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Sustainability of Agricultural Smes: A Methodological Proposal for Their Evaluation

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Summary

In the growing business scenario, it is a strategic element for companies to have instruments that make it possible to evaluate their sustainability comprehensively. The research proposes a methodology for evaluating the sustainability of cocoa SMEs in Ecuador based on Elkington's triple bottom line framework: economic, social and environmental, incorporating two additional dimensions: management capacity and local context support. Exploratory-descriptive research with a mixed approach was conducted in 2021. Techniques and methods were the reviews of scientific-technical documentation, a survey, the Delphi method, the experts' level of competence, and the kendall's coefficient of concordance. The methodology was developed through a series of stages to establish a system of indicators that will evaluate the sustainability of cocoa SMEs in Ecuador.

Keywords: SMEs, triple bottom line, Corporate sustainability, Indicators

Resumen

En el creciente escenario empresarial es un elemento estratégico que las empresas cuenten con instrumentos que posibiliten evaluar integralmente su sostenibilidad. La investigación plantea una metodología para la evaluación de la sostenibilidad de las PYMES cacaoteras en Ecuador fundamentado en las dimensiones del marco de triple cuenta de resultados establecida por Elkington: económico, social y ambiental, incorporándose dos dimensiones adicionales: capacidad de gestión y apoyo contexto local. Se realizó una investigación exploratoria-descriptiva con enfoque mixto, en el 2021. Se empleó técnicas y métodos como: revisión de documentación científica-técnica, encuesta, método Delphi, nivel de competencia de expertos, coeficiente de concordancia de kendall. La metodología fue desarrollada a través de una serie de etapas lográndose establecer un sistema de indicadores que permitirán la evaluación de la sostenibilidad de las PYMES cacaoteras en Ecuador.

Palabras claves: PYMES, triple cuenta de resultados, Sostenibilidad empresarial, Indicadores

Introduction

Sustainability, a challenge in current times, seeks to achieve dynamic and simultaneous harmony between social-ecological and economic subsystems. Dimensions are often collectively called the "triple bottom line" (TBL) of sustainability (Plasencia Soler *et al*., 2018). This is a multidimensional concept with a strong relationship between its multiple dimensions. (Gan *et al*., 2017). From 2000 onwards, companies began to consider the objectives of sustainable development. And with it, a new category, "corporate sustainability."

Currently, the criterion of business sustainability is relevant for management and decision-making in companies. It corresponds to the idea of always keeping in mind the three results (economic, social and environmental) in the integral management of any company in the 21st century. The economic dimension is based on the generation of income through productive activity. The social dimension refers to the relationships and the company's positive impact on the society in which it is established. On the other hand, the environmental dimension focuses on responsible and environmentally friendly behavior. (Valencia-Rodríguez et al., 2019).

The analysis of the current sustainability situation in companies has become evident as an issue necessarily linked to the business strategy and its transformation, and not as something optional but of survival. However, the fact that the word "sustainability" is increasingly present in business discourse does not mean that all companies understand its meaning in the same way, or, at least, not in its full potential scope... (Plua Panta *et al*., 2022). Based on this approach to corporate sustainability, many studies have used various models to assess corporate sustainability.

Among the most used models to assess corporate sustainability are the Triple Bottom Line, Four Pillars model, Pressure-State-Response, Sustainable Balanced Scorecard, and Environment-Social-Governance (Plasencia Soler *et al*., 2018). Undoubtedly, the TBL approach and model is the one that emerges the most in studies that have considered the analysis of SMEs in an integral manner. For example, involving economic, social and environmental variables in the commercial, industrial, manufacturing and agricultural contexts (Chang & Cheng, 2019; Galdeano-Gómez *et al*., 2017; Pashaei Kamali *et al*., 2017; Schmidt *et al*., 2018). Other approaches have included other dimensions in addition to the traditional ones or new dimensions of analysis (Bravo-Medina *et al*., 2017). However, all these studies do not consider the particularities of SMEs in the Ecuadorian context.

In Ecuador, some studies used one of the dimensions of sustainability or have made relationships between two dimensions (Díaz Granda *et al*., 2017). Other studies have involved a multidimensional analysis of sustainability in manufacturing and services companies. (Lam, 2017; Sarango-lalangui, 2018). Other research was conducted in agricultural systems (Barrezueta, 2018). Therefore, it could be said that sustainability has been approached from several angles. However, there is some consensus on using a set of tools with a wide range of indicators, which allows for a holistic view of each dimension of corporate sustainability.

