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Biofuels adoption in Nigeria: Attaining a balance in the food, fuel, feed and fibre objectives

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ABSTRACT

The drive towards economic development in Nigeria brings about the pursuit of many competing objectives whose attainments depend on limited resources. Biofuels adoption has been set as an important path, among other options, for pursuing economic growth and development for the country. The Federal Government of Nigeria (FGN) is currently promoting the production, processing and utilization of biofuels in the transport and energy sectors. The article examines biofuels adoption in Nigeria vis-à-vis the attainment of a balance in the food, fuel, feed and fibre objectives. Crops already profiled as preferred sources of feedstock for the primary biofuels production are also crucial for food, feed and fibre. The resources needed for producing these crops are limited, hence the need for a balance. This paper derived data from secondary sources including the Food and Agriculture Organization (FAO). The paper explores some aspects of biofuels sustainability and present recommendations for attaining a balance in the multiple objectives for attaining socioeconomic development.

Contents

1. Introduction

Energy is a critical factor in the pursuits of socioeconomic growth and development objectives of any nation. Energy is required for driving activities in the various sectors of the economy. There is also a linkage between energy supply and consumption, and meeting the food, fuel, feed, and fibre targets which in turn determine the aggregate contribution of agriculture and other sectors to the national gross domestic product (GDP). Various studies have attested to the strong link between energy consumption and socioeconomic development. Kebede et al. [1] posited that there is a direct relationship between energy use and technological development on one hand and economic growth on the other. Yildirim et al. [2] established the link between economic

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growth and energy consumption in the USA. The economic growth and development witnessed in China, India, Austria, Japan, and the United Kingdom have also been reported to lead to increase in energy consumption [3–5].

Karekezi [6] quoting an earlier report indicated that the rationing of electricity in Ethiopia, Kenya, Malawi, Nigeria and Tanzania impacted adversely these economies. The low energy consumption in Sub-Saharan Africa (SSA) accounts largely for why the GDP in these countries are among the lowest in the world [6]. The energy consumption and economic growth linkage re-enforces the need to gear up energy generation and consumption in an economy like Nigeria struggling to take off. Esso's [7] study of seven African countries including Nigeria re-enacted the fact that energy consumption and economic growth are co-integrated. This implies, to ensure the growth of the Nigerian economy is not impeded, concerted effort in policy and investment must be channelled towards ensuring stable energy consumption.

Access to energy at both the urban and rural sector of the Nigerian economy has been a recurring issue. Nigeria still depends on imported refined petroleum products for meeting the local consumption for transport, electricity generation and powering other activities. The decline in the local refining capacity as the nation's refineries age has led to the dependence on import for over 70% of the refined petroleum products consumed in Nigeria [8]. Recent industrial and civil crisis relating to the hike in prices of petroleum products, resulting from the removal of subsidies on imported refined petroleum products is an indicator of how dire the energy situation is in Nigeria [9]. The energy related crisis also is also telling on the nation's revenue profile as the financial burden of subsiding petroleum products increase every year. With the decline in industrial and agricultural production, partly accounted for by the energy shortage, Nigeria now depend largely on import for meeting food, feed, and fibre demands. Like in other countries with food security concern in West Africa, Nigeria import food to meet the shortfall in demand that local production cannot fulfil [10]. The trend in imports has been on the increase, making Nigeria a net importer of food and other products.

The overall impact of unstable supply of imported petroleum products, unstable prices tied to prices of crude oil internationally constitute further constraint on an economy with increasing unemployment, poverty rate, among other socio-economic indicators. The introduction of the biofuel policy in 2007 was set to provide an alternative path through agriculture to solving energy and related socioeconomic problems. Facing the obvious energy challenges, Nigeria, which is endowed with the conventional and renewable energy resources, must harness these resources to meet the fuel requirement for socioeconomic growth and development.

