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Climate Change and Vicious Circle of Economic Dependency and Food Crisis in Poor Countries

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Abstract – **As a chronic ongoing issue, climate change negative impacts on crop production beside lack of socio-economic stability threaten food security in poor countries, especially in Africa. In place of a temporary and immediate solution these countries generally rely on foreign crop producers to meet their growing internal consumption. Scoreless repeating of this strategy increases dependency of these countries in long term which may have some unconsidered negative aspects. In this paper this issue is explored by reviewing the statistics of crop production and imports beside economic indices of several poor countries. The results show how extensive crop importing strategy, in the absence of firm comprehensive economic policies, may degrade long term food security in countries with low Gross National Income (GNI).**

Keywords – **Climate Change, Crop Production, Dependency, Food Security, Gross National Income (GNI).**

INTRODUCTION

The World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life"[1], [2]. However the terms are clear, there is an ongoing academic effort to expand the practice of vulnerability assessment for food security purposes by addressing more touchable economic and financial indices. In most cases the goal is to identify risk sources threatening adequate access to sufficient food especially in less developed regions. There are notable researches which focus on the vulnerability resources, Dilley and Boudreau (2001) analyzed food security risks in Tanzania via the concept of vulnerability [3]. In another case, Ianchovichina et al (2014) estimate how price Shocks can make food security vulnerable in specific regions [4]. In addition to the absolutely economic analysis, by the growing awareness to global warming, the food security is going to be an inseparable topic of climate change literature. Wheeler and von Braun (2013) provided a detailed argue that demonstrates how climate change could potentially interrupt progress toward a world without hunger [5]. Severe droughts and longer high temperature season in arid and semi-arid regions have reduced agriculture productivity; therefore in many cases, governments have no choice but to cover a large proportion of their internal consumption by overseas producers. Although this policy is partially effective in short term, but the long term effects must be investigated too. In this paper agriculture and economic statistics of some poor and relatively poor countries are explored to show how this policy may involve some controversial aspects.

II. CLIMATE CHANGE IMPACTS ON FOOD SECURITY

The mechanism of the climate change impact over food security is rather more complex than it seems in the first glance. The first round of impacts could be mentioned as the direct effects of less rainfall and higher temperature on the agricultural products. There is strong evidence of climate impacts on specific cereal grain due to the effects of daily pattern of temperature on the plant's lifecycle. Peng et al (2004) analyzed weather data to examine the relationship between rice yield and temperature which concluded as rice yields drop with higher night temperature resulted from global climate change [6]. In this regard, results of research by Olesen et al (2011) over the 2000-2010 decade in Europe indicate that different patterns of temperature and precipitation had increased crop production in northern Europe despite a considerable decline in the southern and eastern Europe [7]. And thanks to the newly developed models that link yields of the commodity to weather, we know that maize and wheat production declined between 1980 and 2008, relative to the absence of climate change factors [8].

Moreover, reduction in crop production in local scale can lead to lower income amongst workers in agriculture sector and higher rate of unemployment. In a less developed country where industrial and tertiary services sectors are not main sources of national wealth, any reduction of incomes in agriculture sector will affect the whole economic system and shows its impact very rapidly in indices such as GDP and GNI (Gross Domestic Product and Gross National Income). This procedure can threaten food security as we know there is a strong relation between economic indices (especially GNI) and poverty [9].

Furthermore, the phenomenon of interaction between economy (in both regional and global scale) and Climate change is prone to show some sort of Self-Resonator behavior. There is an undeniable relation between economy and climate change when we consider the results indicating CO2 emissions increased sharply after the 2008–2009 global financial crisis [10]. Any Interruption in the agriculture production that can be caused by climate change is a potential risk which affects financial markets and then the financial crisis is known as a significant factor which results higher amounts of CO2 emissions; a self-exacerbate cycle that it seems to be severely unbreakable.

Lastly, another mechanism of climate change impacts on the food security, which is discussed more comprehensively in this paper, addresses the more dependency of low income countries to the international market. However in the absence of strong agriculture

infrastructures the nation's options are restricted to foreign producers (particularly during crisis and disasters), the pros and cons of this issue must be investigated.

III. Economic Dependency and Food Security

Although researchers such as Dupraz and Postolle (2013) outline that the effect of imports on the food sovereignty policies is marginal, but the many others believe that the food security cannot rely on dependency on food imports [11]. According to the findings by López (2012), there is an unquestioning connection between lack of self-sufficiency in agriculture and food crisis in Africa [12].

