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PROS AND CONS OF BIO-FUEL INDUSTRY: EVIDENCE FROM PAKISTAN

Mr. Shivam Gupta

Chitkara University, Patiala

ABSTRACT

Pakistan is an agrarian country, and the main agricultural products are cotton, wheat, rice, sugarcane, fruits, and vegetables. Fuels derived from agricultural sources offer an alternate to the rapidly increasing price of petroleum fuels and the increasing scarcity and the toxicity of such fuels. This paper seeks to examine the impact of biofuels industry on the Pakistan economy. The paper further explores the potential advantages and disadvantages which Pakistan as a developing country may have while developing the Biofuels industry in the country. The methodology adopted in this paper is qualitative with the purpose of exploring and analyzing the advantages which a developing country like Pakistan can have while concentrating more on the biofuels and less on the imported fuel. The outcome of the study is an applied and policy research, which can be applied for policy formulation and strategy designing in future.

1. INTRODUCTION

In developing countries, agriculture continues to be an important economic sector as it makes a significant contribution to national incomes and economic. Agriculture plays an important role in the economic transformation of many countries, particularly in Less Developed Countries (Boris et al, 2002). Agriculture provides livelihood support for 60–80% of the population in Pakistan (Hussain, 2006). Agriculture constitutes the largest sector of its economy. According to Siddiqui (2007), Agriculture is main source of livelihood and 66 percent of the country's population depends on it, it accounts for almost 21 percent of the GDP. Agriculture sector has strong linkages with other sectors of the economy. Hence it contributes to growth directly and indirectly by increasing its own production and by providing raw material to industry such as textile and garment in case of Pakistan. Despite falling share of agriculture in GDP, it plays a dominating role in growth process of the country. The main agricultural products of Pakistan are cotton, wheat, rice, sugarcane, fruits, and vegetables, in addition to milk, beef, mutton, and eggs. Pakistan depends on one of the world's largest irrigation systems to support production. There are 2 principal seasons. Cotton, rice, and sugarcane are produced during the kharif season, which lasts from May to November. Wheat is the major Rabi crop, which extends from November to April. The total irrigated area of Pakistan is 18 million hectares. About 4 million hectares is rain fed. Owing to inadequate water availability in winter as storage capacity is too small and at the beginning and end of summer, cropping intensity is exceptionally low (Panhwar, 2004). The Agriculture management model in Pakistan is quite similar to other developing countries.

The Ministry of Food, Agriculture & Livestock (MINFAL) through its provincial departments carries out most of the agricultural extension (Umali and Schwartz, 1994) Small and medium farmers comprise approximately 93% of the farming community in Pakistan with 81% cultivating less than 12.5 acres of land (Government of Pakistan, 1996–7). The recent tendency to reduce the amount of petrol used for energy production has driven the policy of many countries towards the adoption of measures to support alternative mode of fuels. Biofuels are a relatively newly applied alternative fuel (Bekiaris et al, 2007). In the past few years, interest in biofuels has greatly increased and this can be attributed to environmental, economic, and geopolitical factors. Harmful emissions, high crude oil prices, and the growing dependency on foreign oil supplies have provided incentives for pursuing alternative fuel sources such as ethanol and biodiesel (Elobeid & Tokgoz, 2008). Rising global demand for oil and concerns about the costs and consequences of global warming are contributing fresh momentum to viewing agriculture as a way to diversify our sources of energy for a more secure and renewable energy future. Global interest in farm-based energy—in particular liquid fuels derived from crops and agricultural wastes, or biofuels—is gaining momentum around the world. Indeed, in the first five years of the 21st century, worldwide production of ethanol doubled and production of biodiesel quadrupled (Caldwell, 2007). Fuels derived from agricultural sources offer an alternate to the rapidly increasing price, the increasing scarcity and the toxicity of petroleum fuels. The addition of recycled soybean-derived biofuels to the distillation fraction known as middle distillate, or diesel fuel, has been shown to be excellent for ground transportation

vehicles (Mushrush et al, 2000). In general, factors driving the demand for biofuels, besides global warming policies include: rising fuel prices, growing energy demand, awareness of renewable energy resources and possibilities to expand the crop market internationally (Msangi, et al, 2006).

