

Title: Climate change as a business risk to the Kenya Manufacturing sector

Eng. Kimeu J. Mbutu

PhD student

Institute of Climate Change & Adaptation

University of Nairobi

Abstract

Failure to climate change adaptation measures has been ranked as the highest risk in terms of impact and number three in terms of likelihood in the global risk report 2016, this puts risks associated to climate change on top of the world economic forum risk matrix. The purpose of this paper is to assess climate change vulnerability to the Kenya manufacturing sector and identify whether climate change poses a business risk to the sector. There is a wide literature on climate change especially about the impacts of climate change and climate variability. However, there is no clear integrative theory on the impacts of climate change and the risk it poses to the manufacturing sector. Based on systematic literature review, vulnerability of Kenya manufacturing sector to climate change and climate variability is assessed and business risks posed by the same identified. The paper also attempts to put in perspective the likely impacts of such risks to the sector if they are not proactively managed.

1.0: Introduction and background

The manufacturing sector in Kenya constitutes 70 per cent of the industrial sector contribution to GDP, with building, construction, mining and quarrying cumulatively contributing the remaining 30 per cent, with the sector contribution to total wage employment being 12.9 per cent in 2012 (KIPPRA, 2013). The Second MTP points out that formal employment within the manufacturing sector over the First MTP grew by 5 per cent from 264,800 in 2008 to 277,900 employees in 2012 while informal employment grew by 17 per cent from 1.57 million in 2007 to 1.83 million workers in 2011. Further, the informal sector created more additional jobs than formal sector with private sector contributing the largest share of employment in manufacturing (GOK, 2013). Lavopa and Szirmai (2012), suggest that manufacturing has much stronger links and much larger employment multipliers in an economy; for every job created in manufacturing, their evidence points to two or three outside. Therefore the sector makes a significant contribution to Kenya's economy. Despite the importance and size of this sector in Kenya, it is still very small compared to the contribution of the same sector in the industrialised countries (UNIDO, 2012). KIPPRA, (2013), Kenya economic report shows fluctuations in quarterly growth patterns which has been attributed to weather changes and agricultural seasonality, since the sector is heavily reliant on agro-based processing. Successive decline in growth rates during the second and third quarters of 2009 was attributed to prolonged drought, which resulted in decline in the food and beverages sub-sector production (KIPPRA, 2013). This demonstrates the vulnerability of Kenya manufacturing sector to climate change.

Kenya is a resource poor country with rapid population growth and, in terms of employment, a large agricultural sector. With limited access to fertile land, the agricultural sector may not be able to deliver sustained growth in per capita income in the future. As land is not an important factor for manufacturing production, this is much less of a constraint for manufacturing growth. Unless there is a high rate of growth in the formal manufacturing sector generating job opportunities for the rapidly growing Kenyan labour force, Kenya risks remaining a low-skill, low-capital economy with low incomes and increasing distributional tensions (Bigsten et al., 2010). This situation may be worsened by climate change effects which affect various spheres of the manufacturing sector.

As quoted in the UNDP climate risks, vulnerability and governance in Kenya report of 2012, Expansion of the industrial and service sectors forms a significant part of Kenya's economic development strategy. As stated in Vision 2030, Kenya aims to become a rapidly industrializing middle-income country by 2030 (GOK, 2007). Strategies to achieve this goal include promoting investment in key agro-processing industries, becoming a provider of basic manufactured goods for Eastern and Central Africa, supporting local industries that use local raw materials, and adding value to imports that can then be re-exported (GOK, 2007). The primary goal of the First Medium Term Plan was to increase growth in manufacturing, wholesale and trade from 5 per cent to 10 or 12 per cent by 2012. This goal was to be achieved by expanding Mombasa and Kisumu's manufacturing sectors, establishing at least five small- and medium-enterprise industrial parks and specialized economic zones (GOK, 2008), and creating at least 10 wholesale hubs and 1,000 to 1,500 producer business groups (GOK, 2007). However, this goal was not achieved due to a number of factors some of which can be associated to climate change.

To achieve Kenya's goals related to the industrial, service, and transportation and communications sectors, exposure to climate risks will need to be managed. Historically, these sectors have been adversely affected by extreme weather events like the rains and ensuing floods of 1997–1998 (UNDP, 2012).