Though Dupraz and Postolle (2013) state that in an internationalized market, smallholder agriculture (in Africa) can survive under Economic Partnership Agreements, but this interpretation is coming from the historical economic analysis. The main problem here is when the climate change matter is considered, the historical data and experienced patterns are subjected to a fundamental review. A small and low-productivity agriculture system can keep its competency under economic agreements only if it receives enough water and suitable temperature; and exactly at this point, this is the global warming that may change the game rules. Besides, we also must consider the fact that in most cases, small agriculture holders are small and restricted because of the unfitting climate which is prone to become even worse while the international cartels and huge producers use the appropriate climate in the other parts of planet to produce high commodity in large scales. In the other words countries with high levels of poverty will lose their incoming resources gradually and should import their required foods at same time. Even if the huge producers can reduce their prices, heavily indebted poor countries import commodity hardly because of the low national production and wealth indices. These reasons explain why there is growing demand for humanitarian assistance for food in Africa [13].

According to the argue mentioned in the previous paragraph, countries with low national production and wealth indices are potentially vulnerable to the current view that encourages them to recover the lack of local production by expansive import. This argues can be explored in sample countries by analyzing the statistics released by FAO (Food and Agriculture Organization of United Nation) and the World Bank. Fig.1 illustrated the worldwide wheat production for 1993-2013. According to the graph, provided by the Food and Agriculture Organization of the United Nations (FAO), there is a considerable increase in the global wheat production (about 26%). On the other hand the world population has experienced a more rapid rise from 5.57 Billion in 1993 to 7.16 Billion in 2013 which means 28% increase. The results may be interpreted as worse accessibility to wheat around the world; however it not enough to determine that is there a real drop in global food security indices especially when we only focus in a particular grain. In order to answer this question, some economic indices must be considered beside the particular statistics of more vulnerable regions.

Fig.2 illustrates the Top 10 countries with highest prices for wheat [14]. Out of these 10 countries, five ones could be considered as vulnerable regions where socio-political tensions have affected the economy sizably. A notable comparison can be seen between Japan as the most expensive wheat consumer and Rwanda, the fifth country in the ranking. While the GNI reaches more than 46300 US$ in Japan, this index is 610 US$ in Rwanda in which 63% of people earns less than 1.25 per day. In Kenya, the country where the price of wheat reaches to 3.66 US$ per Kilogram, 43 percent of people live under Poverty line ($1.25 per day). With a Gross national income (GNI) of 1080 US$, local price of fiber crops has been doubled since 2010 (Fig.3). It means access to local productions is now more costly in this relatively poor country. With about 20% of under poverty line population and 1580 US$ GNI, Sudan is in a relatively better condition In comparison to Kenya. But fiber crops price has been experienced 150% increase after 2009 which could be related to the civil war and the economic disaster after Darfur conflict, similarly to Yemen where the civil war cast its shadow over the economy. The figures outline that not only access to food in poor countries is very expensive, but also this situation can be exacerbate by negative aspects of socio-political conflicts that these countries are prone to. In addition, fiber crops costs in poor countries is experiencing an upward trend totally which means any replacement for wheat doesn't guaranty lower prices for consumers.

In addition to the high price of crops in poor countries, the connection between crop production and economic indices must be considered. According to research findings by Ong'anya et al (2012), agricultural is the backbone of Kenyan economy and there is an obvious correlation between crop production and economic indices in this country [15]. Achieving to the long term development goals such as vision 2030 is not possible unless more employment is being created in agriculture sector. As a traditional strategy, when the regional prices of goods and commodities increase in a short interval, governments try to keep their control over market via expansive import. As a negative aspect, not only does this strategy eliminate many job positions (that means lower national income) but also shifts local prices to international values. Although it is not clear that in what extent this strategy reduces job opportunities, but its negative impact is undeniable in most relevant economic theories. However it is very important to consider the fact that there is growing difficulties in labor market of low income countries; for instance, unemployment Rate in Kenya increased to 40 percent in 2011 from 12.70 percent in 2006 [16]. Moreover, according to Muyanga and Jayne, T. S. (2014), in Kenya, rural household income per adult declines as population density rises between 1997 and 2010 [17].

Fig.4 shows how wheat import into in Kenya has climbed after the sudden rise of local production costs in

2010; the local price doubled and the import also increased at the same order which means Kenya and similar countries are now more dependent on the international market. In the other words, people in the lower developed country should purchase food in its international price and it is clear that the international market sets its own prices by global average of purchase power, not the low Gross National Income (GNI) of these countries.

