 models, where model 4 (M4) with 15 items has adequate goodness-of-fit indices $(\text{CMIN/DF} = 2.24; \text{CFI} = 0.92; \text{TLI} = 0.91; \text{RMSEA} = 0.07)$ confirming the factor structure of the single-factor model. In conclusion, as it has adequate goodness-of-fit indices, the M4 is the most appropriate for measuring the durability of entrepreneurship in entrepreneurs.

Keywords: exploratory factor analysis, one-factor model, entrepreneurship, business perdurability, financial support, liquidity, innovation, confirmatory factor analysis.

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Resumen: los nuevos emprendimientos se presentan de muchas formas, sin embargo, perdurar en el tiempo es un desafío, debido a los diversos factores que intervienen en su subsistencia. Por lo tanto, el objetivo del estudio es diseñar y validar una escala de perdurabilidad del emprendimiento empresarial (EPEE). La investigación está bajo el soporte metodológico de un estudio de tipo instrumental, para esto se elaboraron 20 ítems bajo la revisión de la literatura, se verificó los ítems por medio de jueces y prueba piloto. El instrumento se aplicó a 400 emprendedores. Luego, a partir del control de calidad de los datos se obtuvo estadísticas descriptivas y de fiabilidad para realizar el análisis factorial exploratorio (AFE) y el análisis factorial confirmatorio (AFC). Los resultados revelaron adecuados niveles de fiabilidad (α=.989; ω=0.99) de los 20 ítems; además, el AFE reportó que los 20 ítems cargan en un solo factor (λ>0.8), un KMO muy bueno y un Bartlett significativo $(KMO = 0.97; \chi^2 = 4674;\ df = 190;\ p < .001)$ con una varianza explicada del 82,5 %; en cambio, el AFC reportó 4 modelos, donde el modelo 4 (M4) con 15 ítems tiene adecuados índices de bondad de ajuste $(\text{CMIN/DF} = 2.24; \text{CFI} = 0.92; \text{TLI} = 0.91; \text{RMSEA} = 0.07)$ que confirman la estructura factorial del modelo unifactorial. En conclusión, al contar con adecuados índices de bondad de ajuste, el M4 es el más apropiado para medir la perdurabilidad del emprendimiento empresarial en emprendedores.

Palabras clave: análisis factorial exploratorio, modelo unifactorial, emprendimiento, perdurabilidad empresarial, apoyo económico, liquidez, innovación, análisis factorial confirmatorio.

Introduction

An entrepreneur is the person who distinguishes opportunities, generates novel ideas, shapes them into innovative products or services and commercializes them in the market (Acuña, 2021). The entrepreneur's orientation creates an image for the social and economic growth of their locality, region or country (Silveira-Pérez *et al*., 2016), however, he/she struggles to maintain the entrepreneurship in the market based on competitiveness, innovation and adapting to the increasingly competitive and globalized market.

Knowledge, skills, abilities, and attitudes are essential elements in entrepreneurs, which attract the attention of researchers and academics, which over time become work agendas and public policies, both in consolidated and emerging economies (Machmud and Sidharta, 2016). Thus, knowledge seems to be the differentiating element available to countries to preserve a competitive advantage and a fundamental piece to increase profitability at the business level (Lupiáñez *et al*., 2017). Hence, the interest of knowing the factors that influence entrepreneurship, to establish strategies with emphasis on innovations, human capital, organizational development, among others (Méndez-Picazo *et al*., 2021).

The theoretical literature reveals three needs that predominate in the motivation of entrepreneurs: the need for achievement, affiliation, and power, all related to the individual's desire to succeed and grow (Molina *et al*., 2016). López *et al.* (2019) point out that managerial skills, composed of knowledge and capabilities are important for the development, improvement of productivity and durability of the company over time. Thus, the initiative of starting a business expects to achieve benefits that make it possible to maintain operations in the first instance and achieve economic stability (Texis *et al*., 2016), which implies its durability over time, achieving a maturity level in strategies and operational processes (Daza, 2016). As a result of its contributions to job creation, innovation, product diversity and social movement, entrepreneurship is a driving force for economic growth and development (Soria-Barreto *et al*., 2021).

