Social Impacts of Biofuels Production in the Kwa-Zulu Natal and Western Cape Regions of South Africa

Tatenda Talent Chingono and Charles Mbohwa

***Abstract*—a social life cycle assessment is a social impact assessment technique that aims to assess the social and socioeconomic aspects of products and their positive and negative impacts along their lifecycle. The focus is mainly on the impact on workers and communities at large, where production and consumption generally takes place.This work is justified, mainly because there is growing customer/market pressure on the state of the social and economic circumstances of production and services for products like bio-fuel. Issues like corruption, unionization of workforce, policies and laws in the creation of bio-fuels and its by-products are increasingly being recognised as important as they affect production largely.**

***Index Terms*— Biofuels, Social life cycle assessment, South Africa.**

I. Introduction and Background

In general, a social life cycle assessment is a social impact assessment technique that assesses the social and socioeconomic aspects of products and their positive and negative impacts along their lifecycle[1]. The focus is hugely on the impact on workers and communities at large, where production and consumption generally takes place. According to more recent literature, assessment of social impacts of products and services has gained increasing interest in society. Traditionally LCA has focused on environmental impacts, but recently approaches for social life cycle assessment (SLCA) have also been developed. Most of them generally address social performances of business.[1]

The growth of biofuels production and use in South Africa can play a major role in job creation and can help alleviate poverty, improving environmental protection and economic growth. Bio-fuels has the potential to contribute to job creation and skills development in both agricultural and production sectors. It can spur economic development in disadvantaged rural communities, provide energy security, assist to mitigate the shortage and high cost of energy and can contribute to reducing greenhouse gas (GHG) emissions.

According to most referred recent literature, SLCA is still mainly in the process of being developed and resolved to ensure comparability of results [2]. The methodology is more qualitative due to the existence of minimal numerical databases. Interpreting the meaning of data is also a bit problematic and difficult. The process is very expensive, challenging and creates subjective data. System boundaries are also more difficult to define through the entire product life cycle [4], but since social impacts of anthropogenic activities are a critical factor in determining sustainability of production and consumption systems there is hence a great need to explore and assess them according to Reference [1]. This paper examines the production and consumption of bio-fuels in South Africa, in relation or with a view to do an assessment of its life cycle social impacts.

Objectives include, gathering information with regards to social parameters associated with biofuel production and to also assess the impacts of biofuel production on employees and the society throughout the product life cycle of biodiesel

This work is justified mainly by the growing customer/market pressure on the state of the social and economic circumstances of production and services for products like bio-fuel [9]. Issues like corruption, unionization of workforce, policies and laws in the creation of bio-fuels and its by-products are increasingly being recognised as important as they affect production largely [4]. The triple bottom-line of people, planet and profit or prosperity has become the focus of many development projects. As such, the environmental Life Cycle Assessment (E-LCA), Life Cycle Costing (LCC), Social Life Cycle Assessment (S-LCA) and Socioeconomic Life Cycle Assessment (Social-LCA) have become very important aspects in sustainability assessment [3].

This paper will only focus on the Social-LCA, covering and focusing on people's health and safety at work, planetary social costs of pollution prevention, raw material costs, taxes, interest and costs on society externalities impact on human well-being due to the social impacts, planetary biodiversity, human health impacts of pollution and profit /prosperity loss due to for example yields reduction due to pollution.

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II. METHODOLOGY AND SCOPE OF STUDY

The study was conducted in the Kwa-Zulu Natal and Western Cape Province of South Africa and it involved several stakeholders, such as value chain actors, employees, local community members, government, and nongovernmental organization representatives related in the industry. The assessment was mainly carried out using a social criteria developed by adopting the Society of Environmental Toxicology and Chemistry/United Nations Environment Program Code of Practice, supplemented by an expert survey mainly in the form of questionnaires. Stakeholders' perspectives were evaluated by determining the gaps between expected and perceived quality of each social criterion, which are gauged using the seven point Likert scale.

Data was mainly collected through interviews and Questionnaires. In the Kwa-Zulu Natal most of these were producing Bio-ethanol while in the Western Cape most were producing Bio-Diesel. Stakeholder's categories that need data collection were identified and they included the workers, local communities, society, consumers and values actors in the biodiesel development projects. Impact categories were also identified, these included human rights, working conditions, health and safety, cultural heritage, governance and socioeconomic repercussions of biodiesel production. Subcategories were developed, indicators identified, inventory collected and data gathered. Stakeholder categories were assessed at each location, these included NGOs, provincial and local authorities, governments and future generations. The social impact of the current biodiesel production efforts and proposed projects on future generations will be a key indicator on social sustainability.4 inches in width.

