Sustainability assessment of six Brazilian coffee farms in Bahia and Minas Gerais

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Summary

The sustainability of six coffee producing farms of various sizes (10 to 1600 ha of coffee) in the Brazilian states Bahia and Minas Gerais was evaluated using the Response-Inducing Sustainability Evaluation tool RISE.

RISE, which was mainly developed on dairy or mixed farms, proved also to be a valuable tool for the evaluation of coffee farms. Nevertheless, it had to be adapted to regional conditions and managerial practices. The interpretation of local practices, for example the book keeping system used on the farms, required some clarification and translation to obtain the data used by RISE.

The empirical results can be summarized as follows:

- *Ecological Indicators:* Generally good performance. Deficiencies were observed only in one case for the "Biodiversity" Indicator (farm No. 6), and the "Plant protection" Indicator (farm No. 4).
- *Economical Indicators:* Two farms (No. 1 and 5) perform well in the Income indicator, thanks to a high value added per worker, all farms except the smallest one (No.2) show a cash flow problem caused by low coffee prices and high retained inventory. IN general, larger farms (≥200 ha) pay higher wages.
- *Social Indicators:* The performance of the social situation indicator is decent, except for the smallest farm (No.2); this is due to low salaries and the absence of social security and any other kind of insurance.

Overall, the project underlined the practical flexibility of RISE. It also emphasized the need for a comprehensive and standardized training of the investigators, and for the development of a standardized protocol with guidelines on how to "translate" local data into a format which is consistent with the basic philosophy of RISE.

It has to be stressed that the results only depict the situation and trends of the six farms analyzed in this small case study and cannot be generalized.

1 Background and Introduction

Sustainable production with respect to environmental, economic and social aspects is increasingly gaining importance for farms and companies in the food production and processing sector (Dubois D. 2002; Nestlé 2002; Pretty 1995; SAI-Platform 2002; Syngenta 2003; VDLUFA 2000).

The Swiss College of Agriculture (SCA) has developed the model or expert system **RISE** (Response - Inducing Sustainability Evaluation) to assess and visualise the **sustainability at farm level** (Häni et al. 2002, 2003a, 2003b). The model is based on a *triple* bottom line approach describing the *ecological*, *economic* and *social* situation of a farm using 12 indicators. In addition a strength/weakness profile for the farm and the region is usually determined (not presented in this report).

A key characteristic of the model RISE is the evaluation of both the "State" (S) and "Driving force" (D) for each indicator. The "Degree of Sustainability" (DS = S – D) takes into account the actual situation (S) and the driving force (D), i.e. the existing pressure which tends to decrease the degree of sustainability in the future. Individual indicators are sustainable if the

DS is above +10, the whole farm is considered sustainable when no indicator has a DS below –10. So far, RISE has been applied mainly on dairy or mixed farms in a number of different countries (Häni et al. 2003c, Fischer and Porsche, 2003).

This pilot project was funded by Nestlé, interested in an evaluation of sustainability of Brazilian coffee farms and at the same time interested in a field evaluation of the relevance and usefulness of a tool such as RISE.

In this context, RISE constitutes an important managerial tool for primary producers to become aware of their farm's potential for sustainable production and for further sustainability improvement. A sustainable primary production is a prerequisite for a secure and sustainable supply of raw materials to global food and agribusiness supply chains. Sustainable production supports and promotes the long-term availability and overall quality of the agricultural commodity and is instrumental in promoting an increasingly important component of a global brand value: the image of an economically, ecologically and socially sound company.

2 Methodology

Data collection for the assessment was completed on-site through a researcher from the Swiss College of Agriculture (SCA) who had been specifically trained for this mission. For the practical assessment 6 coffee farms of different size were selected in Minas Gerais (Arabica coffee) and Bahia (Robusta coffee). Senior researchers from SCA completed the assessment with the help of UNACAU, Itabuna Bahia and AFC Arpiglias Ltda, Sao Paulo, and provided feed back to the management of the visited farms. Data and bookkeeping figures from 2002 were used for the current assessments. The results were presented and discussed with coffee producers and experts during several conferences at Nestlé Brazil, Sao Paulo as well as with farmers associations (COCAPEC) in Franca-SP. The feedback from these discussions, comments from other farmers and coffee experts as well as discussions with colleagues at Swiss College of Agriculture and the University of Guelph were all taken into account to comment and validate the field results. In order to respect the privacy of the farms object of the study, no detailed description will be provided, and acreage and total workforce data may have been disguised.