In recent years, increasingly ingenious entrepreneurial initiatives have emerged in Peru, many of these people with basic training and others with studies that are not necessarily related to business, but with the daily effort they have managed to position themselves in the market (Avalo *et al*., 2016). In addition, entrepreneurship had an impact on Peruvian economic growth, causing the development and increase of companies from 1 % equivalent to 0.68 % in GDP (Gross Domestic Product) per capita (León-Mendoza, 2019). However, many of the companies take several years to find stability in the business market, so it is necessary to identify the factors or aspects involved in their stability.

Entrepreneurship studies reveal instruments from the business and academic perspective (Helm and Andersson, 2010; Hornsby *et al*., 2002; Saptono *et al*., 2018; Schjoedt and Shaver, 2012; Sharifi-Tehrani *et al*., 2022; Vendrig *et al*., 2021).

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However, no instruments have been developed yet to measure the durability of ventures over time. Therefore, this research aims to design and validate the sustainability scale of business entrepreneurship in entrepreneurs of the Gamarra Commercial Emporium, located in Lima, Peru, being one of the main commercial emporiums that houses a diversity of entrepreneurs in the country.

Perdurability of the business venture

Entrepreneurship is the attitude and aptitude that a person has to undertake an idea based on opportunities, which is key to generate employment (García-Hernández *et al*., 2020), innovation, productivity, thus economic growth (Flores *et al*., 2017). It is a term used in business due to the creation of new ventures, based on products or services, some more innovative than others (García-Pérez de Lema *et al*., 2016); however, for this venture to last, it depends on several factors such as liquidity and profitability. Therefore, durability is considered to be the ability of companies to last or maintain a high life rate with respect to the start-up, taking into account the various changes of the market and technological advances, i.e.; the company must have the ability to adapt to the abrupt changes that it may have in its environment, so that they can manage the venture without having negative results, transforming those disadvantages into representative solutions, which contribute to the improvement and thus durability (Castillo, 2018).

According to De la Garza *et al.* (2017), entrepreneurship is the process of creating a product or service with an added value through effort that makes it sustainable over time. Resource mobilization is an essential part to ensure the success of entrepreneurship, hence the importance to stimulate economic growth by privileging factors such as innovation, human capital, process improvement, business development and feedback for continuous improvement (Méndez-Picazo *et al.*, 2021). Similarly, there are studies that state the influence of personality in the development of entrepreneurship (Fernández-Pérez *et al.*, 2019), which has a synergistic and socializing effect among members (Korpysa, 2020).

Entrepreneurship also has a social meaning (Sánchez *et al*., 2018), since it is a type of entrepreneurship that seeks to provide services or goods to the unmet needs of society, putting social value above personal expectations. Guerrero *et al*. (2020) point out that entrepreneurship initiatives contribute to the generation of employment and strengthen the country's economy. On the other hand, it contributes to teaching how to manage a business through critical thinking and the development of self-esteem (Martínez-Gregorio *et al.*, 2021). Likewise, there are some countries that encourage social entrepreneurship through proposals developed by university students with the aim of solving a problem in their community with a creative solution (Möller-Recondo and D'Amato, 2020).

There are factors involved with entrepreneurship that determine durability over time. One of these factors is the financing or equity capital that the entrepreneur may have to meet its obligations, being that the optimal results in debt levels are more evident in diversified companies than in focused companies, since their debt capacity allows them to be closer to these levels (Ahuja and Novelli, 2017). Another factor to consider is human capital, being of the most important to the venture; however, this capital is difficult to quantify, since there are several factors that affect the quantity and quality of human capital, such as education, which leads to specialization, the employment and unemployment rate, and the quantity and quality of hours worked (Erken *et al*., 2018).

There are factors related to public policies and the environment. The public policy factor is related to cultural values and entrepreneurial activity, in addition to the economic level of the country, and these are determining when explaining entrepreneurial activity (De la Garza *et al*., 2017); likewise, the environment in which an entrepreneurship is developed along with current legislation, sources of financing, qualification opportunities, among others, directly influence the process. However, it is in the environment where the needs and potential opportunities for entrepreneurship are identified (Prada-Villamizar and Sánchez-Peinado, 2021), i.e., the need is focused on the desire to generate income in a scenario of scarce employment, and the opportunity are the motivations they have to contribute

to society or to carry out an entrepreneurial idea. In either scenario, a deep and favorable relationship with the environment is needed.

