Social and environmental responsibility of agriculture

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Abstract

Multiple functions of agriculture have to be broadened by new corporate social and environmental responsibilities (CSER) to meet diverse consumer demand. Since CSER includes various aspects, our main goal was to work out a model which can be used to define the positive social and environmental footprint of agricultural products. Life Cycle Assessment and Cost Benefit Analysis have been applied in the research.

Keywords: social and environmental responsibility, agriculture, carbon footprint, fair miles

1. Introduction

Environmental expectations toward agricultural production involve a shift to systems with **low carbon footprint**. The necessity of reducing CO_2 emission can change traditional agricultural procedures to low-energy production, processing and transportation. Organic production has gained constant consumer acknowledgement by trying to minimize harmful effects of food production on the environment even though its health and social benefits are still not fully proved scientifically. Measuring and labeling products which are air freighted from distant, usually tropical and developing countries may serve some consumer and regulatory demand with trying to reduce **food miles**. Avoiding long transportation means less trading opportunity to farmers in the developing countries thus **fair miles** would be more righteous toward poverty stricken areas. Coincidently, agricultural production in these areas requires less energy as produce there are 'grown under the sun' which means less CO_2 emission as well. Food miles are being reduced by **locavore movements** but these also challenge some ethical issues. Taking away poor countries' activities to spare their share from the business is just as unethical as exploiting their recourses. **Fair trade** may empower poor farmers of the developing countries whereas it means high carbon emission production during the transportation. When agricultural products are being transported, beside the product itself a huge amount of **virtual water** is being travelled as well. Virtual water refers to the sum of water embedded and hidden in the final product that has been used during the production at the place where it was produced. As fresh water is one of the most endangered natural resource, agricultural practice should also consider the water demand of production in different areas in the aim of reducing its **water footprint**.
Social responsibility of agriculture in Hungary involves the possibility of job creation and equal opportunities to reach these new jobs in rural areas. For instance, the Gipsy minority in Hungary found its welfare in some agricultural activity. Production of pickling cucumber mainly employs Romas. Another example is that horseradish production in a Hungarian village, Bagamér and its neighborhood depends on the local Roma communities which changes the everyday agricultural practice to an empowerment strategy.

Growing global population and depleting natural resources are urging innovative development in agricultural practice to be able to fulfill the original responsibility of traditional agriculture: efficient food and raw material production. Newly created business models should rely on the poverty at **BOP** (bottom of the pyramid) exploiting the benefits of the **long tail** theory. In this

research all the aspects above should be incorporated into a comprehensive and meaningful model.

2. Method of research

As we wanted to compare the level of environmental and social responsibility taken by various agricultural products, first we needed to find a methodology through which we are able to take every aspect into consideration.

LCA (Life Cycle Assessment) is a method which allows to consider all the benefits and risks in every stage of life of a product. Figure 1. shows the possible life stages of a product. When working with a given product, every stage of its life cycle should be included in the definition of its positive social and environmental footprint.

