



Management Model for Technical Training and Gender Equality for a Productive and Sustainable Rural Cheese Agroindustry

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Abstract

The objective of this research was to develop a management model for technical training and gender equality for a productive and sustainable rural cheese agro-industry, which promotes sovereignty and food security; based on inputs from the evaluation of the economic, social and environmental sustainability of the factors that affect the agro-productive system for an effective cheese production, located in Cojedes state, Venezuela, framed within the positivist paradigm, quantitative approach, explanatory level and design field, using the survey technique as a strategy, which yielded low sustainability indices (general global arithmetic average index of 3.09, located on a scale from Apt tending to Deficient), a low cognitive index was detected in agricultural producers on the management of milk production and processing, and evidenced the participation of women in rural labor that these field processes merit. In addition to being based on theoretical and legal bases, aligned with the strategic actions to promote and support the country's regional, local, rural and integral Sustainable Development, which contributes to neutralizing or eliminating weaknesses and threats, taking advantage of the opportunities and strengths of the environment. A planning of training strategies with the support of related social actors is proposed, which includes agroecological technical management, especially in the case of small-surface plots, to favor the conservation of environmental goods and services, hence a succession of beneficial effects, equally, the technical management of milk processing and marketing, framed in training, financing, strengthening and fair, which contemplates improvements in the quality of life of producers, employees, community and consumers; without leaving aside the know-how, the valuable work of women is highlighted in equal rights, responsibilities and opportunities with respect to men, in agricultural and business work and their responsibility in the well-being of their family members; and evaluation and follow-up strategies of the training program adapted from the Kirkpatrick model are proposed. Finally, the training and scientific knowledge that agricultural producers achieve in: social, technical, academic, research and agrotourism development functions, will allow overcoming the deficiencies shown in the research, improve the use of native resources and promote production diversification..

Keywords: Management Model; Technical Training; Gender Equality; Rural Cheese Agroindustry; Sustainability

Introduction

Sustainability is a term that becomes essential to guarantee survival on this planet. It must be understood as a paradigm to reflect on and build a future that leads to a better quality of life for all, a way of living that requires the commitment of each one of us to make it possible. It is based on the calculation of the productive capacity of an ecosystem that allows to satisfy with relative ease the

economic, material and service needs of the communities or collectives of the present and the following ones, without generating environmental liabilities [1], these results allow making the right decisions and giving a management response with wisdom and sobriety. However, this calculation is somewhat more complicated in living systems, since they are dynamic and complex, many systems under exploitation have not been scientifically analyzed, methodol-

ogies are still being developed. Indeed, the sustainability indicators for specialized dairy are under construction [2-4], no parameters or universal criteria have been detected, some measurements have been made by separate dimensions, few in triad.

The new logic of the economy has given rise to new needs and, with them, new capital and a new concept of value, or at least new dimensions of value; however, this value is often ignored and not always measured; companies and governments work without information and with an inadequate value paradigm, dominated by financial information and GDP evolution data. If financial capital grows at the cost of destroying other capital, instead of creating value, we may be destroying it, therefore the real value of companies must be balanced against the intangible ecological and social benefit or loss; Said intangible capital such as business culture, business model, leadership, innovation capacity or the degree of worker satisfaction are behind most of the market capitalization of the world's leading companies [5].

The inclusive and real vision of sustainable management in a company is essential to understand its operation and improve productivity using fewer resources. Hence, a sustainable rural cheese agro-industry is a company that is sustainable in time and space, willing to respond to emerging needs, through multidimensional harmonious interaction management, with financial, ecological, social and intangible capital, jointly with the different social actors in all processes [6].

Based on the results of the measurement of the sustainability variable of the economic, social and environmental dimensions, which sought to be as holistic as possible by circumscribing valuable indicators that would influence the understanding of the current reality of the agro-productive system for an efficient rural cheese agro-industry, located in Antiguo Hato "El Charcote" of Cojedes state, Venezuela, area under special administration regime (ABRAE); which showed that these artisanal cheese technology processes have low sustainability indices and low cognitive indices in agricultural producers on the management of milk production systems that harm the effectiveness of these cheese companies, and where the participation woman in the rustic labors that merit these field processes. The objective is to develop a management model for technical training and gender equality for a productive and sustainable rural cheese agro-industry, with a strategic program that includes agroecological technical management, milk processing technician and marketing, framed in training, financing, strengthening and fair.