One of the great challenges of entrepreneurship is that the venture lasts over time, and this depends on the factors mentioned above and others that originate during its development. However, sustainability is an important factor for entrepreneurship. This concept was valued from its beginnings with the industrial revolution to the company we know today (Almaraz, 2020). In the effort to make a company, through trial-error-trial, knowledge is obtained, skills and abilities are perfected, involving organizational learning to ensure the durability of the venture (Castillo, 2018). Factors that could intervene in the durability of ventures over time are the information and communication technologies (ICT), due to the vast existing information on any venture idea, as well as the constant innovation and adaptation by competing companies (Fang *et al*., 2022). The latter is a key element in business sustainability, since competition among companies forces them to adapt to changes quickly and efficiently. Thus, a competitive business environment generates competitive advantages, sensitizes the reflexive behaviors of managers to seek immediate responses in the face of adversity to ensure their survival for long periods (Castillo, 2018).

An enduring enterprise is the term used when it is consolidated, i.e., it is solvent and can meet its business obligations. A consolidated company maximizes its profits and benefits (Yamada *et al*., 2020), in addition, it has a good and important financial management to acquire new machinery and equipment, purchase inputs in a timely way and pay decent salaries to its employees. This involves taking care of financial resources, rationing and prioritizing its expenses (Sánchez *et al*., 2018). The search for differentiation in the market guarantees the continuity of the business, and depends on the proper management of knowledge, skills, autonomy, evaluation of the environment and management of the organizational life cycle (De la Garza *et al*., 2017), in addition to the efficient use of resources, which are essential for any enterprise. The latter allows achieving the company's objectives supported in business management, favored at the time of making an efficiency analysis that helps to make the right decisions, since it allows evaluating the company's performance (Alberca and Parte, 2013).

However, sixteen studies were found that measure entrepreneurship from different perspectives in bibliographic databases such as Scopus and Web of science on the proposals related to instruments or scales for measuring entrepreneurship; however, in the analysis of the instruments and their dimensions or factors, no study was found that involves the sustainability of entrepreneurship, but there are some factors that are directly related to the sustainability of an entrepreneurship, such as the factors proposed by Hornsby *et al*. (2002), Helm and Andersson (2010), Nájera *et al*. (2018), Kannampuzha and Hockerts (2019) and the factors presented by Vendrig *et al*. (2021). However, the durability of entrepreneurship is still not very clear, so it is worth filling the gap of theoretical knowledge under the initial proposal of an instrument that measures the durability of entrepreneurship from the perspective of consolidated business ventures.

Table 1
Evolution of proposed instruments on entrepreneurship

Author and year	Factors/dimensions	Name of instrument and/or model
Hornsby *et al*. (2002)	Appropriate use of rewards, gaining top management support, availability of resources, supportive organizational structure, risk-taking, and tolerance for failure.	Corporate Entrepreneurship Assessment Instrument (CEAI)
Helm and Andersson (2010)	Innovation, proactivity and risk-taking.	Nonprofit Social Entrepreneurship Instrument
Schjoedt and Shaver (2012)	Locus of control with three items (unifactor).	Locus of control scale for nascent entrepreneurs

