

Sustainability, equity and competitiveness of the production systems of La Estrella community, Zulia state

J. J. Pérez¹, I. Huerta², N. Rincón¹ y F. Urdaneta¹

¹Universidad del Zulia, Facultad de Agronomía, Venezuela

²Universidad Nacional Experimental Rafael María Baralt, Venezuela

Abstract

The present descriptive study was carried out in order to determine the sustainability, equity and competitiveness of the production systems of La Estrella community, Zulia state, Venezuela. The population considered in the study was of 90 small farmers. The instrument used was a questionnaire formed by 20 items applied to the population and used to determine the indexes of sustainability (Is), equity (Ie) and competitiveness (Ic). The results obtained show that, from the point of view of the sustainability (Is = 0.50) the production systems of the community are in instability condition. The Ic (0.36) and Ie (0.06) showed a critical condition in the production systems, that is, the competitiveness and the equity between the farmers are the most important limitations in the community.

Key words: sustainability, equity, competitiveness, index.

Introduction

La Estrella is an agricultural community located at La Cañada de Urdaneta parish, Zulia state, Venezuela. Among its characteristics are highlighted: high illiteracy rate and educational desertion, low individual income, and high level of critical poverty, among others (6).

The economical activity of the community is centered in the

agriculture. According to the sowed area, the most important crops are cassava, vegetables and fruit bearings. The production systems of approximately 5 hectares, are handled with scarce technical, economical and managerial criteria (5), which has an influence in the low yields and in the poverty levels of producers and their families.

Nowadays, there are several institutions as Planimara, Facultad de Agronomía of LUZ, and others, that have participated in the area in order to promote together with the participation of producers, programs of rural development oriented to the achievement of a community with a permanent and safe future, without reaching significant achievements. This future is guided to the sustainability of the production systems, in the equity and social justice, and at the same time reaching optimum levels of competitiveness.

In this sense, emerges the necessity of determining indicators that would allow to evaluate and make decisions in short, mid or long terms, the realization of the proposed goals by the development programs

about to be applied or already applied by these organizations. Therefore, this research was done considering all these aspects, which main objective consisted on determining the sustainability, equity and competitiveness of the production systems of La Estrella community, through the elaboration of multidimensional indexes.

The theory that was the support of this research was constructed in base of the conceptual fundamentals proposed by the Organizations of the United Nations for the Alimentation and Agriculture, FAO about the sustainable agriculture, and approaches about the sustainable development mentioned by Müller (2) and Sepúlveda *et al.* (9).

Materials and methods

This research corresponds to a non-experimental descriptive study, because it was oriented towards the collection of information and the posterior description, interpretation and analysis in function of the place of origin (7). Due to the descriptive aspects, the used design consisted on the descriptive transversal, which main objective is to know the incidence and values where one or more variables appear measured only once (1).

The population used in this research was formed by 90 producers, located at La Estrella community, La Cañada de Urdaneta parish, Zulia state, who are committed to the agricultural, animal and vegetal

activity. The size of the population allowed to consider all the producers for the realization of the research.

Considering the theory, the variables of the investigation (table 1) were operationally defined in the following way:

a) Sustainability index (Is): numerical feature measured through the development of production, vegetal and animal health, crops tradition, yields, water availability and own incomes.

b) Equity index (EI): numerical feature measured through the participation of producers in the decision-making, equal distribution of credits, water distribution, expenses distribution of electricity and community organization.

Table 1. Operationalization of the variables

Variables or indexes	Indicators
Sustainability index (Is)	Yields of crops Tradition of crops Animal health Development of the production systems Vegetal health Incomes of the system Water availability
Competitiveness index (Ic)	Quality of products Adequate prices Market for products Lost of products Cost of production Available technology Transport Agro-industries in the area
Equity index (Ie)	Participation in the decision-making Organization of the community Distribution of the electricity costs Water distribution Access to credits

e) Competitiveness index (IC): numerical feature obtained from the quality of products, agro-industries located near the community, transport facility, access to technology, costs of production, lost of products, location in the market and adequate prices.

The collection of information was done during the firsts semesters of the year 2002, through the design and application of a questionnaire with 20 items with three alternatives as answers: high, medium, low. With the aim of facilitating the comprehension and handle of the instruments by producers, pictographic diagrams were used to represent answer alternatives.