An indicator is an observable qualitative or quantitative variable, and they are the basis of evaluation frameworks. It allows describing characteristics, behaviors or phenomena of reality is from a multidisciplinary social-economic and environmental perspective (Barrezueta,

2018). In the literature, many scholars in different fields have proposed a variety of business sustainability indicators from various perspectives.

However, many of these indicators are inappropriate for Ecuador's cocoa SMEs. Thus, the absence of studies in Ecuador focused on the evaluation of sustainability comprehensively is highlighted. Considering that these SMEs have a powerful socioeconomic impact on the country. They play an essential role in the productive matrix and the generation of sources of employment. Therefore, there is a gap due to the absence of a tool that makes it possible to comprehensively assess the sustainability of cocoa SMEs in the Ecuadorian context.

Promoting the participation of these SMEs in sustainable development becomes an inevitable competitiveness strategy to be applied by these companies. This leads us to the research question: Will the design of a system of indicators, given the characteristics of cocoa SMEs in Ecuador, contribute to a comprehensive evaluation of their sustainability?

Development

Corporate sustainability and its evaluation

Related to the general concept of sustainable development are sustainable companies. They have integrated business sustainability as a strategy for their development and permanence, positively influencing their community and the environment (Valencia-Rodríguez *et al*., 2019). In order to achieve business sustainability, it is necessary to have instruments with approaches to sustainable development that allow the measurement of business sustainability; their results will be essential for decision making as they allow the definition of measures, strategies or the formulation of policies to achieve sustainable businesses over time. To this end, it is essential to have methodologies that allow an objective quantification and analysis of the sustainability of agricultural SMEs, taking into account their characteristics and the environment in which they operate (Plua Panta *et al*., 2022).

Indicator-based corporate sustainability assessment tools depend on the perspective with which they are approached, they are also directly related to the economic activity that the company to be assessed has. However, it is concluded that these indicators are defined based on the components of the three dimensions of sustainability: economic, environmental and social (Valencia-Rodríguez *et al*., 2019). Therefore, an appropriate set of indicators for each of the three pillars is necessary to quantify the key sustainability objectives of SMEs (Egenolf & Bringezu, 2019).

Economic indicators refer to the profitability of the company. Social ones measure the impact on the community of influence, and environmental ones evaluate ecological aspects, resource utilization and pollution levels (Valencia-Rodríguez *et al*., 2019).

Conceptual bases of the methodology

The structuring of the methodological proposal is based on the following fundamentals. Elkington's theoretical approach considers the triple bottom line framework conformed by three dimensions: Economic, social and environmental (Plasencia Soler *et al*., 2018).

The Bellagio Principles is assumed in evaluating sustainability (Gan *et al*., 2017), considering that the set of indicators to be selected for assessment should not be an end but part of an assessment process.

The fundamentals of constructing the indicators about the requirements in terms of technical and scientific terms; refer to their scientific validity, relevance, sufficiency and representativeness. (Schuschny and Soto, 2009).

In the analytical measurement approach to sustainability Feil (2019), in relation to the creation of a set of indicators, each indicator is incorporated into a criterion and a component or dimension.

In the systemic approach, regarding the analysis of its dimensions, as well as the relationships between these (Barrezueta, 2018).

Materials and methods

Applied research was carried out, taking as a starting point the available literature on variables and indicators of corporate sustainability to design a methodology for the evaluation of the sustainability of SMEs, which will be applied in various pilot cases.

The research employed techniques and methods such as the review of scientific-technical documentation and the observation of SMEs to consider the dimensions and variables as indicators.

A descriptive statistical analysis was conducted by applying a survey to 50 SMEs randomly selected from a nationwide list; the instrument was prepared with Likert scale questions to determine the indicators for each dimension.

The validation of the indicators was developed by the Delphi method by a group of 15 experts, the level of competence was determined and the hypothesis test was evaluated through the kendall's coefficient of concordance.

The survey method was self-administered through the Internet, considering the worldwide health emergency caused by the COVID-19 pandemic, and the automatic tabulation of the responses increased its reliability by not having to transcribe the results, facilitating the subsequent comparative analysis of the behavior of each variable. Finally, the frequency analysis results obtained through the SPSS v. 25 statistical packages were synthesized.