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Author and year	Factors/dimensions	Name of instrument and/or model
de Souza *et al.* (2013)	Prospecting and innovation and management and persistence.	Instrumento de escala para medir la actitud empresarial (IMAE)
Carraher (2013)	Social entrepreneurship with 11 items (unifactor).	Social entrepreneurship scale
Davari and Rezazadeh (2015)	Before alliance formation, after alliance formation, and alliance performance.	Entrepreneurship of alliances
Saptono *et al.* (2018)	Dimensions of the entrepreneurial attitude indicators: business opportunities, business risks and innovation. Value dimensions of the entrepreneurship indicator: look confident.	Affective Domain Assessment Instrument for Entrepreneurship
Nájera *et al.* (2018)	Operational processes, entrepreneurial profile, support processes, public policies, mentoring, leadership, future orientation, task and results orientation.	Entrepreneurship model for PYMES
Steyn and de Bruin (2018)	Management support, job discretion/ autonomy, rewards/reinforcement, time availability, organizational boundaries.	Instrumento Breve de Evaluación del Espíritu Empresarial (BCEAI)
Daud *et al.* (2019)	It contains two dimensions: perseverance and social and cultural awareness.	Rasgo de emprendimiento "ET"
Kannampuzha and Hockerts (2019)	Making change, social mission, earned income, paid employees, democratic decision making, stakeholder involvement, social impact.	Organizational social entrepreneurship
García-González *et al.* (2020)	Personal subcompetencies, leadership subcompetencies, social innovation subcompetencies, social value subcompetencies, entrepreneurial management subcompetencies.	Competence of social entrepreneurship
Capella-Peris *et al.* (2020)	Personal characteristics, social characteristics, innovative characteristics.	Social Entrepreneurship Competency in Higher Education (SECS)
Vendrig *et al.* (2021)	Entrepreneurial attitude, management skills, entrepreneurial resilience and financial health.	Work and Well-Being Inventory (WBI)
Sharifi-Tehrani *et al.* (2022)	Emotional and practical responses, recognition of the capabilities of marginalized people, understanding of marginalized people, awareness of social discriminations, narcissism.	Tourism Social Entrepreneurial Scale of Ethnocultural Empathy (abbreviated as TSE-SEE)
Martínez-Gregorio and Oliver (2022)	Attitude toward entrepreneurship, subjective norm, entrepreneurial self-efficacy, entrepreneurial intention.	Entrepreneurial Intention Questionnaire (EIQ)

Materials and Method

Type and design of research

This study is instrumental, in the sense that the psychometric properties of the proposed instrument are analyzed, with a cross-sectional design (Ato *et al*., 2013).

Participants

Since this was an instrumental study with a structural analysis, an *a priori* sample was calculated for structural equation models, so the necessary parameters were considered. This determined a median anticipated effect size equal to 0.30, a statistical power level of 0.95 with 2 latent variables, 20 observable variables and a probability of 0.05, and 147 participants as the minimum sample to detect the effect. Consequently, a non-probabilistic sampling was considered, surveying 400 entrepreneurs of Micro, Small and Medium Enterprises of the Gamarra Commercial Emporium located in Lima, Peru, where the instrument was applied in different types of enterprises (clothing, food, household appliances, etc.) with an age older than ten years.

Table 2 shows the characteristics of the entrepreneurs who participated in the study. Of the 100 % of the respondents, 63.2 % are women entrepreneurs and 36.8 % are men entrepreneurs, of whom 46.8 % are between 26 and 35 years old, with a representative secondary education equivalent to 44.8 % and who mostly live in Central Lima (35.5 %). In addition, 59.25 % are businesses that have less than five years of constituted and most of these businesses tend to have between five and ten employees.

Table 2
Characteristics of participants (n=400)

Sociodemographic variable	Categories	Participants	% of participants
Genre	Female	253	63.2
	Male	147	36.8
Age	18-25	86	21.5
	26-35	187	46.8
	36-50	105	26.3
	51 to more	22	5.5
Academic background	Primary education	28	7.0
	Secondary education	179	44.75
	Baccalaureate	140	35
	Magister	36	9
	PhD	7	1.75
	None of the above	10	2.5
Residence	North Lima	84	21
	South Lima	59	14.75
	East Lima	97	24.25
	Lima Downtown	142	35.5
	Modern Lima	16	4
	Callao	2	0.5
Years of the company	Less than 1 year	64	16
	From 1 to 5 years old	173	43.25
	From 5 to 10 years old	135	33.75
	More than 10 years	28	7
Number of employees of the company	Less than 5	84	21
	From 5 to 10	180	45
	From 11 to 20	116	29
	More than 31 years	20	5

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Instrument

The instrument called the Entrepreneurship Sustainability Scale (EPEE) was developed considering the scientific literature that reflects sustainability of companies over time, where it was found that sustainability in a company depends on liquidity (Quiñones *et al.*, 2014), profitability, innovation, analysis of the environment and markets, strengthening of entrepreneurship in the market, and employee commitment (Cerón and Torres, 2017; Meneses and Gómez, 2014; Pulgarin-Molina and Rivera-Rodriguez, 2007; Restrepo *et al*., 2009; Rivera *et al*., 2006; Vélez *et al*., 2005), which are linked to business entrepreneurship. The latter is composed of a series of indicators such as: entrepreneurial attitude, entrepreneurship training, motivation, access to bank credit, public or private financial support, policies and laws for business creation, business strengthening, the business-environment relationship, and family and friendship networks (Murray and Stern, 2015). As a result of this set of factors and indicators, in addition to those already presented in Table 1, 20 observable variables (items) were elaborated with a measurement scale of five responses, totally disagree (TD; 1) to totally agree (TA; 5) (see Table 3).