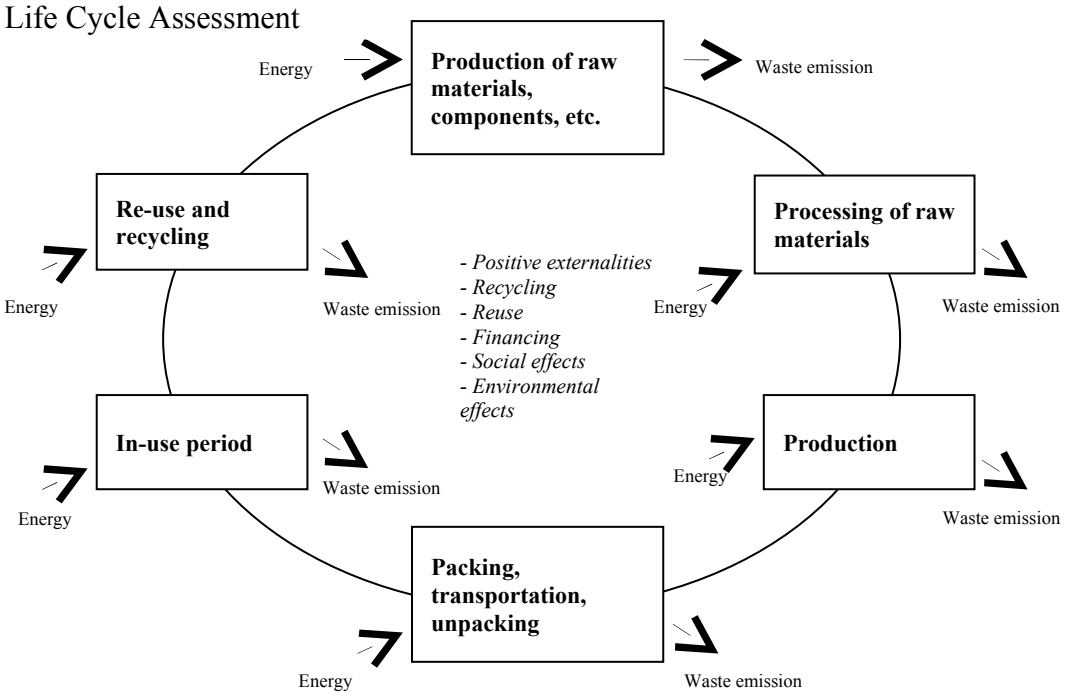

Figure 1. The life cycle assessment

The next step is to determine what aspects of social and environmental responsibility should be studied in the different stages of the product's life cycle. We define 13 such parameters. We would like to emphasize that parameters have been chosen according to our recent secondary research which aimed to collect relevant information about CSER. We are aware that the list is not complete and can be complemented with various new aspects. Nevertheless, the 13 studied parameters are considered to be sufficient to work out the model.

Given the fact that the different aspects of environmental and social responsibilities being studied in this paper can only be measured in different ways or cannot be measured at all, we have worked out a grading system. Quantification consists of five yes/no questions on every parameter studied. The more 'YES' answer we got, the higher (from 1 to 5 point) grade the product got. Questions have been formulated to be able to define a positive footprint. Table 1. shows the parameters and the questions to be answered in each case when defining a product's social and environmental footprint.

	Questions
Food miles	1. Have the product been produced in the region?
	2. Have the product been produced in the country?
	3. Have the product been produced in less than 1.000 km?
	4. The products cannot be produced under continental climate
	5. High labor need
Social benefits	1. Is there any social groups to whom this product means
	2. Does this product help developing countries?
	3. Does this product favor special minorities?
	4. Is it good for local farmers?
	5. No danger of greenwashing
Carbon footprint	1. The production does not include drying and processing?
	2. The produce does not have too much package
	3. Does not induce deforestation
	4. CO_2 emission during production is low
	5. It requires simple technology
Energy footprint	1. No need of glasshouse/heating during production
	2. Low energy need of processing
	3. Low energy need of producing raw material
	4. No or low cooling need during production and transport
	5. Low energy need of transportation
Virtual water	1. No need of irrigation
	2. High water accessibility to water in the place of production
	3. Low water need during processing
	4. Low quantity of water transported
	5. Low water content
Health risks	1. No potential toxins
	2. No pesticide residues
	3. Controlled production system
	4. No storing treatment
	5. Fulfills food safety requirements
Health benefit	1. High essential nutrient content
	2. High amount of vitamin
	3. Special health benefits
	4. No added chemicals
	5. No allergens (lactose, fructose, gluten etc)
Benefits for the poor	1. Induces BOP business models
	2. It has benefits for poor consumers
	3. It has benefits for farmers in developing countries
	4. Produced in a developing country
	5. Involves locally based companies
Spill-over effect	1. Induces the formation of social networks
	2. High innovation need
	3. Symbolizes new business models
	4. Contributes to healthy, modern lifestyle
	5. Cross-border and cross-cultural effects

Accessibility of the product	1. Can be found in shops all the time
	2. Pricing favors middle class
	3. Pricing favors poor consumers
	4. Low additional cost
	5. Special marketing (on farm, pick your own, online
Need of subsidies	1. Low need of state subsidies
	2. Low need of organizational subsidies
	3. Consumers pay surplus to finance business model
	4. No need of international partnership to sustain production
	5. No special subsidies
Waste management	1. Recyclable waste and package
	2. Low package need/unit of product
	3. No package
	4. No dangerous waste
	5. Low waste emission during production of raw material
Equal opportunity	1. Equal job opportunity
	2. Special job opportunity for minorities
	3. Easy to join
	4. Low venture capital
	5. Low cost of marketing

Table 1. Parameters and questions (quantification of parameters)

To be able to try the model, we have chosen three agricultural products to be bought in Hungary.

1. product: locally grown strawberry by pick your own on-farm marketing
2. product: fair trade instant coffee grown in Guatemala
3. product: dried and tinned organic pineapple grown in Sri Lanka

3. Results and discussion

The first group of our results includes all the information collected about new aspects of environmental and social agriculture. We defined 13 parameters that should be considered when the environmental and social risks and benefits of agriculture are being studied.