Methodology

A scientific model can be understood encompassing the three meanings: they represent the theory, they show the ideal conditions

in which a phenomenon occurs when a law or a theory is verified and, on the other hand, they constitute a particular sample of the general explanation given by the theory. [7]; therefore they are an innovative, rational, systematized, logical, verifiable and original representation that allows generating or building the epistemological (knowledge), axiological (values) and ontological (being) postulates and principles product of the researcher's creativity [8]. These representations are valid when they manage to explain and predict; explain how and why things happen, and predict when the hypotheses of how the past may have been and how the future may be verified, giving rise to new problem statements and making the dynamism of science a permanent and endless search for knowledge.

On this occasion, the model that is proposed from the theorization of the results of the measurement of the sustainability variable, which was framed within the positivist paradigm, with a quantitative approach, of an explanatory level, field design and as a strategy the technique of the written survey, designed by the researcher herself according to the perception of the reality of the context, based on the definition of a priori indicators (a total of 24 indicator variables and 70 items), prior to its application it went through a process debugging with a group of experts for internal validation (content).

The population is comprised of 650 plots (of different sizes: 10, 15 and 20 hectares), which make up nine (09) sectors of the Los Luchadores commune. For the sufficient size of the sample, a pilot test was carried out with individuals chosen at random, in the procedure governed by chance, between three (3) and four (4) production units (UP) were considered for each one of them. the nine sectors of the sample population, until completing a sample of 32 cases. Based on the postulates of the Central Limit Theorem and the IBM SPSS STATISTICS v 27 (2020) program, which indicates that adequate results can be obtained with non-multinormal data in samples as small as 20 data (case), preferably 32 data (cases) minimum, considered a small sample large enough according to the degree of variance of the data [9-11].

The results were obtained through situational analysis of the agro-productive system (SWOT matrix), socio-demographic data analysis and socio-technological analysis, statistically from multivariate parametric analysis of the requirements and proven assumptions (item internal consistency, factorial and cluster analysis). and the estimation of the construct quality index by the forms: 1. using M-Estimators (robust median means) and, 2. using a multivariate factorial model. Indeed, the analysis of the statistical modeling and the presentation of the global Metamodel of the correlational path between items and the theorized factors of the sustainability construct are validated and adapted, giving rise to the

restructuring of the operationalization framework of the construct variable (originally proposed a priori), proposing for future measurements, the incorporation of a new factor, called “Technological-agronomic management”, apart from the environmental, social and economic factor, and of course the introduction of new indicators.

Consequently, a proposal for a theoretical model of operational management created for the current reality of the Rural Cheese Agroindustry in the Old Hato “El Charcote” is described and generalizing it to the sample population (the producers of the 650 plots). Initially, the objectives of the model are defined in terms of its social, technical and academic function, research and agrotourism development, then the training strategies are defined, the management of the agro-productive chain, resources, issues, social actors, place and subsequently the evaluation and monitoring strategies of the program adapted from the Kirkpatrick model, which allows leaving records of evidence of the quality of the efforts and benefits of the development of training.

On the other hand, it is important to highlight that the internal validation of the theoretical model was carried out according to expert judgment, through the evaluation format created by the researcher, resulting in sufficiency in the training management approach for the detected needs. and program evaluation. However, due to lack of economic resources and time, experimentation for its external validity was not achieved, for the scope not only of conceptual clarity, but also the ability to generate multiple applications in the diverse reality of its dimensions.

Results and Discussion

Product of all the investigative activities, the data, information and knowledge (DICs), were obtained from visits to the study area, for a preliminary approach to reality, through direct observation and participatory meetings with agricultural producers and Community Councils, Likewise, in order to broaden the information collected in the field, visits were made to State institutions and the Association of Ranchers and Producers, resulting in a situational analysis of the agro-productive system of rural cheese-making agro-industries (Table 1).