As the Federal Government of Nigeria (FGN) pushes the agenda of growing the economy through biofuels adoption, this paper explores some aspects of biofuels sustainability and how to attain a balance in and securing the supply of food, fuel, feed and fibre. The paper offers interpretations on the link between the objectives and how the advancement of biofuels can help in attaining the needed balance.

The data used in this paper were mainly derived from the Food and Agriculture Organisation (FAO) crop production and food balance sheet database. Data on water footprints for biofuels crops production, water footprint per energy and per litre of biofuel were sourced from Mekonnen and Hoekstra [11]. The paper is based on basic statistical analysis of secondary data on the crop production and land use.

2. Situating the food, feed, fuel and fibre objectives in the Nigerian biofuel policy

The advancement in the biofuel development and adoption in Nigeria is hinged on the directive – Automotive Biomass Programme for Nigeria – and the subsequent Nigerian Biofuel Policy and Incentives [12]. The directive and policy were put in place to promote biofuel utilization through seeding of the market through importation of refined ethanol from Brazil and promoting local production [13,14]. So far, no study exists showing there is a strategy in place to attain a synergy between food, feed, fuel and fibre objectives in Nigeria.

The biofuel policy identify and classified biomass as renewable raw materials from agriculture including trees, crops, plants, fibre, cellulose based materials, industrial wastes and biodegradable municipal solid wastes [12]. A further description of biofuel feedstock in the policy document include cassava, sugarcane, oil palm, jatropha, cellulose based materials and other crops as may be approved by a commission governing biofuel utilization in Nigeria. This broad categorization includes the sources of food, feed, fuel and fibre (for textile). Since the crops classified and being promoted for biofuel production are also used as food, feed or fibre, it is expected that the use of these crops for biofuel does not affect the attainment of other equally important objectives. In this scenario, there is bound to be conflict between food, fuel, fibre and feed, as these compete for the utilization of land, water, labour and other factors of production. Ohimain [15] had pointed out the obvious gap in the Nigerian biofuel policy and incentives of 2007 as it failed to address the potential food versus fuel conflicts. There is also the possibility of feed versus fuel, fibre versus fuel conflicts.

As the biofuels subsector in Nigeria evolves, it is crucial that the omitted goal of attaining a balance in the food, feed, fuel and fibre objective be included in the subsequent review of the Nigerian Biofuel Policy and other legislations that will be put in place to promote biofuel development and utilization. Though the current biofuels policy recognized that some food, feed, and fibre crops are biofuels feedstock, the policy was designed as mainly pursuing biofuels development goal in isolation to other objectives. The reworking of the biofuel policy must extend equally important incentives such as tax relief and import duty waiver; meant for facilitating the production of the crops classified as biomass or feedstock to crops devoted to other objectives.

3. Making biofuels sustainable in Nigeria

The advancements in biofuels adoption are not without fervent debates on the sustainability of fuels sourced from biomass. Amigun et al. [16] appraised the sustainability of biofuels in Africa on the premise of food versus fuel, land use and tenure security, climate change and environment, poverty impact and gender equality. The paper drew a conclusion on the need to adopt along with biofuels development, practices, process and technologies that can improve efficiency, reduce energy and water requirements for biofuels production. Janssen and Rutz [17] assessing biofuels development in Latin America vis-à-vis risks and opportunities concluded that environmental and social aspects are crucial for sustainability.

Specific issues about biofuels sustainability have also been assessed by other authors. Yang et al. [18] examined the land and water requirements for biofuel production in China and concluded that the pursuit of the current biofuel development path for the country will impact significantly food supply, trade and the environment. Owing to the link between fuel, food, feed and fibre, the production of one may influence the price of the other. Zhang et al. [19] identified a potential influence on the short-run prices of agricultural commodity as the global production of ethanol increased.

In summing the arguments on biofuels sustainability, von Braun [20] proposed a conceptual framework bordering on political, economic and environment as essential domains for assessing biofuels.