In the other hand, however there is an evident link between local crop prices and socio-economic crisis, there are also several research works emphasize connections between climate change and theses conflicts. Theisen (2012) believes that Climatic difficulties rouse the higher risk of conflicts and violent events in Kenya between 1989 and 2004 [18]. As another comprehensive study, Ide et al (2014) describes distribution pattern of violent conflict across Kenya and Uganda and its relation to climate change during 1998-2008 [19]. The indirect effect of climate change on the crop prices through socio-economic tensions in poor regions becomes more important when the absence of legislation and governmental control in these regions increases the risk of conflicts and at the opposite side, the advanced economies as the main crop producers take advantage of social stability.

IV. Conclusion

In conclusion, it can be inferred that people in low income countries still purchase crop production in significantly high prices. In addition, although the world crop production has increased since 1990's decade, but the world population rate overcomes this growth which means more difficulties for poor nations. local crop production prices in low income countries is vulnerable because of potential socio-political and military conflicts therefore poor nations become more dependent to international crop market. Less local production will affect Gross National Income; therefore, Climate change as a global phenomenon may put a higher pressure on the fragile economy of these poor nations while they try to overcome these difficulties by more imports, an exacerbating strategy which accelerates this vicious circle.

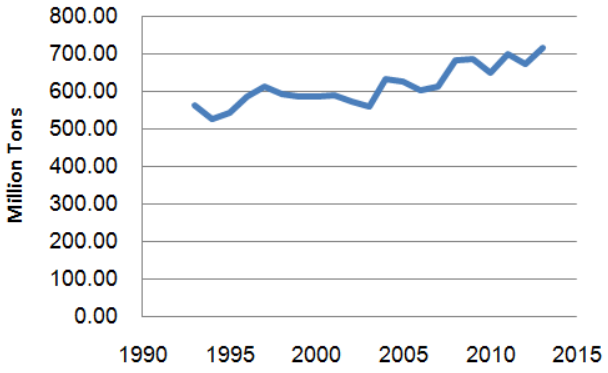

Fig.1. Global wheat production between 1993 and 2013 (Million Tons)

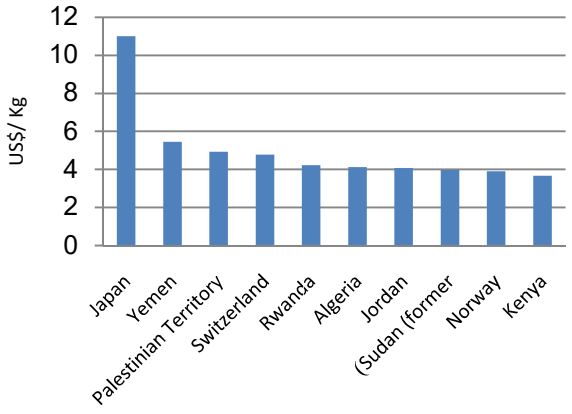

Fig.2. Top 10 countries with highest prices for wheat according to the FAO data sets.

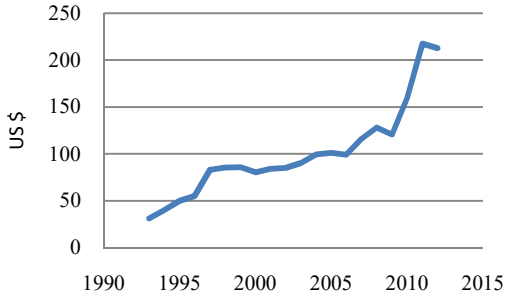

Fig.3. Average local crop price (1 Ton) in Kenya according to the FAO data sets.

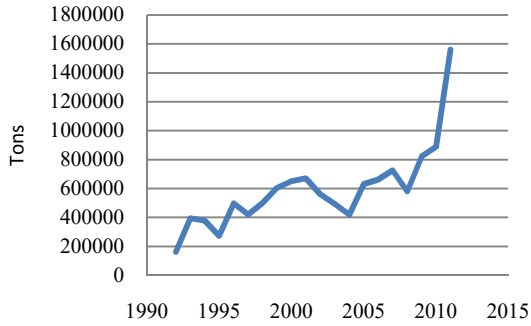

Fig.4. Imported wheat into in Kenya according to the FAO data sets.

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