Results

The research for developing the methodology for evaluating the sustainability of cocoa SMEs in Ecuador is shown in Figure 1.

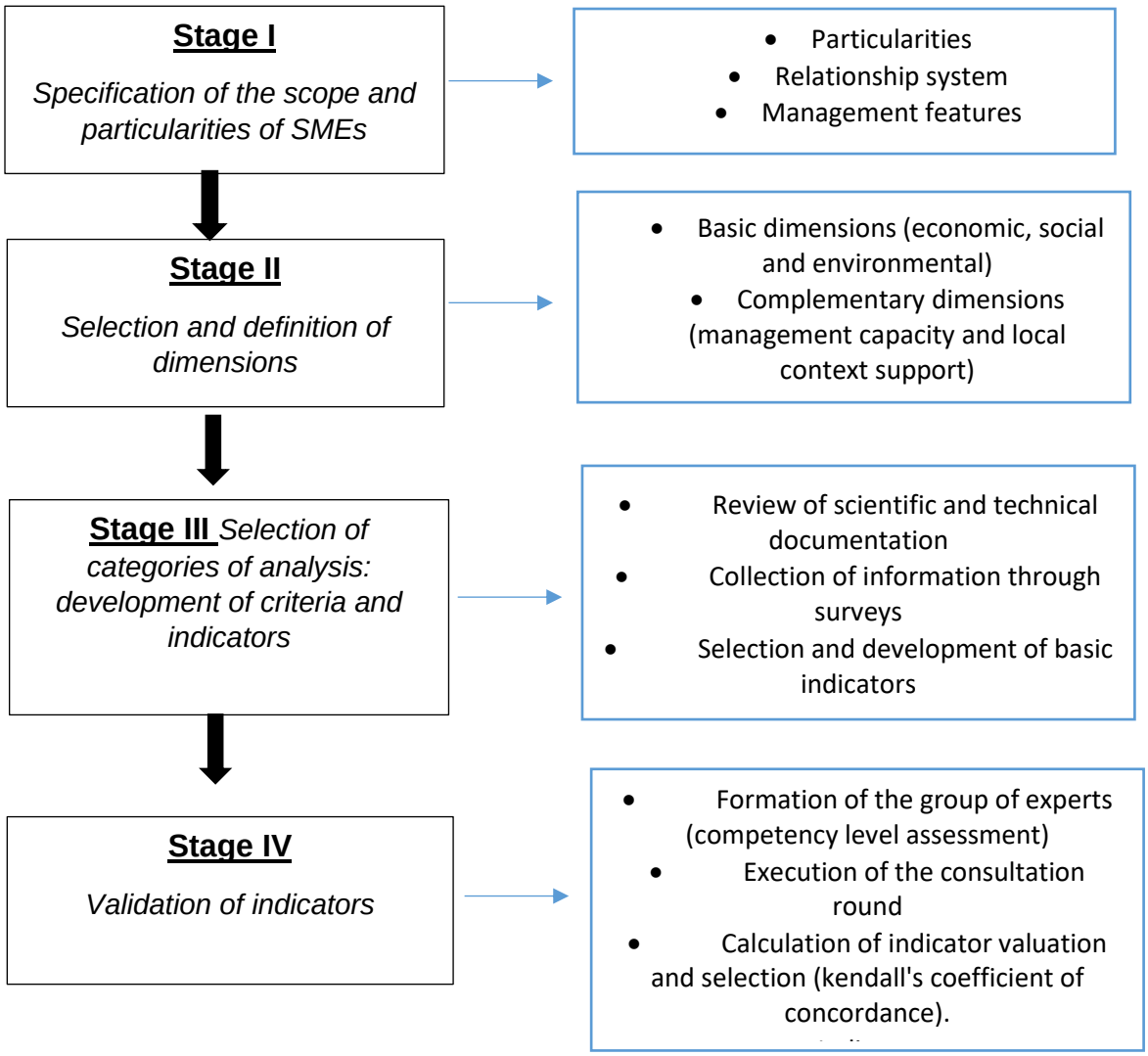

Figure 1. Methodology used in the study.