Fuels derived from biomass are considered an alternative renewable energy source, which is claimed to have several advantages in comparison to fossil energy sources. Ethanol is the most visible of the biofuels benefiting from this recent surge in interest. It can be produced from a variety of feed stocks such as cereals, sugarcane, and cellulose material (Elobeid & Tokgoz 2008). Bioethanol still has the greatest significance among all biofuels on a global scale (EU Commission report, 2006). Ethanol is produced by maize, sugarcane and wheat; biodiesel is produced by soybean. Three different scenarios are simulated on a global scale. The results show that when the demand for biofuels is growing very rapidly, holding crop productivity unchanged, world prices for crops increase substantially. According to "The role of biofuels, Benefits and limits" debates (2008), First-generation biofuels currently in commercial use - of which Bioethanol and biodiesel are common examples - are derived from animal fats or parts of food crops such as corn, sugar cane, soybeans and other oil-producing crops. They are often used in cars, military vehicles and even heavy duty generators and power stations. Bioethanol is typically created from sugar cane and corn, and is produced by fermenting, distilling and drying the sugars of stored starches in the plant. It can be blended with petroleum at a simple ratio of 85% ethanol and 15% petroleum, also known as E85. Ratios ranging from E10 (10% ethanol, 90% petroleum) to E95 (95% ethanol, 05% petroleum) are available, and E100 is an option for vehicles such as the Saab Aero X which are capable of running on 100% ethanol. Biodiesel is created from fats, oils or greases during transesterification - a refinery process that separates the biomass' glycerine from its fat or oil and turns the latter into methyl ester (biodiesel) (The role of biofuels, Benefits and limits debated , 2008). This fuel can be used at 100% or as a blend with petroleum diesel. European countries, led by Germany and then France, are at the forefront of biodiesel production, having generated approximately 15 billion liters to date or over 80% of global supply (The role of biofuels, Benefits and limits debated, 2008). First generation crops are already creating real value for rural economies in the developing world by producing crops which can be used for biofuels (Europa Bio-Fact Sheet, Biofuels and developing countries, 2008).

Energy crops often represent a diversification for 'cash crops' for subsistence farmers. The UN's Report on Sustainable bioenergy cites the benefits especially of second generation fuels which the UN believes will "create higher-value co-products (and thus greater wealth generation)".Second-generation biofuels, sometimes referred to as cellulosic ethanol, is still in the early stages of development. Instead of relying solely on crops that have traditionally been used for food and thus creating land-use competition between humans and vehicles, the second generation is not restricted to this narrow range of source materials and can be produced by converting agricultural, forestry, human and plant waste, as well as using crops that can be grown on degraded lands lacking the necessary nutrients to support food. Although some of the existing agricultural products that can be converted to biofuel are currently used as animal fodder or grown on potentially viable land, second generation growth is not limited in this way. In converting waste from already established processes, the entire biomass is turned into a gas and then liquid fuel, in a process known as 'biomass to liquid'. Waste gases, like methane, can be converted in a similar way. However, a scientific breakthrough is needed as the process currently consumes more energy than it produces (Biofuels and developing countries, 2008).

2. DISCUSSION

2.1. Advantages of Biofuels

Environmental Perspective The development of biofuels holds great promise for developing countries where the majority of the population often lives in rural areas and subsidies on agriculture. Global warming, as it stands today, could be considered more of a danger than biofuels to the biodiversity in these areas (Biofuels and developing countries, 2008). There are two main environmental benefits of using biofuels in place of fossil fuels. First, because they are renewable, biofuels offer the potential for long-term, relatively cheap, secure energy supplies. Second, many biofuels contribute significantly less to greenhouse gas emissions in their production and use than oil or natural gas. It was considered that the biofuels option, if well assessed, planned and sequenced, could offer win-win-win opportunities to developing countries – in terms of climate change benefits, rural development, and decent work and energy diversification – while leading to a less carbon-intensive economy (UNCTAD, 2007). Biofuels can also be used for controlling the soil erosion in the fertile plans of Pakistan. Hoogwijk, (2003) argues that biomass influences the humus content of the soil and reduces erosion, thus increased biomass production can improve soil quality of agricultural land. Another problem in which biofuels can be used is the migration from rural areas of Pakistan to the cities; the only way to stop flight to the cities is to create a successful rural economy. As rural jobs increase, the poor will be less likely to

migrate from rural to urban areas – urban areas in less developed countries have long been synonymous with urban poverty, lowered life expectancy and increased health risks (Biofuels and developing countries, 2008).