3 Results

The results for farm 1 and 2 are presented in Figure 1.

Farm No 1, in Bahia, performs well on ecological and social indicators. The indicator "Energy" reflects a relatively high driving force caused by the high energy consumption per ha. The "Cash Flow" indicator is unsatisfactory because of the high imputed cost of interest on owners' equity. On the other hand, the average farm income per full time worker equivalent (FTE) is relatively high at 2.2 times the regional Gross Minimum Income (GMI). Salaries account for 20% of revenues.

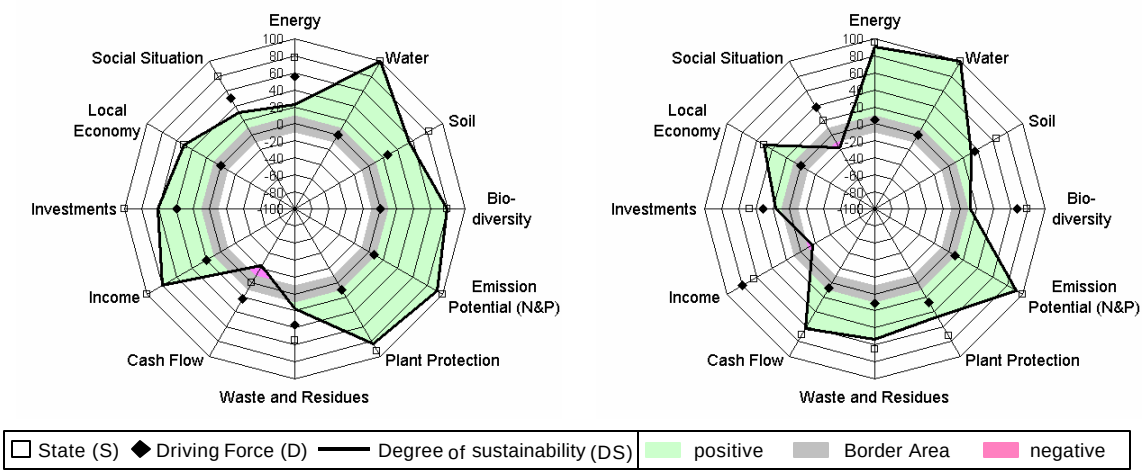
Farm No 2, also in Bahia shows a sustainable "Cash Flow" indicator, thanks to a low capital per hectare and no on farm inventory of coffee. Salaries absorb 80% of total revenue, which would obviously be quite problematic in a depressed market. The average farm income per FTE is only 0.92 GMI, hardly an attractive level. The social situation indicator appears to be non sustainable due to the absence of social security or other insurance protection. In addition, the indicator "Biodiversity" is quite low as some regulations on land destination were not observed. The case of Farm 2 is a good example of the flexibility of RISE as a

holistic tool, and provides an interesting example of the quality of managerial information that may be obtained from it.

Figure 1: Results for Farm 1 and Farm 2 (Bahia).

Farm No 1: 190 Work forces (FTE),
220 ha Coffee (1200 kg/ha),
1'300 ha Cocoa, 400 ha Palmito

Farm No 2: 16 Work forces (FTE),
10 ha Coffee (1800 kg/ha),
5 ha Cocoa, 13 ha Palmito