Stage I - specification of the scope and particularities of SMEs

Achieving the sustainability of cocoa SMEs in Ecuador becomes an unavoidable task because these companies are a fundamental axis in the country's economic development. Being one of the leading export products, they are a fundamental pillar in the economic function, being currently the sixth most exported product within the non-oil remittances. Furthermore, in the social field, they contribute 5% of the national economically active population (EAP), and 15% of the rural EAP. These SMEs are located in 23 of Ecuador's 24 provinces, with the greatest concentration in the provinces of Los Ríos, Guayas, Manabí, Esmeraldas and El Oro (Vargas *et al*., 2021).

In order to achieve this phase, it was necessary to understand the place of these SMEs in the cocoa value chain, the system of relationships they develop with their environment, their production and marketing processes, and to establish their specific characteristics.

Cocoa value chain in Ecuador

In order to better understand the characteristics of cocoa SMEs in Ecuador, the global cocoa value chain was analyzed, showing the importance of small and medium-sized producers in this chain. This chain has several links:

Producers: are made up of small, medium and large producers with a size range of agricultural production units (UPAs) of up to 20 ha; 20 to 50 ha and more than 50 ha respectively. They carry out the processes of planting, maintenance and harvesting of cocoa. In addition, there is a minority group of associations made up of small and medium-sized producers who sometimes collect and market the product for subsequent sale to local and regional intermediaries or directly to exporters. At this stage of the chain, the producer often benefits the least from the prices received.

First industrial processing (stockpiling): Intermediaries are involved in this chain stage. They have different proportions according to their locality, purchase and storage location. Thus, in the chain of intermediaries, the product passes through local, regional and large storage centers until it reaches the exporter. In many cases, these intermediaries carry out the post-harvest processes (fermentation, drying and classification of the cocoa), increasing the added value of the bean and thus obtaining a better price in the processing industry or for export.

Second industrial transformation: this stage involves the semi-manufacturing industry, which processes the cocoa bean and transforms it in one of its intermediate stages to obtain products such as cocoa butter, cocoa liquor, cocoa cake, cocoa powder, and fat, among others. These products are generally destined for the external market or the processing industry.

Final destination (mass consumption): cocoa's final destination is for domestic and foreign markets. In the domestic market, cocoa is transformed into intermediate industrial products (butter, paste, liquor, powder), which is mainly sold on the international market and is dominated by foreign companies such as Nestlé, CAFIESA, INFELERSA, ECUACOCOA and FERRERO: Nestlé, CAFIESA, INFELERSA, ECUACOCOA and FERRERO, as well as the presence of small and medium-sized companies dedicated to the production of chocolates, of a national constitution.

Regarding the external market, the country exports beans in its two varieties Sabor Arriba and Colección Castro Naranjal CCN51. 85% of the total production of dry cocoa beans is exported to countries such as Indonesia, USA, Mexico, Netherlands, and Malaysia; in addition to semi-finished products such as liquor, butter, cake, powder and processed products such as bars, tablets, chocolates, toppings, powder, fillings, baths and many other manufactured products obtained from mixtures with other products or nuts in smaller quantities. (Vargas et al., 2021)

Relationship system of cocoa SMEs in Ecuador

According to Rueda-Granda (2019), external variables can influence business sustainability and are outside the strict business control, which acts as causes that can affect its sustainability. These elements can directly or indirectly affect the company's activities, investments, financial results and, consequently, the scope of development in a sustainable manner of the company.

The following is a detailed description of the system of relationships between cocoa SMEs and external agents in Ecuador, which in some cases have had a positive or negative influence on the competitive capacity of these SMEs.

Advice and training: Here, intervene associations of which SMEs are part in the locality where they are located; in addition, associations of national character as the National Association of Exporters and Industrialists of Cocoa of Ecuador (ANECACAO), are also added institutions of public character as the National Institute of Agricultural Research (INIAP), the

Ministry of agriculture, livestock and fisheries (MAGAP), Higher Education Institutions through the substantive functions of research and linkage with the community, private companies in the commercial field of agricultural products all contribute to knowledge, technical assistance, technology transfer, regional workshops, pruning projects, cocoa harvest forecasts, information at the time of the New York and London stock markets, export statistics, training, field schools, post-harvest management, orchard restoration, actions that benefit and encourage SMEs to increase cocoa productivity.

Suppliers: are responsible for the supply of inputs, sale of products and services, joint promotion and demand for specialized services for cocoa production. This process may involve associations to which the SMEs belong, who collaborate in acquiring volumes of raw materials, machinery and equipment at low costs, as well as private companies and government institutions such as INIAP.