From the constructed SWOT matrix, the following strategies are proposed: take advantage of the opportunities in the environment: credit availability that exists in public and private banks, advice and training offered by research institutes and universities; face the threats of the environment, in terms of personal and collective legal security and ensure the replacement of financing; take advantage of the strengths of the edaphoclimatic conditions, water sources and electric power service that is free; and lastly, neutralize or eliminate weaknesses in infrastructure and public services.

| Strength (internal situation) | Opportunity (external situation) |
|---|--|
| Mixed-race livestock adapted to edaphoclimatic conditions. High agricultural capacity of the soils. Natural water source: deep and river Three (03) educational centers from 1st to 6th grade and one (01) technical school. Small-scale management. Electric power service Liquefied petroleum gas service | Credit availability. Quantity and quality of research institutes and universities Ministry of food |
| Weaknesses (internal situation) | Threats (external situation) |
| Internal agricultural roads. Knowledge about agroecological management of pastures. Primary health care for the population. Primary health care for animals. Housing assistance Outdated technology. Infrastructure Technical assistance Renewal of genetics. Compliance with the applicability of the parameters of the COVENIN standard. Wholesale markets Information and statistics of the production system | Lack of public policies: Acceso a créditos Asesoría técnica Capacitación al personal de la UP Seguridad jurídica Capacidad adquisitiva del consumidor |

Table 1: Internal and external situational SWOT matrix.

Font: Laya (2022).

On the other hand, it was possible to identify three types of cheese agro-industries, one characterized by the production and processing of milk in the same production unit (10 of this type), one that produces and processes, but is supported by the purchase of milk from other small-scale producers (8 companies of this type), and three (03) cheese factories with industrial capacity.

Subsequently, the field measurements through the survey applied to the producers, which required a deep statistical process of analysis and comparison: analysis of sociodemographic data in the segmentation of cases and the sociotechnological analysis for the segmentation of cases, both through the hierarchical cluster analysis method, Ward method, Euclidean distance, whose results indicate that the sample population is divided into three homogeneous clusters with specific needs each, which facilitates intervention in a more specialized way. Regarding the estimation of the quality index of the sustainability construct by factors, it was carried out in two ways: M-Estimator of each Factor and the factorial model, with both methods the same result is obtained and it is demonstrated that these artisanal cheese technology processes they have low sustainability indices (Table 2).

| Factor | Index | |
|---------------|-------------|--------------|
| | M-Estimator | Factor model |
| Economic | 3,11 | 3,12 |
| Social | 2,84 | 2,84 |
| Environmental | 3,32 | 3,32 |

Table 2: Comparison of methods for estimating the degree of sustainability quality. Case. AIR cheese factories, Old Hato “El Charcote” sector.
Font: Laya (2022).

The above table shows that the sustainability quality index of the cheese AIR production system, on a fuzzy differential semantic hedonic scale from 1 to 5, the economic factor is 3.11, the social factor is 2.84 and the environmental factor of 3.32; giving a global arithmetic average general index for the construct of 3.09. Therefore, the economic factor is located on the Adequate scale tending to Deficient, in terms of productivity, self-management and continuous performance, for which it requires intervention to improve it. The social factor is located on the scale from Bad to Very Bad, in aspects of the labor market, education, community action and collective and individual well-being, which requires intervention in intangible capital (business culture, leadership, innovation capacity and degree of worker satisfaction). And the environmental factor is located on the Apt scale, however, it is likely to be improved in technological innovation, environmental services, environmental impacts and environmental awareness.

Presentation of the Model

Based on the inputs from the research, a management model of technical training and gender equality is designed, in which the valuable work of women in equal rights, responsibilities and opportunities with respect to men is enhanced, in agricultural and business tasks and their responsibility for the well-being of their family members, without neglecting know-how, a very local resource that can favor innovation processes and territorial potential (comparative and competitive advantages), with its natural, technological and cultural historical identity attractions, which allows adding value to economic, social and environmental activity; in addition to considering the theoretical and legal bases, aligned to the strategic actions to promote and support the Sustainable Development of the country, regional and local.