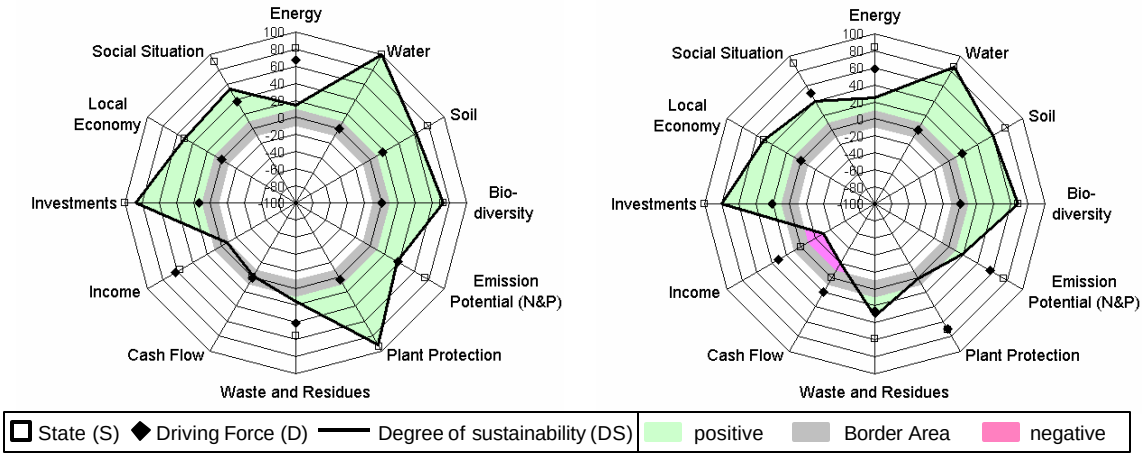


The four farms visited in Minas Gerais are presented in Figure 2 and figure 3.

Figure 2. Results for Farm 3 and Farm 4 (Minas Gerais)

Farm No 3: 850 Work forces (FTE),
1'640 ha Coffee (2900 kg/ha),
500 ha Eucalyptus, 500 ha Grass

Farm No 4: 35 Work forces (FTE),
230 ha Coffee (2100 kg/ha),
55 ha Eucalyptus, 25 ha Grass



Farm No 3 can be considered sustainable as a whole. It has a decent ecological performance, with some weak points represented by high energy consumption and unsatisfactory waste disposal practices. The picture offered by the "Cash Flow" and

"Income" indicators is less favorable, as in both cases the results are in the gray border-line area. Farm income per FTE is 0.84 GMI, a rather low value, and total salaries absorb 60% of total revenues.

Farm No 4 has rather low results for the "Emission Potential (N&P)" and "Plant Protection" indicators, resulting from a high usage of fertilizers and pesticides. The "Energy" indicators reflect a relatively high driving force due to the high energy consumption per hectare. Both the "Cash Flow" and the "Income" indicators provide non sustainable results, as could be expected given the negative average farm income per FTE.

Farm No 5 in figure 3 has a well balanced polygon and can be considered sustainable as a whole. Only the indicator "Cash Flow" is in the borderline area. As seen before for another farm, also in this case the main reason is the high imputed cost of the owner's equity, and the high on farm inventory of unsold coffee. The average farm income per FTE is however high at 1.8 times the GMI.

Farm No 6, also in figure 3, has a good ecological performance with the only exception of the marginally non sustainable "Biodiversity" indicator, which was due to a regulatory requirement being ignored. The "Cash Flow" indicator is hurting the overall performance, as is the "Income" indicator which also ends up in the border-line area. The average farm income per FTE is a relatively low 0.88 times the GMI.

Figure 3. Results for Farm 5 and Farm 6 (Minas Gerais)

Farm No 5: 65 Work forces (FTE), 200 ha Coffee (2000 kg/ha), 185 ha Grass

Farm No 6: 5 Work forces (FTE), 16 ha Coffee (1800 kg/ha), 5 ha Citrus, 33 ha Grass