The posterior handle of information was done assigning a randomized score in the scale of 0, 1 and 2, where 0 represents a low intensity of the problem, 1 a medium intensity, and 2 a high intensity answer.

The validation of the used instrument was estimated through the method explained by Hernández *et al.* (1), which was done asking experts in the management of agro-industries, who revised the instruments and told their opinions and suggestions in this matter, suggestions that were considered for the application of the final versions. The trustable measurement of the instrument was done using the

Cronbach coefficient μ , being this 0.70, which made the instrument trustable.

The information obtained through the measurement instrument was processed with the calculus of an index for each of the mentioned variables (sustainability, equity and competitiveness). Before doing the calculus of indexes, it was proceeded to diminish each of the indicators with the equations proposed by Sepúlveda *et al.* (9):

$$f(x) = \frac{x - m}{M - n} \text{ (a)}$$

$$f(x) = \frac{x - M}{n - M} \text{ (b)}$$

Where:

F(X)= is the value of the variable or indicator for a determined analysis unit in a determined period.

M= is the maximum level in a determined period.

N= is the minimum value of the variable in a determined period.

X= observed value of the variable.

The equation (a) is applied when the relation between the indicator and the index is positive; the equation (b)

when is negative; the relation between the indicators and indexes (sustainability, competitiveness and equity) are shown in table 2. In this way, formulas allow to obtain indicators with values between 0 and 1, and allow to compare it between them.

Subsequently, it was proceeded to the calculus of each index considering the corresponding indicators and applying the following equation (9):

$$\frac{1}{n} \sum_{i=1}^n I_i$$

Where:

n= total of indicators

I= is an indicator in a determined moment

The analysis and interpretation of indexes was done through an adapted estimation scale of Sepúlveda *et al.* (9), (table 3). Lately, the correlation analysis was done for the three indexes. In the statistical analysis, the statistical analysis program SAS version 6 was used (8).

Results and discussion

Sustainability index (Is)

The Is measured in 0.50 (table 4), represents an unsteady situation of the community according to the estimation scale.

Studying the indicators of the sustainability index, can be said that the scarce development of the production systems, it means the use of land and vegetal health, constitutes

the elements of higher negative effect in the sustainability of the production systems of the community, so these should be firstly attended to achieve the permanence of these systems in the time.

Besides, the scarce development of systems resulted to be significantly correlated ($P < 0.05$) to the water availability and the yield of crops.

Table 2. Indicators relation with the sustainability, competitiveness and equity.

Variables or indexes	Indicators	Relation
Sustainability index (Is)	Yield of crops	+
	Tradition of crops	-
	Animal health	+
	Development of the production systems	-
	Vegetal health	+
	Own incomes of the system	+
	Water availability	+
Competitiveness index (Ic)	Quality of products	+
	Adequate prices	+
	Market for the products	+
	Lost of products	-
	Costs of production	-
	Available technology	+
	Transport	+
Equity index (Ie)	Agro-industries in the area	+
	Participation in the decision-making	+
	Community organization	+
	Costs distribution of electricity	+
	Water distribution	+
	Access to credits	+

The sustainability index of the production systems of the community is oriented towards the necessity of designing strategies that would allow

to promote an agriculture development with adequate technological alternatives that would maintain or recover the productive capacity of the

Table 3. Interpretation scale of the sustainability, competitiveness and equity indexes.

Value of the index	Interpretation
< 0.2	High possibility of collapsing
0.2 – 0.4	Critical level
0.4 – 0.6	Unsteady system
0.6 – 0.8	Steady system
> 0.8	Optimum level

Source: Adapted from Sepúlveda *et al.* (9).

Table 4. Sustainability index of the production systems of La Estrella community, Zulia state.

Sustainability indicators	Diminished values
Yield of crops	0.52
Tradition of crops	0.49
Animal health	0.80
Development of the production systems	0.35
Vegetal health	0.35
Incomes proper of the system	0.52
Water availability	0.47
Sustainability index	0.50

land in order to preserve the natural resources and the environment. This reality evidenced in the production systems of La Estrella, is not different from the ones observed in the rest of the country, and in the non-developed and poorest countries of the world. Therefore the FAO (3) have suggested the sustainability as a goal or challenge to answer to the deep and fast changes that are happening worldwide, where it is necessary to produce more with less.