This research adopted the weighting criteria provided by Society of Environmental Toxicology and Chemistry (SETAC)/United Nations Environment Programme (UNEP) Code of Practice [14], supplemented by a survey. Experts were selected based on their insights on bio-fuel issues. The panel consists of representatives from academia, social/environmental activists, members of nongovernment organizations (NGOs), and governmental agencies that are relevant to the industry.[15]

It beneficial to apply a weighting system to these criteria based on experts' evaluation [1]. This weighting process was performed using a questionnaire allowing experts to assign direct ranking on every criterion and impact category according to their importance. Ten willing experts participated in this weighting process. An expert was defined as a person who has an understanding of the policy issues on biofuels production. Experts consisted of representation of academia, government agency, NGO, community leaders, and general public.

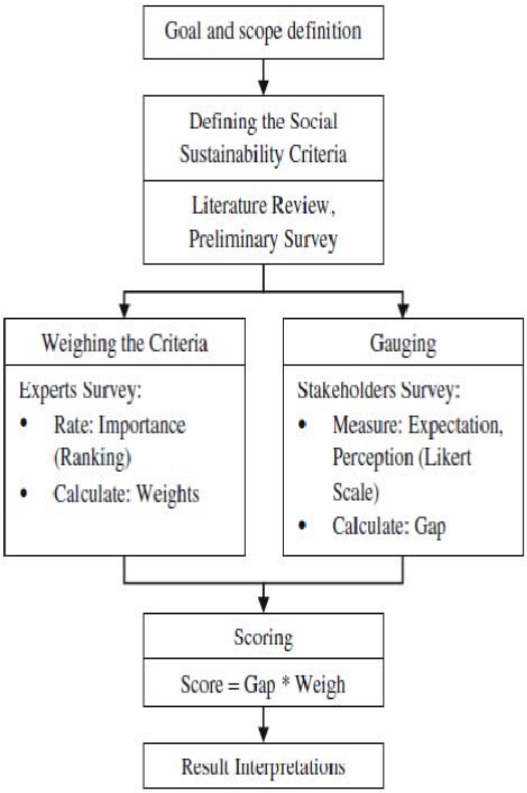

Fig 1. Framework of research methodology, adopted from reference [1]

In the questionnaire participants were asked to rank the criteria from 1 to n, where n is the numbers of impact categories/criteria in that particular section; 1 means very important and n means least important. Later on for the weighting calculation purpose, this ranking was turned backwards, in which the most important is marked as n and the least important as 1. The weights of each impact category or criterion were then calculated using the mathematical operations. The result of this criteria development and weighting is a set of 24 weighted social criteria aggregated into 5 social impact categories: human rights, working conditions, cultural heritage, socio-economic repercussion, and governance

TABLE I

Impact categories	Weight	Criteria	Label	Weight	Overall weight	Relevant stakeholder
Human right	0.274	Free from child labour	A1	0.345	0.06	Workers
		Free from forced employment	A2	0.206	0.075	workers
		Free from Discrimination	A3	0.449	0.76	workers
		sum		1		
Working condition	0.303	Freedom of association and collective bargaining	B1	0.283	0.025	workers
		Fair salary	B2	0.301	0.066	workers
		Decent working conditions	B3	0.205	0.043	workers
		Occupational health and safety	B4	0.221	0.049	workers
		Social benefit	B5	0.13	0.03	workers
		sum		1		
Cultural heritage	0.204	Land aquisation, delocalization and migration	C1	0.137	0.03	Local community
		Respect on cultural heritage and local wisdom	C2	0.157	0.03	Local community
		Respect of customary right of indigenous people	C3	0.2155	0.031	Local community
		Community engagement	C4	0.123	0.037	Local community
		Safe and healthy living condition	C5	0.155	0.029	Local community
		Accesss to marital resources	C6	0.123	0.027	Local community
		Access to non-marital resources	C7	0.081	0,018	Local community
		Transparency on social/environmental issues	C8	0.042	0.01	Local community
		Sum		1		
Socio-economic reparcations	0.178	Contribution to local development	D1	0.234	0.021	society
		Contribution to economic development	D2	0.005	0.017	society
		Food security	D3	0.057	0.02	society
		Horizontal conflict	D4	0.311	0.035	society
		Transfer of technology and knowledge	D5	0.1.11	0.023	society
		Sum		1		
governance	0.041	Public commitments to sustainability	E1	0.284	0.031	Value chain actors
		Fair competition	E2	0.185	0.043	Value chain actors
		Free from corruption	E3	0.366	0.01	Value chain actors