Procedure and data analysis

An exhaustive search for scientific information was carried out in a bibliographic database, which allowed the development of the instrument, giving way to the review and evaluation by judges who provided their observations and suggestions. Then, the instrument was tested in a pilot sample, where it was possible to verify a reliability analysis of general alpha above 0.8 (Cronbach, 1951), which allowed applying the instrument according to the recommended sample from the *a priori* effect size. In this application phase of the instrument, working groups were organized to cover the different galleries of the Gamarra Commercial Emporium; it is worth mentioning that a certain reluctant attitude to collaborate was evidenced in the entrepreneurs, for the same reason, it was a great challenge to cover a sample of 400 respondents required. In addition, all respondents in this process were also informed of the purpose of the study, where it was emphasized that their participation was voluntary and their anonymity was guaranteed by the researchers. Finally, an option of acceptance or refusal was included in the form to ensure informed consent.

To apply the surveys, we proceeded to the registration in an Excel sheet, where the quality control of the surveys was carried out and the descriptive analysis of the characteristics of the sample collected was performed. The 400 participants were divided into two (n1=147; n2=253) in order to perform the exploratory factor analysis (EFA) in the Jamovi 1.6.23 software and the confirmatory factor analysis (CFA) in the AMOS software, respectively.

The Cronbach's Alpha reliability analysis was explored (Cronbach, 1951) and item discrimination were explored with n1, initially identifying item 6 with a rest item correlation equal to 0.79, but which was not enough evidence to eliminate it completely; the mean, standard deviation and ω McDonald's of each of the items were also identified. This originated a more robust AFE to determine the internal structure of the instrument (Pérez and Medrano, 2010); for this, the Maximum Likelihood extraction method was configured based on an Oblimin rotation and number of factors based on parallel analysis (O'Connor, 2000). In addition, there were comparisons of assumptions in Bartlett's test of sphericity and KMO sampling adequacy mean (KMO>0.6) (Kaiser, 1970, 1974); meanwhile, factor loadings higher than 0.5 were requested and the lower ones were configured as hidden (Escobedo *et al*., 2016). It is at this point where item 6 is rechecked as the rest of the items and it was observed that the 20 items had λ>0.8 that represented the factorial structure by a single factor, so that all items contributed to the construct.

Knowing that all the items are adequate and contribute better to the construct, n2=253 was used, executing the CFA (Pérez and Medrano, 2010). After having extracted the data to the aforementioned software and having elaborated the factorial structure, it was proceeded to configure the estimations, ordering the applica-

tion of the Maximum Likelihood extraction method, requesting the adjustment of the saturated and independent model and the estimation of means and intercept. Likewise, outputs were configured, requesting the minimization history, the standardized estimators, the modification indexes, among other parameters necessary to verify and validate the factorial structure of the instrument. It should be noted that the analyzed goodness-of-fit indices focused on the absolute fit (CMIN/DF<3), the comparative fit centered on a CFI>0.90 and TLI>0.90, and the determination of the model based on the RMSEA<0.08 with a confidence interval equal to 90 % (Escobedo *et al.*, 2016), whose parameters allowed identifying four models.