Pakistan is currently facing the Power (Energy) crisis and if Pakistan develops the biofuels industry, it can overcome that crisis in more effective way. According to World Bank, (2005), Transforming agricultural waste and manure into biogas will; improve the living standard of poor rural people by providing energy for cooking and lighting, increase jobs and substitute the time spent collecting fire wood with economic activities and decrease the release of greenhouse gases, mainly in rural areas and this all can be applied to the rural areas of Pakistan also. The UN reported that "As biofuels absorb crop surpluses in developing countries, commodity prices will rise, increasing income for farmers in poor countries". This will lead to more economically sustainable agriculture and prices in most developing countries, encouraging local production and allowing farmers to live from production (Sustainable bioenergy, 2007). According to the Europa Bio-Fact Sheet (2008), "Non food crops for biofuels can contribute to diversifying farmers' production with 'cash-crops' and provide them with an income, even on a very small scale, in a similar way that crops grown for fibers have done in the past". Another advantage that Pakistan can have while developing the Biofuels industry is that it will create lot of jobs and unemployment which is a major problem for Pakistan can be controlled to some extent. According to Europa Bio-Fact Sheet (2008), the development of biofuels will bring direct opportunities to developing countries because their production will create many local jobs in the value chain - from growing raw materials to their manufacture. Furthermore, the local production of biofuels in developing countries will help to decrease the dependency on costly fossil fuel imports. According to Kartha, (2006) Producing more biomass could contribute to improved environment by cultivating barren land, by protecting watersheds and by creating new habitats. As Pakistan is developing economy and there are no define rules for the dumping, biofuels can be used to control the dumping. According to Europa BioFact Sheet (2008), "As production surpluses are reduced in OECD countries there will be less 'dumping' of cheap agricultural commodities in developing countries". The UN report describe it as "As biofuels absorb crop surpluses in developing countries, commodity prices will rise, increasing income for farmers in poor countries". This will lead to more economically sustainable agriculture and prices in most developing countries, encouraging local production and allowing farmers to live from production (Europa Bio Fact Sheet, 2008).

2.2. Disadvantages of Biofuels – Cost Perspective

Beside the advantages of biofuels, there are some disadvantages also in developing the biofuels industry. Pakistan is a free economy and prices of commodities are set by the demand and supply factors. Government plays very little role in setting the prices of all the products in general and agriculture products in particular A major criticism often leveled against biomass, particularly against large-scale fuel production, is that it could divert agricultural production away from food crops, especially in developing countries and current high prices of agriculture products can be make the daily used commodities of Agriculture out of reach of poor people by the introduction of biofuels. Due to use of Agriculture products as biofuels, the demand will become high and supply will remain the same, this will increase the price of the commodities. There is the inevitable tension therefore that whilst using them for biofuels may have environmental benefits; there are social and economic consequences. In the short term the main consequence is likely to be higher food prices; but in the longer term there is the possibility that using them as fuels may contribute to food shortages (Biofuels and developing countries, 2008). Pakistan is a developing economy and the financial conditions of Pakistan are not so sound. To develop a biofuels industry; it need a huge sum of money.

Bekiaris et al, (2007) argues that the major disadvantage of biofuels blends (always in comparison to petrol and diesel) is their high production cost that results in higher prices at the pump. Biofuels are mostly produced from agricultural products and the cost of production rises significantly for that reason. This has kept a fair amount of stakeholders from getting involved with the production of biofuels. In developing economy of Pakistan where the total forest area is 4.2 million hectares, which makes about 4.8 percent of total land area of its total land (Hassan, 2008). Deforestation in the Pakistan is a long standing problem. Forest cover was 5% in 1996 compared to 20-25% in 1850 (Sungi, 1996) and they have gradually decreased. The developing of biofuels industry in Pakistan will also foster the speed of deforestation in the country. Population in Pakistan is increasing very fast and the forest and agriculture land is getting lesser and lesser. Pollution is also increasing with decrease in forest and other green resources and due to rapid increase in population. Developing of biofuels industry in the country will also increase the pollution.

There are few general conclusions to be drawn about bioenergy and its effect on the environment (Kartha, 2006). Crutzen et al (2008) show that emissions of nitrous oxide, which is a byproduct in the production of biofuels from oilseeds or corn, can completely wipe out the potential cooling brought about by the utilization of the biofuels instead of fuel from fossil sources. Kartha (2006) argues that producing more biomass could also contribute to a poorer environment by exhausting the soil from nutrients, worsening erosion, drawing on the water resources, and pushing habitats aside with deteriorating biodiversity as a consequence. There is a serious danger that biofuels are being produced at the cost of rainforests, which not only absorb carbon dioxide from the atmosphere but are also home to a unique range of biodiversity (Biofuels and developing countries, 2008).

3. SUMMARY & CONCLUSION

Overall analysis shows that Biofuels provide an opportunity for the developing countries like Pakistan to decrease their import of oil but at the same time it is a threat as well as they can create food shortages in the country. The government needs to take this matter into consideration as it a “bold challenges” and it requires “bold leadership” to manage it. If this industry is handled correctly, it can save lot of country reserves. The government should take serious actions like providing the farmers and industrialist with low interest loans for developing the biofuels industry near to the demand place as it will decrease the transportation cost and will provide them with the technical support from Brazil and EU countries etc., where biofuels industry is well developed. Developing the biofuel industry will diversify our domestic energy production and will provide low cost fuel which will be better for the environment, creating jobs, stop migration from rural areas to cities, increase the investment in the country as new investors from all over the world will invest in the project, and will bring ‘‘energy security”. This means that a nation's dependence on oil is reduced, and substituted with use of locally available sources, such as coal, gas, or renewable sources.

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