Table 1. Impact categories, criteria, and their weights

III. RESULTS AND DISCUSSION

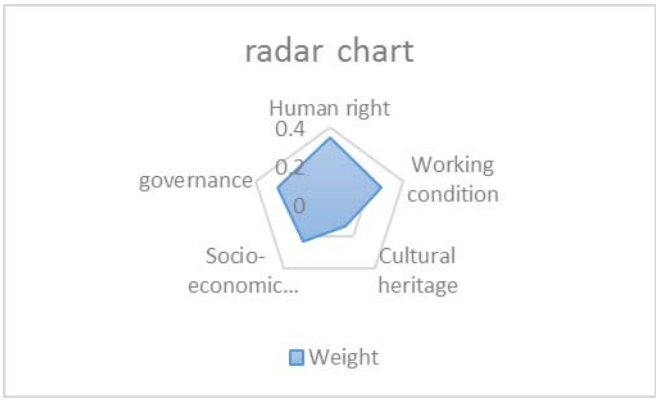

Fig 2. Stakeholders' perspective in a radar chart

Results from the survey of stakeholders' perspectives are represented on a radar chart showing the average gap for each impact category (Fig. 2). It is evident that two impact categories (working condition and cultural heritage) have much wider gaps comparing to the others. The human rights impact category seems to have no gap, while the socio-economic repercussion and governance impact categories show relatively narrow gaps. This result shows that stakeholders' overall perception on the social impacts of the assessed product system is lower than their expectation, not balanced dimensionally.

IV. CONCLUSIONS

Major talking points identified include the social conditions of farm workers, the abuse and exploitation of immigrants, and the need to empower the previously disadvantaged coloured race groups. It is therefore suggested that some laws protecting human rights needs to be looked into and modified, so as to create a better working environment

Exploitative labour relations, alienation, and other negative impacts on the well-being of local communities are the most noticeable social hotspots that might prevent the sustainability of biofuels as shown in fig 2. These social hotspots reveal the fact that the current state of the development in biofuels industry is not socially justifiable. The local community and indigenous people are the most vulnerable and eventually bear these social costs. These scientific findings were also noted by other reports published by activist groups [5], [7].

Outstanding social impacts where identified and government should strive to address as such: Working conditions should be improved by strengthen the regulations regarding the casual daily labourer, such as improvements on wage and benefits, health and safety standards, and rights for collective bargaining. Concerning the negative impacts on the well-being of local communities, it is absolutely necessary for the government to take the measures to fully recognize and protect the rights of local communities who might threatened by the expansion of biofuels industry including land use change other environmental hazards and implications. In order to continue the positive socioeconomic benefits of palm oil industry, it is important to promote further bio-fuels production through smallholders rather than large scale industrial estates, because the development benefits will be larger when communities retain their land and directly involved as growers, compared to when they sell their land to estate companies).It is also absolutely relevant to educate the consumers about the impacts of bio-fuel on sustainability to engage the demand-side pressure. The consumer stakeholder was excluded in this study, further research should be focused on the downstream processes, which should include consumer stakeholders. Additionally, voices of large-scale importers such as the European Union or the USA trade organizations should be incorporated and put as stakeholder in the clustered "value chain actor".

The protection granted to farm workers by the Department of Labour has also been found to be inadequate. The Department of Labour has only 800 labour inspectors for all workplaces in South Africa, compared to 70,000 farms in the country [17]. Working conditions on farms are therefore not fully regulated by law, but by the interests of the landowner. Farm workers have the lowest wages in South Africa varying from as little as R60 to R800 per month. Illegal and some few farm workers mostly from Mozambique and Zimbabwe and other Southern African countries are also subject to extreme abuse and exploitation. These are preferred by the farm owners and they can arrange to have them deported without pay. Violence against illegal workers goes mostly unreported. Rural areas in the former "homeland" areas of South Africa today are characterized by high levels of poverty and HIV/AIDS infection, limited economic and employment opportunities, undeveloped infrastructure and limited services, with marginalized communities economically dependent on income from urban areas and social grants.

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