Table 3
Item reliability statistics

Items	Description	M (4.06)	SD (1.21)	IHC	If the element is removed	
					α (0.989)	ω (0.99)
Item 1	I think that having an entrepreneurial attitude is important to start your own business.	4.24	1.39	0.94	0.989	0.989
Item 2	I believe that higher education is adequate to start a business.	4.07	1.31	0.91	0.989	0.989
Item 3	I am happy to start my own business.	4.16	1.34	0.92	0.989	0.989
Item 4	It is key to know the leverage ratio when applying for financing for our venture.	4.11	1.27	0.92	0.989	0.989
Item 5	If I have financial support, I am willing to start my own business.	4.10	1.33	0.92	0.989	0.989
Item 6	I believe that the State promotes business entrepreneurship.	3.84	1.40	0.79	0.990	0.990
Item 7	Starting a business requires rigorous but necessary procedures to achieve formality.	3.95	1.28	0.89	0.989	0.989
Item 8	I have a team capable of achieving the goals and objectives of the venture.	4.01	1.32	0.91	0.989	0.989
Item 9	My family or friends influenced me to become an entrepreneur.	3.97	1.37	0.88	0.989	0.989
Item 10	A company needs to have liquidity to be able to meet its expenses.	4.31	1.29	0.94	0.989	0.989
Item 11	The product or service sold by a company must be profitable in order to last over time.	4.18	1.31	0.92	0.989	0.989
Item 12	My company carries out innovation processes on a continuous basis.	4.20	1.28	0.92	0.989	0.989
Item 13	I need to be informed of everything that is happening around my company in order to make better decisions.	3.99	1.29	0.89	0.989	0.989
Item 14	An employer must have a comprehensive commitment to its employees.	4.03	1.30	0.90	0.989	0.989
Item 15	I think it is important for the company to motivate employees to be part of the company.	4.01	1.31	0.89	0.989	0.989

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Items	Description	M (4.06)	SD (1.21)	IHC	If the element is removed	
					α (0.989)	ω (0.99)
Item 16	I believe that the staff contributes to the company's work efficiency.	4.03	1.35	0.90	0.989	0.989
Item 17	I have conducted training for my employees.	3.99	1.32	0.90	0.989	0.989
Item 18	Highly qualified personnel must be available for the management and/or administration position.	3.99	1.34	0.90	0.989	0.989
Item 19	Employees should be encouraged to act ethically and be responsible for their actions.	4.01	1.35	0.91	0.989	0.989
Item 20	The company must have as one of its main objectives to be number one in its sector.	4.09	1.31	0.92	0.989	0.989

Note. M=Mean; SD=standard deviation; IHC=corrected homogeneity index; α= Cronbach's alpha; ω= ω McDonald.

Results

Reliability analysis

Reliability analysis was performed for all the items constructed, where an overall average of 4.06 with a standard deviation of 1.21 was identified. Highlighting an item-rest correlation higher than 0.79 (Zijlmans *et al.*, 2018), it was possible to identify that if the item is eliminated for both α Cronbach's and ω McDonald's it is possible to obtain a reliability of up to 0.99. However, an overall α Cronbach's equal to 0.989 and an ω McDonald's higher than α Cronbach's is reported, which allows determining the reliability of all constructed items, so it is not necessary to eliminate any constructed item; hence, a more robust internal analysis of all items is required (see Table 3).

Results of exploratory factor analysis

An exploratory factor analysis considered more robust was conducted to determine the internal structure of the instrument, where it was identified that all items contribute to the construct, which have factor loadings above 0.80 with communalities ranging between 0.1 and 0.37. Additionally, a very good KMO equal to 0.97 with a significant Bartlett's test of sphericity (χ^2=4674; df=190; p < .001) was found, and a cumulative variance that explains 82.5% of the total test. In addition, it was found that the factorial structure is represented by a single factor, since eigenvalues greater than unity were observed, determining the single-factor model.

Table 4
Exploratory factor analysis (n1= 147)

Ítems	Factor	h^2	KMO (0.97)	Items	Factor	h^2	KMO (0.97)
	1				1		
Item 1	0.94	0.11	0.97	Item 11	0.93	0.14	0.98
Item 2	0.91	0.17	0.98	Item 12	0.92	0.15	0.97
Item 3	0.92	0.15	0.96	Item 13	0.89	0.21	0.97

Ítems	Factor	h²	KMO (0.97)	Items	Factor	h²	KMO (0.97)
	1				1		
Item 4	0.93	0.14	0.97	Item 14	0.90	0.18	0.98
Item 5	0.92	0.15	0.98	Item 15	0.90	0.20	0.98
Item 6	0.80	0.37	0.97	Item 16	0.91	0.17	0.96
Item 7	0.89	0.21	0.96	Item 17	0.91	0.18	0.98
Item 8	0.91	0.18	0.98	Item 18	0.91	0.18	0.97
Item 9	0.89	0.22	0.98	Item 19	0.92	0.16	0.98
Item 10	0.95	0.10	0.96	Item 20	0.93	0.14	0.99

Note. The "maximum likelihood" extraction method was determined in combination with an "oblimin" rotation. h2: communalities. KMO: Kaiser-Meyer-Olkin measure of sampling adequacy.

