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AN ASSESSMENT OF THE ECONOMIC SUSTAINABILITY OF *JATROPHA*-BASED BIODIESEL INITIATIVES: IMPLICATIONS FOR LABOUR AND RURAL LIVELIHOODS

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Abstract

Crude oil is the single most utilized resource for energy and global demand is expected to increase 40 – 50 % that of current levels by the years 2025 to 2030. One renewable energy alternative is liquid biofuel, which currently is one of the fastest-growing markets for agricultural products globally. Whilst reducing environmental impact is well appreciated in developed nations, powerful drivers for stimulating the biofuel market in poorer regions of the world are socio-economic in nature. A plant of great contemporary importance is *Jatropha curcas* L. (*Jatropha*) which produces inedible oil seeds with good properties for biodiesel refinement. Promoters of *Jatropha* motivate that the benefits associated with this biodiesel feedstock are a solution to many of the developing world's socio-economic problems as it generates high levels of rural employment, improves national balance of trade and stimulates both agricultural and non-agricultural sectors associated with the *Jatropha*-biodiesel production chain. *Jatropha* needs to be pruned often initially to establish higher yields, it isn't at present harvested mechanically, it requires pesticide application and weeding, and the labour requirement during establishment is high. This labour requirement may contribute greatly to rural employment but at a significant labour cost which may undermine the profitability of growing *Jatropha*. This research aims to assess the economic sustainability of *Jatropha*-based biodiesel production as a suitable driver for rural development and in particular by modelling the maximum potential financial returns for labour.

A spreadsheet based financial model was developed from life-cycle economic analysis of the *Jatropha*-biodiesel production chain to determine if income can support labour wages in southern Africa and India, under local wage legislation, at different yield, production cost and fuel price scenarios. The main assumption of the model was that the biodiesel sales price is proportional to the prevailing petro-diesel price. During the execution of the study it became apparent that the application of the conceptual model is strongest for India however, for comparative reasons, South Africa and Zambia were included. Results suggest that

minimum legal wages in South Africa are too high to support production at the current fuel price. India and Zambia have the potential to generate profits but under specific circumstances; which are a complex function dominated by yield, labour wages, the petroleum-diesel price and the market opportunities for by-products.

Financial capital is among many complex and almost unquantifiable assets to rural livelihoods, many of which compete for labour opportunity. In the 1990's a sustainable livelihoods framework was developed by the UK Department for International Development (DFID). At the core of the framework is the "belief that people require a range of assets to achieve positive livelihood outcomes", categorized into five different capital forms, namely; natural, human, financial, social and physical. The impacts that the biofuel industry can have on rural livelihoods in southern Africa and India can be considerable.

Declaration

I declare that this dissertation is my own unaided work, except where acknowledged. No part of this dissertation has previously been submitted for any degree or examination to any other University.



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