Promotion: these are institutions in charge of promoting the sustainable and sustainable development of micro, small and medium-sized enterprises, promoting productive development here, it can be mentioned the generation of public policies and strategies that encourage their entrepreneurship, their formalization, their productive capacities, the creation of networks and productive chains, which achieve their insertion in national and international markets here we have the Undersecretariat of micro, small and medium-sized enterprises (MSMEs) and handicrafts were belonging to the Ministry of Production, Foreign Trade, Investment and Fisheries of Ecuador.

Regulation: The Superintendency of Companies plays a fundamental role in the management of SMEs since, through the Companies Law, it controls, monitors and promotes the securities market and the corporate sector taking into account various regulatory systems and services, contributing to the reliable and transparent development of business activity in the country.

The Ecuadorian Agency for Agricultural Quality Assurance (AGROCALIDAD), attached to MAGAP, is the national sanitary, phytosanitary and food safety authority in charge of defining and executing policies and regulating and controlling the productive activities of the national agricultural sector, supported by the national and international standards, directing its actions to the protection and improvement of agricultural production, the implementation of food safety practices, the control of the quality of inputs, support for the preservation of public health and the environment.

Product buyers: The commercial process for cocoa is very diffuse due to its structure of independent chains that do not generate value and which leads to the sale of the product to itinerant intermediaries who visit their farms; those who sell to local intermediaries; and others who, through their associations, sell to wholesalers, exporters or the national industry.

Essential characteristics of cocoa SMEs and their management

They are made up of natural resources, human talent and capital. Their management processes are conditioned by internal and external factors that influence their production, which are detailed below:

Economic capacity: profitability margins on sales are influenced by production costs and productivity obtained in the crop. International market fluctuations highly influence the selling price of the grain. In addition, its production costs vary according to externalities such

as climate, presence of pests, rainfall or drought. In this sense, the costs and profitability of cocoa production are not adjusted to the needs of the national producer (Anecacao, 2018).

Management capacity: In Ecuador, SMEs have traditionally been characterized by operating informally and with little business organization. They present particular problems concerning their operability, lack strategic planning, have no defined general policies, or have objectives not established. There is no planning process, which affects their development and permanence in the market (Sarango-lalangui, 2018)

Productive capacity: This category is related to the production that SMEs have and is represented in quintals per hectare per year (qq/ha); in some producing regions of the country, the low productivity of their plantations are caused by factors such as a variety of cocoa, age of plantations, soil fertility, the impact of diseases, the low performance of many plantations for genetic and management reasons in addition to climate, frost, drought and prolonged rainfall in certain areas. (Anecacao, 2018)

Technological capacity: this is reflected in the technical practices that occur in the crop in order to increase the physical productivity of the farm and the economic profitability of the production system and is specifically related to the use of hybrid seeds, propagation technologies (grafting, twigs, layering, and planting by seed) and cultivation methods (shading, irrigation, weed control and pruning). (Anecacao, 2018).

Human resources: The existing human resources in cocoa SMEs in Ecuador lack activities that stimulate the management of human talent and knowledge, which impacts the SME's organizational culture and productive results.

Environmental management: Cocoa cultivation is characterized by the little use of technologies or machinery that affect or pollute, usually, the different stages of cultivation are still performed manually because there is no technological offer that has been generated in a generalized way to accuse this type of adverse effects (Barrezueta, 2018). However, the environment can be contaminated by residues from agricultural activities (pesticides, fertilizers, biomass), resulting in a series of environmental impacts (soil, air, water, vegetation).

Product price: The determination of cocoa prices are regulated in a non-intervention market. These are referenced by the price of the New York Stock Exchange by the International Cocoa Organization (ICCO), which leads to a price variation according to the marketing channel used by the SME. This means that in many cases, they do not cover their production costs, thus slowing down the impetus to continue increasing their planting areas and, worse, neglecting their existing plantations because they do not have sufficient income for the necessary controls to reach optimal productivity levels. (Anecacao, 2018)

Marketing chain: When analyzing the marketing chain of cocoa SMEs, this is primarily shaped by excessive intermediation; there is limited and insufficient regulation of the chain; it is also considered a weak chain with the creation of little added value, a chain that influences the price of the product obtained by SMEs (Anecacao, 2018).