Results of confirmatory factor analysis

Figure 1 shows graphically the results of the CFA with 253 remaining respondents (n_2), where it is observed that the Entrepreneurship Sustainability Scale (EPEE) is represented by a single factor, in which λ>0.45 and λ<0.79 are observed among the 15 items that contribute significantly to the EPEE factor model. In addition, the standardized regression weights of the items considered in the confirmatory factor model resulted in estimators >0.68 and <0.85 with a p<0.000 being significant in all items, i.e., the EPEE factor has a significant effect on all items.

Table 5 shows the goodness-of-fit indices, which show four models with their goodness-of-fit indices extracted. Model 1 (M1) shows the indices of the 20 items without modifications or covariances in the errors, where an absolute fit index was obtained with a CMIN/DF equal to 2.082 less than 3, being an adequate fit index. The comparative fit indices (CFI=0.86 and a TLI=0.84) are below the permitted threshold (CFI>0.90 and a TLI=0.90), with a RMSEA=0.08 being at the limit as recommended by the scientific literature. In view of this, covariances were sought in the errors of items 6-7 and 18-20 in model 2 (M2), resulting in improvements in the absolute fit index but not in the comparative fit nor in the RMSEA. Consequently, one more covariance was added on items 10-11 resulting in model 3 (M3) not exceeding the threshold of the comparative fit indices. In view of the lack of adjustment of the indexes, those items with high modification indexes (MI) were eliminated in order to have better indexes and an adequate factorial structure. This enables to obtain a model 4 (M4) based on 15 items with an adequate absolute fit index (CMIN/DF=2.24) and an appropriate comparative fit index higher than 0.90 (CFI=0.92; TLI=0.91), in addition, a RMSEA equal to 0.07 (RMSEA <0.08) was observed with a lower limit equal to 0.06 and an upper limit equal to 0.08, based on a confidence interval equal to 90 %.

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Figure 1
Confirmatory Factor Analysis of the EPEE model (n2=253)

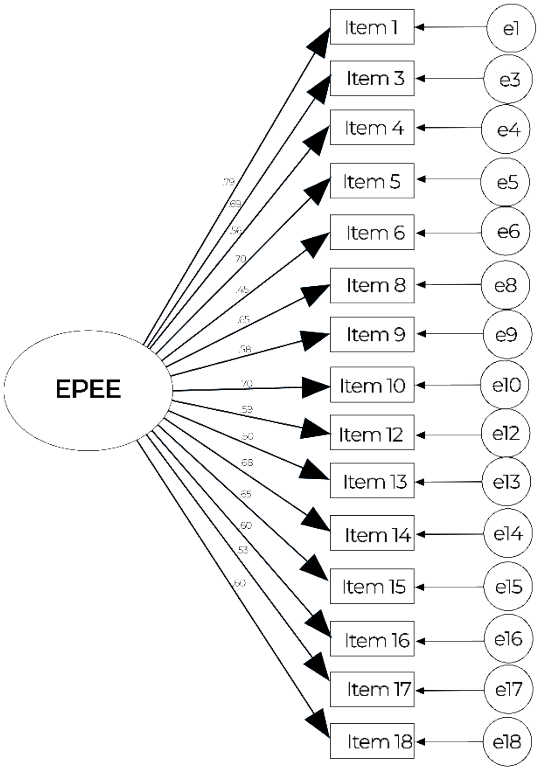

Table 5
Goodness-of-fit index of the extracted models (n_2=253)

Model	Covariances	Absolute adjustment			Comparative adjustment		RM-SEA***	RMSEA 90 % CI****	
		CMIN	DF	CMIN/DF	CFI*	TLI**		LI	LS
M1	20 items without covariance	451.85	170	2.66	0.86	0.84	0.08	0.07	0.09
M2	6<->7; 18<->20	415.22	168	2.47	0.88	0.86	0.08	0.07	0.09
M3	6<->7; 10<->11; 18<->20	398.68	167	2.39	0.88	0.87	0.07	0.07	0.08
M4	15 items without covariance	201.93	90	2.24	0.92	0.91	0.07	0.06	0.08

Note. *Comparative fit index; **Tucker-Lewis index; ***Mean squared approximation error; ****Confidence interval; LI=Lower limit; LS=Upper limit.

