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PROSPECTIVE IMPACT ANALYSIS OF THE GROWTH PINEAPPLE CROP AREA IN THE ATLANTIC REGION OF COSTA RICA

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Abstract. **Pineapple (*Ananas comosus* (L.) Merr) production in Costa Rica has significantly increased both in cultivated hectares and tonnage in the last 8 years. The production systems are diverse, from small scale production of rustic varieties (Montelirio), to intensive production of improved varieties (Smooth Cayenne, Champaka and MD2). In 1973, the pineapple crop was 738 hectares. In 1984 it increased to 2,500 ha with none acreage in the Atlantic Region. In 2002 production covered 13,500 and in year 2006 production will cover 27,000 hectares. Of these, more than 10,000 hectares will be in the Atlantic Region where there was very little a decade ago. The objective of this work was to do a prospective structural analysis of trends and then the construction of scenarios of the impact that such expansion will cause in the region. The main components, plus endogenous and exogenous factors of pineapple expansion were identified. An incidence matrix between components and factors was built, and from this a cross-impact matrix of the key factors of pineapple production was mounted in order to identify foresight scenarios on the increase in pineapple area in this Atlantic Region (HAR).**

Historical Overview

Pineapple (*Ananas comosus* (L.) Merr) is a non-traditional fruit crop for export that has increased in production area very significantly in the last 8 years. The diverse systems and techniques of cultivation range from the small scale production of rustic varieties by small farmers, to the intensive production of improved varieties Smooth Cayenne, Champaka and MD2.

In 1973, the pineapple crop, reached was of only 738 ha. The 1984 Census reported a cultivation area of 2,474 ha, for the same varieties, none in the Huétar Atlantic Region (HAR). The area went from 13,500 ha in the 2002 to 15,500 ha in the 2003, and in 2006 the crop will cover 27,000 ha. It is estimated that in the HAR there are at present some 10,000 ha.

Pineapple produced in Costa Rica goes mainly to international market as a fresh fruit to the United States, 56%; followed by Belgium, 11%; Germany and Italy, 10% each, United Kingdom, 12% and 1% others.

In the mid-90s, a new variety appeared in the market, known as MD2 or *Del Monte Gold* produced by Del Monte's Costa Rican subsidiary Pindeco (See "*La lucha dorada por la fruta: Del Monte contra las demás empresas*", La Nación, 11-8-97). The popularity of this variety caused an increased in production area of more than 380% for Costa Rica. In the HAR alone, it increased 1500% in just 8 years (Table 1).

Methodology

The structural analysis method (Gomes de Castro et al., 2001; Samper, 2003) was used. This form of analysis describes a system using a matrix which combines the constituent components of the system, and it identifies the main variables which are both influential and dependent: those which are essential to the evolution of the system. The purpose of the structural analysis is to help identify the principal key variables, taking into account the relations of dependence among variables. Key variables are defined as those that exercise the greater influence on the other variables. The methodological objective is to keep less than ten variables (preferably not more than five).

Structural analysis is carried out by a working group made up of actors and experts from the field under study, and also external advisers. The previous phases that should be covered for the execution of the exercise are the following: 1) Identification of the variables that compose the problem; 2) Detection of the interactions among them; and 3) Decision to choose the most outstanding variables. In building the base

Table 1. Area increment of pineapple crop in the Atlantic Region of Costa Rica and total exports 1995-2005.

Year	Crop area in Costa Rica (hectares)	Crop area in HAR (hectares)	Pineapple exports (US$ × 1000)
1995	6000		61.300
1998	9300		114.321
1999	9900	600	130.814
2000	12500	1200[z]	121.086
2001	13000	1800[z]	139.906
2002	15500	2600[z]	175.926
2003	16500	3600	197.210
2004	18000	5500	231.881
2005	23000	8900	n.a.
2006	27000[z]	>10000[z]	n.a.

[z]Author's estimates.
Source: MAG, SEPSA,PROCOMER, Grupo Colono (Supplier).

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for the actors and variables the method suggested by Vieira (1999) was adapted to this case. Therefore, the phases of the prospective analysis were: 1) Construction of the base: 2) Identification of actors and of the variables; 3) Structural Analysis of the strategies and of the actors; and 4) Construction of settings and strategies.

Stakeholder (Actors) Identification. The following actors were identified:

- Multinational corporations (producers-exporters);
- Independent farmers;
- Government: MAG, CINDE, MINAE;
- Environmentalists & NGOs: Foro EMAUS;
- Suppliers: Grupo Colono;
- Farmers Organizations: Cámara Nacional de Productores y Exportadores de Piña;
- Civil Society: Comisión Ambiental de Guácimo y Pococí;
- International consumers;
- International brokers.