Food miles

The distance a food product travels from the field to our table has become huge with international trading. According to environmentalists, the higher ‘food miles’ a product has, the more it is responsible for global climate change. Although avoiding transportation does have some potential benefits, producing certain goods in continental climate requires sophisticated technology (greenhouse, heating system, irrigation system, fertilizers etc). Labeling food miles on the product may be disadvantageous to farmers in less developed countries thus the distance from the field to the table should not be the only aspect, miles should be counted fairly.

Locavore movement

'Forget organic, eat local!' is the new logo to an environmentally aware consumer. Locally produced goods are easy to reach even without cars, induce local social networks and require some really innovative business and marketing models. Locavore movement also favors local farmers.

Carbon and ecological footprint

Measuring the ecological footprint is a widely used method to assess environmental effects of human activities. Although a standard method of measuring ecological footprint is still not defined, it is applicable to compare different human activities. Carbon footprint has been established on the same scientific base but considers only the CO_2 (and other equivalent greenhouse gas) emission during production. The first uncertainty about measuring these footprints is whether which point of the product life cycle should be taken into account, e.g. how far we have to go back. If misinterpreted, carbon footprint may mislead consumers. An organic farm producing certain vegetable is producing less CO_2 emission than an intensive agricultural system using fertilizers, pesticides and machines. But if we consider lower yields of organic production, CO_2 emission per one unit of produce can be lower in a modern, industrialized agricultural system. For example roses produced in Kenya do travel a lot by plane but its CO_2 emission has to be compared with the energy-intensive European rose production which utilizes glasshouses with heating. The situation became very complex since whatever result arises from this competition, the benefits of favoring poor Kenyan farmers may outweigh the carbon issue in a global scale.

Virtual water

Water need per person is not more than 2-3 liters per day but the production of our daily food requires 2-3 thousands of liters of water. Since water have become a scarce resource, we may need to be aware the virtual water content of the products we buy. According to the World Water Council, 70 liters of water is need to produce one piece of apple, 140 liters is used to get one cup of coffee and one kilogram of beef means 15 thousand liters of water. When transporting food, we also make water to travel which can have huge effect, especially in arid areas.

Fair Trade

Fair Trade movement was the first initiative when social aspects have become as important as environmental parameters. In fact, it tries to combine these two aspects of corporate responsibility. Fairly traded products mean rightfully paid farmers and fair trading prices which are financed by the consumers who pay a little surplus when buying a Fair Trade coffee or chocolate. Fair Trade also has some important spill-over effects, such as the development of farmer's networks and cooperatives, the improved standard of living and education of developing areas.

Social responsibility

In Hungary, the main goal of a responsible agriculture would be to create fair and equal opportunities for rural areas. Equal job opportunity for Roma people, women and the ageing population may result the re-integration of disadvantaged social groups into our society. Empowering techniques are said to be more sustainable than using state subsidies to maintain

a low-level life standard of those lagging behind. At an international scale, new business models have been created to find a sustainable and fair way to handle poverty. Prahalad's BOP (Bottom of the Pyramid) model suggests to produce frugal goods that suit well to the basic need of poor people. Yunus and its micro-financing system have proved that social activities could make a working business model.

Positive social of environmental footprint

To visualize our results, we use radar charts. The size and even more the shape of the areas show the impact the given product takes to fulfill environmental and social goals. The more the shape begins to look like an outer circle, the more positive the footprint becomes.

In the case of a locally produced strawberry, the chart shows that this type of produce has benefits for the environment and fulfills special social goals at the same time.

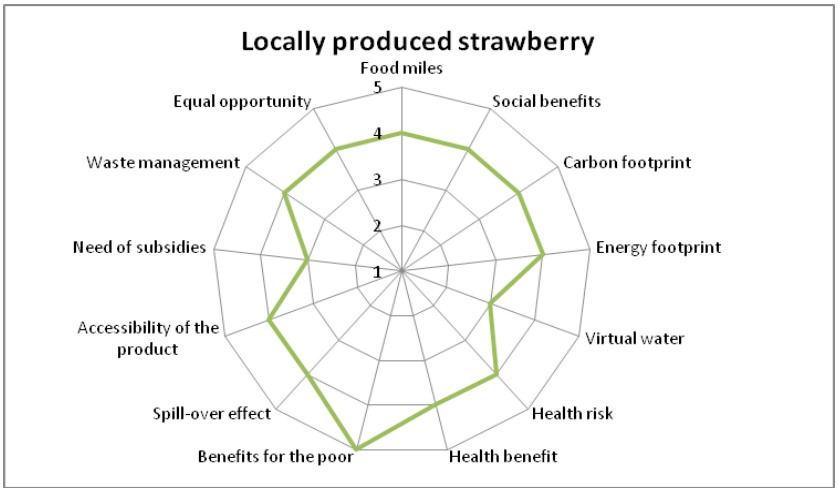

Figure 2. Positive social and environmental footprint of a locally grown strawberry (pick your own)

Fair Trade has realized social equity but environmentally there are certain concerning factors.