Access to training and technical advice**:** despite the existence of public institutions: MAGAP, Banco Nacional del Ecuador (BAN Ecuador), INIAP, higher education institutions and other private institutions: ANECACAO, chemical suppliers, export companies that intervene in order to strengthen knowledge to improve quality standards and therefore the added value of the product, they do not meet the demand.

Credit management: Access to credit for cocoa SMEs is scarce, as it usually presents obstacles caused by asymmetric information, production risks that are not measurable by financial institutions, preference of collateral by such institutions, administrative costs of serving SMEs, lack of collateral, low income, seasonality of crops, climate risks; all of these factors make access to credit costly.

Stage II - Selection and definition of dimensions

Based on the above analysis of the particularities and environment of SMEs in Ecuador, it is necessary to propose two more dimensions for the sustainability of cocoa SMEs in Ecuador: the institutional dimension (management capacity) and an external dimension (support from the local environment), in addition to the basic dimensions generated by the theory of sustainability established by Elkington in the triple bottom line model (economic, social, environmental). Therefore, it was concluded that there should be five dimensions to achieve multidimensionality. These fundamental pillars of indicator formulation evaluate the sustainability of cocoa SMEs in Ecuador and are represented in Figure 2.

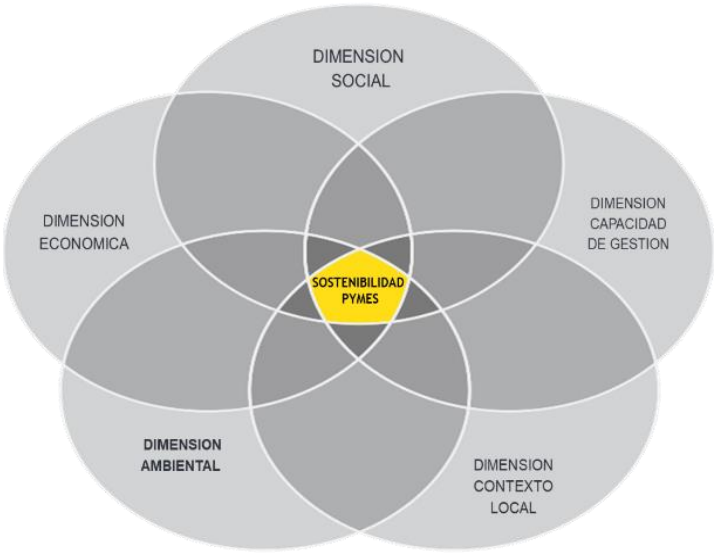

Figure 2. Dimensions of the proposed methodology for evaluating the sustainability of cocoa SMEs in Ecuador.

Economic dimension: a dimension that recognizes the viability of production; that is, whether a system can survive in the long term in a changing economic context caused by variability in the outflow and inflow of prices, yields, public support and state regulations (Barrezueta, 2018).

Social dimension: The social dimension is more relevant in agricultural SMEs with respect to other productive sectors because this activity traditionally carries various social connotations, which go beyond the production of goods and services or the creation of direct employment. It implies the capacity to generate progress, innovation, development of the rural areas of a locality, state or country, food supply and improvement of the quality of life of the population in these areas. (Galdeano-Gómez et al., 2017).

Environmental dimension: This dimension in this type of productive activity requires a higher degree of environmental responsibility of the company, which includes elements such as environmental management, eco-efficiency, environmental policy, waste minimization and control plan, preparation and attention to environmental emergencies (Barrezueta, 2018).

Management capacity dimension: The importance of this dimension is in consideration of the fact that SMEs emerge as enterprises and of the relevance of characteristics such as the profile of the manager, work experience, training, mastery of management strategies, capabilities and competencies, as a variable that affects business survival, according to Rueda-Granda (2019)The present methodology will take the name of"entrepreneurial process" to mean a set of factors that contribute to or hinder the birth and development of enterprises. This methodology will be referred to as *management capacity*.

Local context support dimension: Another item of utmost importance and necessary to assess the sustainability of cocoa SMEs in Ecuador is undoubtedly the achievement of systemic competitiveness, which is that successful business development is not achieved through factors at the micro level of enterprises and macro level of economic conditions, but also specific measures need to be implemented by the national state, regional and local governments, educational institutions, legislative institutions, among other competent bodies, responsible for the enactment and approval of public policies to articulate and interact in the generation of actions that make successful the implementation of activities aimed at strengthening the competitiveness and development of this type of economic agents. (Rueda-Granda, 2019).