Among the concepts and prepositions that explain and give scientific support to the proposal of the model that seeks to solve the problem raised are: sustainability, endogenous development, family farming, localized agri-food systems (SIAL), agroecology, agroforestry system, regenerative livestock, Voisin rotation grazing, likewise, sustainable business models, the new rurality approach, agrotourism, and finally the Management Systems Evaluation Framework Incorporating Sustainability Indicators (MESMIS),

making clear the articulation of The family as one of the potentialities of the rural artisanal cheese agroindustry.

Among the legal bases, it is based mainly on the most important legal instrument of the country, the Constitution of the Bolivarian Republic of Venezuela (1999), as established in its articles 110; 112; 127 and 128, likewise, articles 305, 306 and 307; Next, a set of laws that are related to the investigation are derived, among them: the Organic Law on the right of women to a life free of violence (2007), the Law for the Protection of Free and Captive Domestic Fauna (2010), the Forest Law (2013), the Organic Law on Agri-Food Security and Sovereignty (2008), the Land and Agrarian Development Law (2010), the Organic Law of Communes (2010), the Law for the Promotion and Development of Small and Medium Industry and Social Property Units (2014), finally, and no less important because it is the current Plan, by which the National Executive is governed, the Law of the Homeland Plan, second Socialist Plan for Economic and Social Development of the Nation (2013-2019), specifically what is established in its Objectives III and V, where the optimal use of the potential offered by our resources and the need to build an eco-socialist productive economic model are strategically proposed.

Objectives of the Model

General objective of the sustainability model

Develop a training strategy for the technical improvement and gender equality of the producers of the agro-productive systems of the cheese AIR, which eventually contributes to the conservation of environmental goods and services.

Specific objectives

- Train agricultural producers on the potential of data, information and knowledge (DICs) applied in the processes of the agro-productive system of cheese AIRs.
- 2. Prepare a methodological and technological training strategy for the management of the agro-productive system of the cheese AIRs.
- Develop techniques and tools of didactic utility for the agrotourism venture based on natural resources and the intangible “know-how” available.

For the development and evaluation of the objectives of the topics through work sessions, the following collective participation techniques will be used: workshops and theoretical-practical courses and talks with specialists, in which the teacher or instructor transmits information through advisory services. and explains the contents of different general and/or specific topics until reaching a decision or proposal.

Table 3 below describes the planning of training strategies, resources, themes and sub-themes.

| Means | Topics | Subtopics |
|---|---|--|
| <p>One (01) Agronomist engineer with a specialty and expertise in soil management.</p> <p>In addition, audiovisual resources and information technology</p> | Soil characterization | <p>Physical characteristics: structural, soil profile, contour lines and seasonal variability of the water table.</p> <p>Chemical characteristics of the soil: ionic acidity (pH), oxidation reduction potential (POR: mV), total molecular dissolved solids (SDTm), electrical conductivity (EC: μS).</p> <p>Biological characteristics: viruses, bacteria, fungi, plankton, algae, mites, earthworms, nematodes, ants and the living roots of plants.</p> <p>Biological characteristics of the superficial layer of interaction with the plant.</p> |
| | Pastures, forages, protein bank and agricultural crops for the area | <p>Agronomic management (dry and rainy season)</p> <p>Root system</p> <p>Radical soil exploration capacity</p> <p>Metabolism of the root system</p> |
| One (01) Agronomist engineer with specialty and expertise in agroecology management | Ecological management of pastures | <p>Grassland life cycle</p> <p>Grazing height</p> <p>Nutritional value of the pasture</p> <p>Pasture recovery</p> <p>Load capacity</p> <p>Voisin rotational grazing</p> |
| <p>One (01) engineer in animal production. In addition, audiovisual resources and information technology.</p> | Types of animals for production in the area | <p>Bovine</p> <p>Buffalo</p> <p>Pigs</p> <p>Caprine</p> <p>Animals of small species (rabbit, guinea pigs, among others)</p> <p>Birds</p> <p>Commercial fish (human and animal use)</p> <p>Pollinators: bees and cigarrones</p> |
| | Animal welfare | <p>Sanitary control</p> <p>Sun protection and thermal stress</p> <p>Access to water and food</p> <p>Hygiene and safety of the facilities</p> <p>Management, welfare and animal behavior</p> |
| <p>One (01) agro-industrial engineer. In addition, audiovisual resources and information technology</p> | Technology for post-harvest conservation of pastures, forages and organic residues (non-persistent) | <p>Hay</p> <p>Silage</p> <p>Unconventional rations</p> |
| | Dairy derivatives technology | <p>Preservation of fresh milk</p> <p>Whey</p> <p>Types of cheese</p> <p>Custard or milk cream</p> |
| One (01) Master / Doctor in education and environmental development. In addition, audiovisual resources and information technology | Environmental education | <p>Environmental awareness</p> <p>Function of natural ecosystems</p> <p>Management of persistent waste</p> |
| One (01) graduate in agroecological tourism. In addition, audiovisual resources and information technology | Agrotourism development strategy | <p>Service offers</p> <p>Cultural exchange</p> |
| One (01) system engineer with a specialty in information technology platform and marketing. In addition, audiovisual resources and information technology | Information technology management | <p>Internal administrative control system</p> <p>System for marketing</p> |
| One (01) graduate in management with a specialty in agribusiness. In addition, audiovisual resources and information technology | Financing | <p>Requirements</p> <p>Formats</p> <p>Investment and recovery plans</p> |