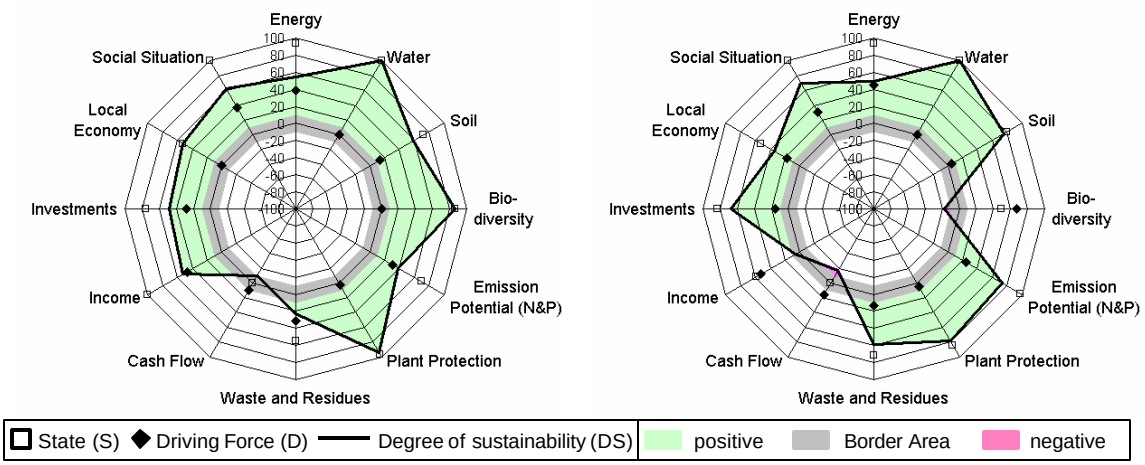


Table 4 summarizes the results by individual indicator for the six farms.

Overall, the results are very satisfactory in the case of the ecological domain indicators, with 40 "sustainable" results (DS>10), only one "marginal" result (-10<DS<10) and only one "non sustainable" result (DS<-10). The marginal result of farm 4 on the plant protection indicator is due to a relatively high use of pesticides and fertilizer. On farm 6 the biodiversity indicator is unsustainable because the areas of ecological compensation are smaller than what is legally prescribed. In fairness to this farm, it should be noted that these requirements are often ignored and not enforced.

The social domain of the results is satisfactory, with the only exception of farm 2, which is non sustainable due to the lack of social security measures and other forms of insurance.

Table 1: State (S), Driving force (D) and Degree of Sustainability (DS)* of the 12 RISE indicators for the six coffee farms.

	Ecology																	
	Energy)			Water			Soil			Biodiversity			Emission potential			Plant protection		
Farm	S	D	DS	S	D	DS	S	D	DS	S	D	DS	S	D	DS	S	D	DS
No 1	78	56	23	100	0	100	82	26	55	78	0	78	100	8	92	92	10	83
No 2	95	4	91	100	0	100	65	35	30	79	67	12	100	8	92	73	27	46
No 3	81	68	14	100	0	100	79	17	62	72	0	72	75	38	37	95	3	91
No 4	84	59	25	86	0	86	78	18	59	68	0	68	75	56	19	72	70	2
No 5	93	38	55	100	0	100	73	14	59	86	0	86	70	31	39	97	3	95
No 6	94	45	49	100	0	100	80	5	76	50	67	-17	98	24	73	84	5	79

	Ecology			Economy												Society		
	Wastes			Cash flow			Farm income			Investments			Local economy			Social situation		
Farm	S	D	DS	S	D	DS	S	D	DS	S	D	DS	S	D	DS	S	D	DS
No 1	54	36	18	0	23	-23	100	20	80	100	39	61	50	0	50	80	50	30
No 2	65	11	54	71	8	63	64	79	-15	47	31	16	50	0	50	20	37	-17
No 3	55	40	15	0	1	-1	56	63	-7	100	13	87	50	0	50	90	37	53
No 4	58	26	32	0	19	-19	0	30	-30	100	20	80	50	0	50	90	50	40
No 5	54	31	23	0	10	-10	100	47	53	76	28	48	52	0	52	100	37	63
No 6	71	13	58	0	17	-17	58	52	6	83	16	68	52	18	35	100	30	70

*Individual indicators are unsustainable if DS is below +10 (grey color), the whole farm is unsustainable if it shows one ore more indicators with a DS below –10 (red color).

The economic domain of the results underlines a number of problems with cash flow and farm income indicators. Often these problems are determined by the consideration of the opportunity cost of the owner's equity, which is often tied up in high on-farm inventories of unsold coffee.