Conclusions and discussion

The study enabled to design and validate an entrepreneurial sustainability scale (EPEE), by obtaining adequate goodness-of-fit indicators for model 4 with 15 items. First, the α and ω reliability scores are adequate, which reached the pre-established statistical standards of reliability (Cronbach, 1951; Streiner, 2003; Viladrich *et al*., 2017). In addition, the EPEE revealed an adequate and robust internal structure according to the parameters (Pérez and Medrano, 2010); it is adequate in the sense of having commensurate and adequate values as suggested by the scientific literature (Escobedo *et al*., 2016; Kaiser, 1970, 1974).

The EPEE has an efficient factorial structure (Pérez and Medrano, 2010), by having adequate goodness-of-fit indexes, complying with the indexes and parameters presented in relation to the absolute index (CMIN/DF<3), comparative (CFI>0.90 and TLI>0.90) and an adequate mean square error of approximation (RMSEA<0.08) (Chau, 1997; Escobedo *et al.*, 2016; Loehlin and Beaujean, 2017). In such sense, this factor structure is similar to previously identified instrument structures (Carraher, 2013; Schjoedt and Shaver, 2012) and disagrees with multifactorial instruments suited to certain contexts that measure entrepreneurship (Daud *et al.*, 2019; Davari and Rezazadeh, 2015; de Souza *et al.*, 2013; Helm and Andersson, 2010; Hornsby *et al.*, 2002; Kannampuzha and Hockerts, 2019; Nájera *et al.*, 2018; Saptono *et al.*, 2018; Steyn and de Bruin, 2018) but does not assess entrepreneurship endurance.

There are instruments developed in various contexts linked to the concept of entrepreneurship, such as those that measure entrepreneurial traits (Daud *et al*., 2019), entrepreneurship (Davari and Rezazadeh, 2015; Hornsby *et al*., 2002; Steyn and de Bruin, 2018), entrepreneurial attitude (de Souza *et al.*, 2013; Lopes and Souza, 2005), entrepreneurial intention (Martinez-Gregorio and Oliver, 2022), entrepreneurship model (Nájera *et al*., 2018), affective domain of entrepreneurial learning (Saptono *et al.*, 2018), locus of control of entrepreneurship (Schjoedt and Shaver, 2012) and entrepreneurship itself (Vendrig *et al*., 2021). Of all those instruments discussed above, more instruments measuring social entrepreneurship with adequate psychometric properties were found (Capella-Peris *et al*., 2020; Carraher, 2013; García-González *et al.*, 2020; Helm and Andersson, 2010; Sharifi-Tehrani *et al.*, 2022).

Having an adequate structure to measure the sustainability of entrepreneurship (EPEE) and not having instruments that contribute to adequately measure this construct, it is evident that this study attempts to fill this knowledge gap but opens the need to study extensively the sustainability of entrepreneurship, in the sense that instruments should be built from other theoretical and empirical approaches, which help to make better decisions regarding intrinsic and extrinsic factors related to the sustainability of a business in the entrepreneurial market. In addition, it is recommended to take with caution the present scale since it measures the durability in Micro, Small and Medium Enterprises with certain characteristics previously presented, so it is necessary to develop a scale to measure the sustainability of a venture in large companies, which allows to know which are the factors that contribute to the sustainability of the venture in a certain economic sector.

In conclusion, having an adequate reliability of α and ω, in addition, adequate parameters of goodness of fit, absolute and comparative indices, and an adequate mean square error of approximation, it is corroborated that model 4 with 15 items is the most appropriate to measure the sustainability of entrepreneurship, so that the scale can be used to measure the sustainability in Micro, Small and Medium Enterprises.

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