Table 3: Planning training strategies. Font: Laya (2022).

The training of the topics identified in the previous table must be carried out with the support of social actors: research institutes and universities, public and private financial institutes, government institutions (INTI, INCES, MPPAT, MINEC, among others). And the meeting place, to suit (in situ in a conference room, field trip and institutional laboratories).

Regarding the evaluation and monitoring strategy of the proposed training program, it is an adaptation of the Kirkpatrick model in order to leave a chain of evidence that supports with data, infor-

mation and knowledge, the results of the teaching-learning process and its impact on the units. organizational, this is defined as the Return on Expectations or ROE (Return on Expectations), which contemplates 4 levels of criteria: Reaction, Learning, Behavior and Results (Table 4). The progressive development of each one of these levels in a systematic way requires measurements beforehand, during and after the fact, and with the collected data they are used to determine key performance indicators (KPI: Key Performance Indicator), such as quality indexes (KPIsc) and training benefit indices (KPIsbc), essential for the intervened organization of AIR cheese makers in the Antiguo Hato "El Charcote" sector.

| Evaluation | Description and characteristics of the evaluation | Examples of tools and methods evaluation | Relevance and feasibility |
|-----------------------|--|--|--|
| Level 1: Reaction | Indicate how the participants felt, as well as their personal reactions to the training or learning experience, for example: Did the attendees like and enjoy the training? Did the attendees consider that the training was relevant? Was it a good use of your time? | Feedback forms based on subjective personal reaction to the training experience. Post-training surveys or questionnaires. | Can be done after training is over It's easy to get instant feedback It is not expensive to obtain feedback or analyze it in groups It's important to know if people left disappointed or upset. |
| Level 2: Learning | Measures the increase in the level of knowledge or intellectual capacity resulting from the learning experience, for example: Did the attendees learn what they were intended to learn? Did the attendees experience what they were intended to experience? What has been the magnitude of the progress or change in the attendees after the training in terms of the direction or area for which it was intended? | Assessments or tests normally before and after the training. Use can be made of interview or observation before and after, although this may be time consuming and inconsistent It is possible and easy to carry out measurements and analyzes at the group level. | They are relatively easy to prepare, but require more investment of time and consideration than a reaction assessment. It is highly relevant and well defined for certain types of training such as: technical or quantifiable skills. It is more complicated for more complex learning such as attitude development, which is known to be difficult to assess. |
| Level 3: Behaviour | It is the extent to which the attendees applied the learning and changed their behavior. This may be determined immediately or several months after the training, depending on the situation, for example: Did the assistants put their new knowledge into practice when they returned to work? Were relevant skills and knowledge used? Is the assistant aware of your change in behaviour, knowledge and skill level? | Some observation or interview is needed as time passes to assess the changes, their importance and sustainability. The evaluations must be subtle and continuous to later transfer them to a suitable analysis tool. The evaluations must be designed in such a way that they reduce the subjective judgment of the observer or interviewer, which is a variable factor that can affect the reliability and consistency of the measurements. | Evaluation of implementation and enforcement is very important, there is little point in counting on a good reaction and a good increase in capacity if nothing changes once you get back to work, therefore evaluation in this area is crucial, not however, it is a challenge. Behavior change assessment is possible if there is good support and participation from direct managers or those attending the training, so it is useful to involve them from the beginning, in addition to identifying benefits for them, which leads to the following level 4 assessment. |