4 Conclusions

Whereas the results are pertinent only to the six farms considered and cannot be generalized, RISE proved to be a suitable tool for the holistic evaluation of sustainability in Brazilian coffee farms. From a "tool" perspective, the experience of this study underlines the need to adapt RISE to local conditions, including different regulatory and book keeping environments. In addition, different farm types and their system boundaries will need to be more clearly defined. RISE provided valuable managerial indications and feed back for the all three domains: ecology, economy and society, thereby proving his flexibility and comprehensive nature.

The farms analyzed depict a decent social situation (except the small farm No. 2) and a good ecological performance. Some problems are noted for the economic indicators. Whereas the consequences of the highly volatile coffee market cannot be disputed, it is interesting to note how RISE forces a "reality check" on farm owners. A market-based opportunity cost to owner's equity is imputed in RISE, in the coffee farm case especially represented by high farm stocks of unsold coffee. To underline the general applicability of RISE, it should be highlighted that similar results were found in Canada for dairy farms (Fischer and Porsche 2003). The high value of Canadian production quota –once properly accounted for– is often driving the cash flow indicator to the "non sustainable" levels

It may appear –based on the results of these 6 farms- that good social and ecological performance may not pay, and that entrepreneurs could therefore conclude that they might save money by paying lower salaries and producing in a less ecological way. Such a conclusion would be very shortsighted, as it would result in a worsening of the ecological and social indicators, and the market -as noted in the introduction- may eventually penalize lower ecological and social performances. This allows to illustrate a further benefit of RISE, as a potential certification tool of holistic sustainability, recognized throughout the supply chain. In essence RISE could become the essential tool to convince market players and all other stake- and shareholders along the food chain that achieving a high overall sustainability performance can translate into tangible competitive advantages and should therefore become an important managerial objective.

Finally, RISE can be relied upon to monitor possible "misbehavior" and "cutting corners", for example by not providing proper salary or insurance, or not observing ecological compensation zones. By helping the "spotting" of such behaviors, and by "quantifying" them, whether voluntary or involuntary, RISE may become an important documentation tool that could be used to protect brand value.

Sustainability is increasingly recognized as an important intangible component of brand value. The results from these six farms indicate that RISE may be used to document, manage and improve it for corporate, societal and consumers benefits.

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References:

Dubois D. 2002. Gedanken zur Forschung für eine nachhaltige Landwirtschaft. Agarforschung 9(5), 188 – 193.

Fischer M., Porsche H. 2003. Development of RISE/C-RISE in Canada. MBA major project report, University of Guelph. Unpublished.

Häni F., Stämpfli A., Keller T., Barth L. 2002. MONA (RISE) – Nachhaltigkeitsanalyse auf Betriebsebene. Agrarforschung 9(5), 194 – 199.

Häni F., Stämpfli A, Keller T. 2003a. ADAMA (RISE): un outil d'annalyse de la durabilité au niveau de l'exploitation. Revue suisse Agric. 35(1), 41 – 47.

Häni F., Stämpfli A, Keller T. 2003b. Sustainability assessment of farms with the model RISE. Agricultura 2, 7 -11.

Häni F., Braga F., Stämpfli A., Keller T., Fischer M., Porsche H., 2003c. RISE, a tool for holistic sustainability assessment at the farm level. IAMA International Food and Agribusiness Management Review. 6(4): 78-90. Online: http://www.ifama.org/conferences/2003Conference/papers/haeni.pdf

Nestlé 2002. The Nestlé Sustainability Review.

Pretty J.N. 1995. Regenerating Agriculture. Earthscan Publications, London.

SAI-Platform 2002. Sustainable Agriculture Initiative, a Food Industry Initiative. SAI-Platform, May 2002.

Syngenta 2003. Annual Report.

VDLUFA 2000 (Verband Deutscher Landwirtschaftlicher Untersuchungs-und Forschungsanstalten). Kongressband, Generalthema „Nachhaltige Landwirtschaft", Teil I. VDLUFA-Schriftenreihe 55/2000.