Identification of endogenous factors in pineapple expansion. The following endogenous factors were identified:

- Strategic decisions, land tenure modality for production, how much to plant and to whom to sell;
- Organizational decisions, how to organize production logistics, marketing, waste management.
- Technical decisions and choices; varieties, crop management, use of conservation practices, technological package applied;
- Cropped area.

Identification of exogenous factors in pineapple expansion. The following exogenous factors were identified:

- Demand, prices, international market;
- Social stability, labor force, unemployment, poverty;
- Environmental degradation;
- Globalization policies and commercial opening of the international market (EUREP-GAP, ISO Norms, Law of Bioterrorism);
- Tax Policies and national regulations.

Crossing both endogenous and exogenous factors against the actors two incidence matrixes (potency/dependence) were built (Tables 2 and 3) and, values were assigned to each cell (0-no influence; 1-fair influence; 2-strong influence). Taking the higher values of the totals, a matrix of crossed impacts of key factors in pineapple production was built (Table 4) assigning one of three options in each cell (H: high, M: medium, L: low with a negative (-) o positive (+) trend). Two opposite scenarios, one optimistic and another pessimistic were built (Table 5) to predict impact trends in the HAR.

Conclusions

Although the formulation of scenarios is criticized as unrealistic and arbitrary, at least they give some practical indications as to what is possible in terms of prospective analysis to predict the impact of a given production system.

In the pessimistic scenario where intensive plantations of pineapple monocultures are pushed to increase yield, and pesticides and mechanical farming are used to extremes, the soil will be barren after only a few years, and, as a result, it would be necessary to move to other areas of the country, increasing environmental degradation will be expected.

Table 2. Incidence Matrix (potency) between actors and endogenous factors in pineapple expansion in HAR.

Endogenous Factors Actors	Strategic decisions	Organizational decision	Technical decisions & choices	Cropped area	Total	
Multinational producers	2	2	2	2	8	P
Independent producers	1	1	0	1	3	O
Government: MAG, MINAE, IDA	0	0	1	1	2	T
CINDE, PROCOMER, COMEX	2	0	1	1	4	E
Environmentalists & NGOs (Foro Emaús)	0	0	0	0	0	N
Farmers Organizations CANAPEP	0	0	1	1	2	C
Civil Society: Guácimo-Pococí Environmental Comisión	1	0	0	0	1	Y
Total	6	3	5	6	20	
D E P E N D E N C E						

Modified from Vieira, 1999. 0: no influence; 1: fair influence; 2: strong influence.

Table 3. Incidence Matrix (potence) between actors and exogenous factors in pineapple expansion in HAR.

Exogenous factors Actors	Demand prices intl market	Social stability, labor force, unempl, poverty	Environmental degradation	Globalization policies & commercial opening	Tax policies & intl regulation	Total	
Multinational corporations (Producers-Exporters)	1	1	2	0	0	4	P
Independent Producers	0	0	2	0	0	2	O
International consumers	2	0	0	0	0	2	T
CINDE, PROCOMER, COMEX	0	0	0	2	1	3	E
International brokers	2	0	0	0	2	4	N
Environmentalists & NGOs (Foro Emaús)	0	1	2	0	0	3	C
Total	5	2	6	2	3	18	Y
D E P E N D E N C E							

Modified from Vieira, 1999. 0: no influence; 1: fair influence; 2: strong influence.

Table 4. Matrix of crossed impacts of key factors in pineapple production.

	Strategic decisions	Cropped area	Demand, intl. prices.	Environmental degradation
Strategic decisions	---	H+	H+	M+
Area planted	L+	---	H+	H+
Demand, international prices	H+	B+	---	L+
Environmental degradation	H-	M+	L-	---

H: high, M: medium, L: low & trend: negative (-) or positive (+).

Table 5. Building two scenarios.

	Scenario 1	Scenario 2
	Pessimistic	Optimistic
Strategic decisions	No regulation	Regulation
Demand prices	As it is	Decrease demand & prices
Intl market	No mitigation mechanisms	Mitigation strategies
Environmental degradation	Increasing	Maintained

In the optimistic scenario, the mitigation strategies set up by consumers and the international market, and the development of criteria and indicators for the certification of pineapple, for social and environmental soundness of the crop production system, environmental degradation could be minimized.

There are, however, huge gaps in the procedure that can and must be filled. How to define representative participants as stake holders and the working group made up of actors and experts from the field under study, and the sample size of the interviews are important factors that influence the output scenarios.

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