| | | | |
|-----------------------------|--|---|---|
| <p>Level 4: Results</p> | <p>It is the effect on the business or environment produced as a result of the improved performance of the trainee. It is the acid test.</p> <p>The measures would normally be the key performance indicators of either businesses or organizations such as: volumes, values, percentages, terms, return on investment and other quantifiable aspects of organizational performance such as: number of complaints, staff turnover, attrition, failures, waste of resources, non-compliance, quality levels, achievement of standards and accreditations, growth, retention, etc.</p> | <p>It is important to identify and agree responsibility and relevance with the attendee at the beginning of the training so that the attendee understands what will be measured.</p> <p>This process overlays a common good management practice, you just need a link to the training input.</p> <p>Annual evaluations and ongoing agreement on business objectives are critical to measuring business results from training.</p> | <p>At the individual level, the evaluation of results does not represent a special difficulty; it becomes much more challenging at all levels of an organization, not least because of the reliance on direct supervision and the frequency and scale of changing structures, responsibilities and roles, all of which complicate the process of charging clear responsibilities.</p> <p>External factors greatly affect organizational and business performance, which blur the real reasons why good or bad results are obtained.</p> |
|-----------------------------|--|---|---|

Table 4: Detail of the evaluation structure (adapted from Kirkpatrick).

Font: Laya (2022).

In the previous table, a set of evaluation, relevance and viability tools are described that serve as a guide to evaluate and control the actions that cheese farming companies must take, to provide a specific justification about the contribution, advantages and benefits generated by a training plan with good foundations and quality.

Conclusions and Recommendations

The results presented on the measurement of the sustainability variable of the economic, social and environmental dimensions, which shows that the cheese factories of the Old Hato “El Charcote” are located on a scale from Apt tending to Deficient (average global index of 3, 09), the low cognitive indices of agricultural producers on the management of milk production systems that impairs the effectiveness of the cheese AIR and the evident participation of women in the work of these field processes to sustain the security would encourage ; They are the precise arguments for the design of management strategies that contribute to solving the problems that are causing the deficiencies in the agro-productive system. In general, producers require training and subsequent follow-up on the management of soil, water, flora, fauna, and milk processing, storage, assurance, and quality control.

The theoretical model of management of technical training and gender equality for a productive and sustainable rural cheese agro-industry, created for the current reality, for it to be successful depends on the degree of training that the producers have regarding the topics: soil characterization; pastures, forages, protein bank and agricultural crops for the area; biological protection areas on the farm; ecological management of pastures; types of animals for local production; animal welfare; post-harvest conservation technology for pastures, forages and organic residues; dairy derivatives technology; environmental education; strategy for agrotourism development; information technology management and; financing. Accompanied by the institutional support of the social actors, for

the logistical support of planning, development, evaluation-monitoring and legal regulatory control of judicial contention, of obligatory nature of the participants (internal and external) in order to contribute to growth and community development.

A guide adapted from the Kirkpatrick model is presented as program evaluation and monitoring strategies, which suggests a priori, during and a posteriori measurements in each of its levels of evaluation criteria, because it is not enough just to train producers, but rather It is essential to know if the training processes generate a change in people and in the management of cheese agro-industries towards sustainability, both in the short and long term. Therefore, contributions of scientific value are offered to the regional and national institutions that are in charge of the Community Development Plans, for the external validation of the proposed model.

On the other hand, it is recommended to complement the economic activity of the rural cheese agro-industry, with the breeding of semi-intensive management animals, to take advantage of the small area of each UP, such as: goats, sheep, pigs and poultry, with the purpose of Reduce operating expenses and increase revenue. Likewise, the producer must start by producing his raw material (milk) from his UP, his own inputs, formulate and prepare rations of balanced food for animals (ABA), based on native resources, and create specific points of commercialization of products. dairy to the minor or major.

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