Competitiveness index (Ic)

The competitiveness index of the production systems of La Estrella community that measures the capacity of these to generate sings and services to obtain a higher participation in the market, was of 0.38 (table 5). This index represents a critical situation of the production systems.

These problems show that there is a critical situation from the point of view of the competitiveness of the production systems of the community, where the search of efficiency requires

Table 5. Competitiveness index of the production systems of La Estrella community, Zulia state.

Competitiveness indicators	Diminished values
Quality of products	0.25
Adequate prices	0.26
Market for the products	0.39
Lost of products	0.68
Costs of production	0.10
Available technology	0.35
Transport	0.59
Agro-industries near the area	0.25
Competitiveness index	0.36

deep changes in the way of conceiving the agriculture, so it is necessary to re-orientate the technological matrix of the agriculture activity, so it will be more efficient in a sense of producing more by a resource unit that would offer products of better quality and of lower costs, as well as some authors said (2, 3, 4), when suggesting this as a challenge towards the agriculture of the Latin American reality.

The analysis of components or indicators of the competitiveness, allowed to determine that the elevated costs of production constitute the factor that mostly limits the competitiveness of the production systems of the community.

This might be due to the low technological level that small producers use in the productive process that is reflected in the quality of products, which at the same time might be related with the scarce of agro-industries near the location. The lack of agro-industries is related to the absence of an agriculture development in the parish.

Equity index (Ie).

The obtained Ie was of 0.06

(table 6); a low index that evidences a critical situation which might represent the collapse of the community. The inequality of opportunities between the different members of the community results to be a difficult problem, which might be strategically handle to achieve the agriculture development.

The inequality evidenced in the community is a very common problem in Latin American countries, as well as it is said by FAO (3, 4), where the unfairness in the rural area, and the lack of opportunities hinder that small producers might improve their incomes thanks to an efficient agriculture, and therefore they might have access to an adequate education or to health services. The indicators that were considered for constructing the equity index affected directly and negatively way the equity between the members of the community, specially in the equal distribution of water and in the decision-making.

Correlation analysis between indexes

Studying the relations between the three indexes through the correlation analysis (table 7), was

Table 6. Equity index of the production systems of La Estrella community, Zulia state.

Equity indicators	Diminished values
Participation in the decision-making	0.05
Community organization	0.05
Distribution of the electricity expenses	0.07
Water distribution	0.05
Access to credits	0.09
Equity index	0.06

Table 7. Correlation matrix (probabilities) in the sustainability, competitiveness and equity indexes of the production systems of La Estrella community, Zulia state.

	Sustainability index	Competitiveness index	Equity index
Sustainability index	-	0.032*	0.045*
Competitiveness index	0.032*	-	0.26
Equity index	0.045*	0.26	-

*Probability values considered as significant in a 0.05 level.

found that there is a significant relation ($P < 0.05$) between equity and sustainability. This relation suggests that the equality of opportunities between members of a community might influence directly on the capacity of the production systems to supply their necessities, because for communities of small producers, cooperation between their members is essential in order to reach the

economical success.

It was also determined that sustainability and competitiveness are significantly related ($P < 0.05$), it means, the capacity of the production systems to generate goods and competitive services are very related to the sustainability of these production systems, agreeing with those suggested by Müller (2) and the FAO (3, 4).

Conclusions and recommendations

The estimation of the sustainability, equity and competitiveness indexes allowed to infer that the level of sustainable development of the community is low, because in three dimensions considered of the development, it is reflected an unsteady situation of the production systems.

The sustainability index estimated in 0.50, represents an unsteady situation of the community, so it is necessary to promote activities and strategies that would allow to overcome the serious limitations that are derived from the scarce

development of the production systems, and to improve problems of vegetal health.

The competitiveness index (0.36), points that the production systems of the community are in a critical situation from the point of view of their competitiveness, so it is necessary to re-orientate the technological matrix of the agriculture activity in order to reduce the production expenses and improve the quality levels and prices of products.

The serious problems between the members of the community, as for

example water distribution, participation, organization and access to credits, showed a low equity index (0.06) being this the lower of the estimated indexes.

The obtained results suggest that there is a significant correlation between equity and sustainability, so

actions and the designed strategies to assure the permanence of the production systems, might be firstly oriented to improve the relation between their members, promoting the participation and fortifying the community organization.

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