The identification of these multiple dimensions that make up the methodology for the evaluation of the sustainability of cocoa SMEs in Ecuador, guided the selection of variables and indicators, more specifically, the characteristics of the multiple dimensions have based the establishment of the hierarchical structure of dimensions and variables of sustainability, from which the indicators for the evaluation of the sustainability of cocoa SMEs in Ecuador were finally derived.

Stage III - Selection of categories of analysis: development of criteria and indicators

To give rise to the possibility of conducting a more comprehensive and multidimensional assessment of the concept of sustainability of cocoa SMEs in Ecuador, as established by. Feil (2019). Criteria are established, a category of conditions or processes through which Sustainable Development can be evaluated. The criteria represent the properties that will be affected by the process of Sustainable Development of SMEs. These, in turn, are characterized by a set of related indicators, which are measured periodically to assess sustainability.

The structuring of these criteria is determined by the dimensions that make up the framework and within each dimension, the criteria necessary for the subsequent selection of indicators are defined.

Defining the criteria and indicators involves steps to achieve their specification in each of the 5 established dimensions.

Review of scientific-technical documentation***:*** this involves a selection of research according to existing scientific and technical publications on the typology of indicators for evaluating corporate sustainability, from which several attributes or criteria and a series of indicators were chosen as alternatives for evaluating the sustainability of SMEs. These attributes and indicators were subject to adjustments for the conditions and particularities of cocoa SMEs in Ecuador.

Collection of information through surveys: In this step, an assessment survey was applied to stakeholders; in this case, 50 managers from a list of SMEs at the national level were selected at random; the survey used Likert scale-type questions, except for the evaluation of

the management level, which used a dichotomous question (Table 1). Four activities performed in the SMEs were considered: Level of Utilization, Level of Performance Achieved, Level of Management and Level of Importance in specific processes carried out by the SME.

The survey method applied was self-administered through the Internet, in consideration of the health emergency suffered worldwide by the COVID-19 pandemic (April - June 2021) and the automatic tabulation of the responses, increasing its reliability by not having to transcribe results, facilitating the subsequent comparative analysis of the behavior of each variable and, finally, the results obtained were synthesized through SPSS version 25.

Table 1. Evaluation scale of the variables for evaluating the sustainability of cocoa SMEs in Ecuador.

Criteria	Always (YES)	Almost always (YES)	Sometimes (NO)	Rarely (NO)	Never (NO)
LEVEL OF UTILIZATION (Frequency with which this practice is used in the SME)	5	4	3	2	1
PERFORMANCE LEVEL (How efficiently this practice is performed in the SME)	5	4	3	2	1
MANAGEMENT LEVEL (Have documented practice process)	5	4	3	2	1
Criteria	Very high	High	Moderate	Under	Very low
LEVEL OF IMPORTANCE (Potential impact of the good practice's contribution to the sustainability of the SME)	5	4	3	2	1

Once the indicators had been selected by the stakeholders surveyed, a matrix of fundamental indicators was structured for subsequent validation.

Stage IV - Validation of indicators

Once the first list of indicators for the evaluation of cocoa SMEs in Ecuador had been defined, a process was developed for the second selection, where a sample of previously defined sustainability indicators was selected; from the list of all of them, their capacity to reflect the problems of the SMEs was analyzed by applying the Delphi method. However, converting the conglomerate of knowledge possessed by experts or specialists in scientific information requires the controlled application of the method to obtain the information, a process that is described below:

Formation of the group of experts: According to the literature, the size of the group usually ranges between 6-30, depending on the problem; although it is not a determining factor in this choice, quality must always take precedence over quantity. For selecting experts, 15

professional experts, academics, researchers, and presidents of associations with knowledge of sustainability and entrepreneurship issues were considered.

Subsequently, the level of competence was evaluated through a coefficient (K)1, which is formed by the knowledge coefficient (Kc) and the argumentation coefficient (Ka) and was calculated through the expression: K = 0.5 (Kc +Ka).

Only those rated high (K≥0.80) were classified as experts. Execution of the consultation round: It was developed employing a questionnaire where the base indicators were detailed and the SMART criterion was used for their evaluation. (Pashaei Kamali et al., 2017)According to the objective of the research, the following questions were established:

- (S) Specific: Is the indicator a precise and reliable measure of the variable to be assessed?
- (M) Measurable: Is the information required by the indicator relatively easy to collect and at a reasonable cost?
- (A) Achievable: Are the targets for which the indicator seeks to record progress achievable?
- (R) Relevant: Is the indicator meaningful for assessing results?
- (T) Timely: Does the indicator express the appropriate timeframe for measuring progress towards results? Is it possible to capture it within that timeframe?