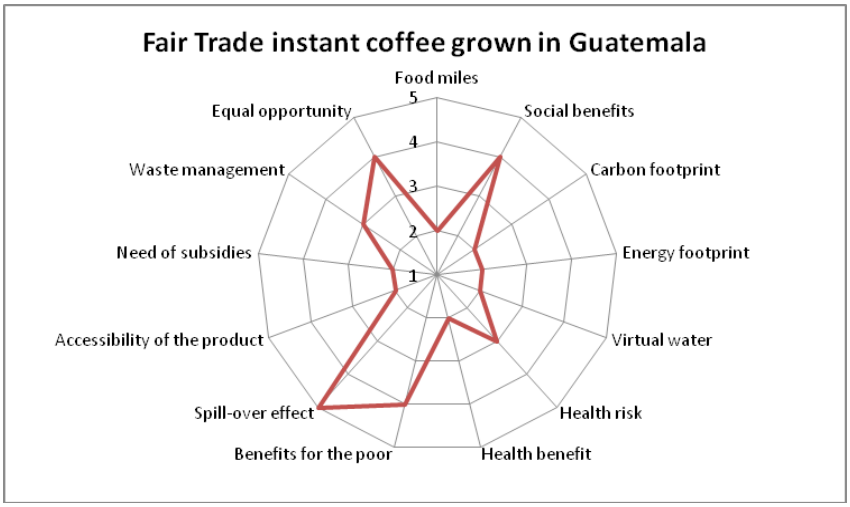

Figure 3. Positive social and environmental footprint of a fair trade instant coffee grown in Guatemala

Organic production systems use the advantageous positive externalities of 'conventional' agriculture and thus may fulfill special environmental goals.

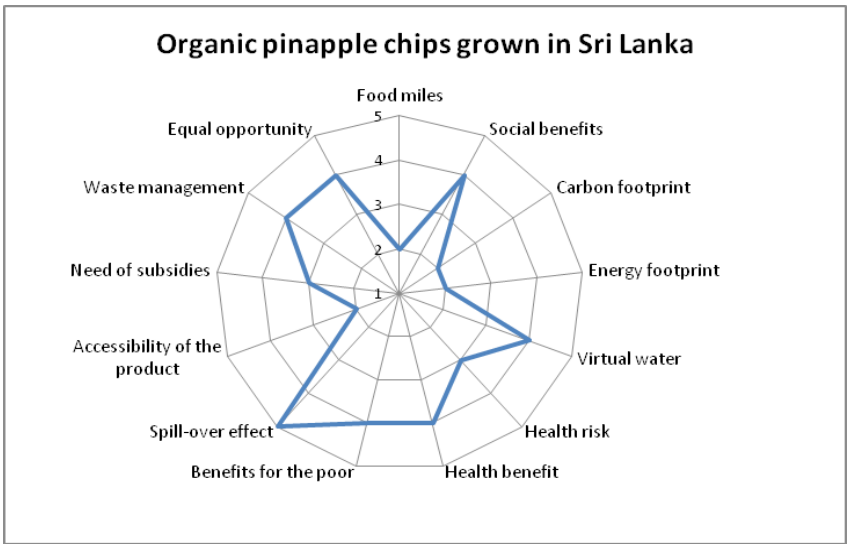

Figure 4. Positive social and environmental footprint of a tinned, dried organic pineapple grown in Sri Lanka

To get an overall view, various economic aspects should also be studied to define the financial, economic, environmental and social sustainability of a produce.

In the future, we would like to continue the research by involving an expert group to able to define an weight system in which certain factors are assessed according to their importance. After having a complex model, we would also like to include a survey among consumers to learn their priorities concerning social and environmental responsibilities of agricultural products.

4. Conclusion

The definition of social and environmental impact of agriculture requires a complex system of goals. This paper shows that the different aspects of social and environmental responsibility can only be handled one at a time but interactions among them also should be considered by applying life cycle assessment and cost benefit analysis. We think that the positive footprint – which emphasizes the benefits – would be a great way to inform aware consumers about products without discriminating important social and/or environmental factors.

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