Calculation of indicator valuation and selection: Once the valuation was obtained from the experts consulted, the average of the scores given by the experts was determined. For this purpose, the scores for each attribute of the indicator were added and divided by five. The arithmetic mean of the experts' ratings for each indicator was then calculated. Those that scored less than 3.5 points were considered to be eliminated.

The experts subjected the indicators to a matrix rating (matrix of ratings, table 2). The experts' evaluations for each of the questions were rated on a scale of zero to five; it should be noted that the indicators that obtained a rating of less than 3 points were eliminated.

Table 2. Matrix model for validation of indicators by experts

Indicator	Specific	Measurable	Affordable	Relevant	Timely
Indicator 1					
Indicator 1					
.....					
Indicator n					

Subsequently, the averages calculated from the individual criteria of the experts for each indicator were mostly higher than 4. Only one indicator did not exceed this level, such as the subsidized agricultural input 3.3, which obtained low scores in the"affordable" attribute.

The degree of agreement between the experts was evaluated employing a hypothesis test of an association through Kendall's coefficient of agreement (Kendall's W), which showed a high degree of agreement between them, according to the value of the Chi-square statistic and the degree of significance (Table 3), rejecting the null hypothesis of the absence of agreement.

Table 3. Results of the kendall's concordance test

Test statistics	
N	15
W for Kendall[a]	,279
Chi-square	117,048
gl	28
Asymptotic sig.	,000

a. Kendall's Coefficient of Concordance

The final result of all these stages of the research was a system of indicators: economic, social, environmental, management capacity and support in the local context that will make it possible to measure the sustainability of cocoa SMEs in Ecuador and its description in Table 4.

Table 4. System of indicators for evaluating the sustainability of cocoa SMEs in Ecuador.

Dimensions of sustainability	Criteria	Indicators
ECONOMIC	1) Productivity	- Production yield per hectare
	2) Profitability	- Net profit margin
	3) Production growth	- Actual production *ha (5 years)
ENVIRONMENTAL	4) Agroecological practices	- Crops on slopes - Good agricultural practices - Vegetative cover - Live Fences - Protection of water sources
	5) Organic agriculture	- Use of organic fertilizers - Integrated pest and disease management
SOCIAL	6) Employment and gender	- Average revenue per employee - Family labor - Women's participation in agricultural activities.
	7) Labor and social security	- Age of workers - Occupational Health and Safety - Employees insured with IESS
MANAGEMENT CAPACITY	8) Manager's educational background and knowledge	- Entrepreneur's schooling - Administrative knowledge
	9) Manager's experience in the activity	- Administrator's experience
	10) Planning of the production and commercial process	- Management planning and records - Marketing channel - Product quality
	11) Technology system	- Irrigation system
	12) Credit management	- Credit management

Dimensions of sustainability	Criteria	Indicators
ECONOMIC	1) Productivity	- Production yield per hectare
	2) Profitability	- Net profit margin
	3) Production growth	- Actual production *ha (5 years)
	13) Associative affiliation	- Participation in associations and cooperatives
	14) Basic services	- Basic services
	15) Agricultural insurance	- ha of insured crops
LOCAL CONTEXT SUPPORT	16) Technical assistance and technology transfer	- Higher education institutions - Public and private institutions
	17) Access to credit lines	- Financial credit
	18) Adequate access roads	- Road conditions

Conclusions

The methodology's conceptualization was based on considering the basic dimensions of sustainable development and business sustainability indicators. It was adapted to the particularities and context of cocoa SMEs in Ecuador, achieving a set of indicators developed through a transdisciplinary approach with broad stakeholder participation.

The system of indicators for evaluating the sustainability of cocoa SMEs in Ecuador, formulated within the methodology and validated by the Delphy method, concluded by establishing 5 dimensions, 18 variables and 32 indicators for evaluating the sustainability of cocoa SMEs in Ecuador.

The achievement of these indicators is a helpful tool for evaluating the sustainability of cocoa SMEs in Ecuador, as well as a determining element in decision-making and the establishment of strategies for the sustainability of these SMEs.

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