2.0: Classification of Manufacturing Firms in Kenya

There are several conventions on how to determine company sizes, which can vary by continent, country, industry and even institutions. Some definitions are multi-parameter, thus by industry, turnover, profit, value of assets, market share, number of employees or in mixed definition (Chindia, 2013). Weston and Copeland (1998), point out that, definition of size of enterprise is not universal. In their view, this is because enterprises may be conceived of in varying terms. In the United States of America, a business is considered to be large if it has at least one thousand (1,000) employees. The European Union classifies a firm with over fifty million pounds turnover as large. Canada and Japan consider a large firm as employing at least 500 and 300 people respectively. India defines the size of its industry by the level of investment where a large company has an investment in equipment of equal to or more than two million US dollars. South Africa and Ghana define their large manufacturers as having at least 200 and 100 employees respectively (Abor and Quartey, 2010).

The structure of Kenya's manufacturing sector comprises of micro, small, medium and large industries classified mainly by employment levels and capital investment. The medium and large industries constitute less than 5 per cent of the total number of enterprises but contribute over 60 per cent to the manufacturing

sector GDP contribution. Similarly, the micro and small enterprises constitute about 95 per cent of total industries but contribute only about 20 per cent to the manufacturing sector GDP contribution (GOK, 2013).

The manufacturing industry can be classified into two broad categories; agro-based and non-agro-based (K'Obonyo, 1999). Kenya's manufacturing sector is largely agro-processing (KIPPRA, 2013).

2.1: Kenya Agro-processing Sector

According to FAO (1997), Agro-processing industry is a subset of manufacturing that processes raw materials and intermediate products derived from the agricultural sector. Agro-processing can therefore be defined as transforming products that originate from agriculture, forestry and fisheries. The Standard Industrial Classification also categorises the following eleven divisions under the agro-processing industry: food, beverages, paper and paper products, wood and wood products, textiles, wearing apparel, furniture, tobacco, rubber products, footwear and leather and leather products (Republic of South Africa, 2012). Agro-processing industry has also been defined as comprising all the post-harvest activities that are involved in the transformation, preservation and preparation of agricultural production for intermediary or final consumption of food and non-food products (Wilkinson and Rocha, 2009)

There are no studies known to the author that have carried out a detailed evaluation of the contribution of agro-processing industries to the GDP in Kenya, however, studies in other countries exist. According to the Republic of South Africa, 2012, in the economic profile of the agro-processing industry in South Africa (1970-2010), most of the economic indicators show that the agro-processing industry makes a significant contribution to the manufacturing sector. The report points out that on average the agro-processing industry contribution to the output and value addition of the manufacturing sector was 29.3% and 29.1% respectively during 2006-2010. Its contribution to domestic fixed investment and export was also 28.5% and 13.6% respectively, during the same period. The employment trend also shows that the agro-processing industry is still the largest employer in manufacturing sector, 40% of the total manufacturing employment during 2006-2010 in Republic of South Africa. The report further points out that, the industry contributed 37% and 57% of formal and informal employment respectively of the total employment share in the manufacturing sector during the same period. IPAP, 2011, quoted in the Republic of South Africa, 2012, in the economic profile of the agro-processing industry in South Africa (1970-2010) points out that six of the top ten manufacturing industries with higher growth multipliers are the divisions of the agro-processing industry. This is a clear indication of how agro-processing industry is significant to any economy and therefore if not properly safeguarded from impacts of climate change can derail economic development plans of the country.

The transformation of agricultural raw materials, particularly of coffee and tea, remains the principal industrial activity. Meat and fruit canning, wheat flour and cornmeal milling, and sugar refining are also significant. Most industrial activity takes place in Nairobi and Mombasa (World Bank, 2011). All this principal industrial activities in Kenya are highly vulnerable to climate variability and climate change.

2.2: Kenya Manufacturing Sector Climate Change Vulnerability

According to the world economic forum 2016 report, failure to climate change adaptation measures has been ranked as the highest risk in terms of impact and number three in terms of likelihood, this puts risks associated to climate change on top of the world economic forum risk matrix. The vulnerability of Kenya to climate change is explained by the dominance of environmental and natural resource sectors in the national economy, and low adaptive capacity (Kenya Economic Report, 2013). The report further points out that, in Kenya agriculture is mainly rain fed and changes in precipitation have great impact on production. In some parts of the country, changes in rainfall patterns are responsible for a shift in planting season and reduction of livestock feed, while higher temperatures are responsible for crop and livestock diseases and pests presence in areas their prevalence was not known (Kenya Economic Report, 2013). This significantly affects agro-processing industries because their main raw materials come from agricultural products. Further, the country has experienced shorter famine cycles reducing from 20 years (1964-1984) to 12 years (1984-1996), to 2 years (2004-2006) and to yearly (2007/2008/2009) (Government of Kenya, 2012). These drought events have been noted to increase in severity.

The floods associated with the 1997 - 1998 El Niño and the drought associated with the 1998 - 2000 La Niña, show a cost to Kenya of 11% and 16% of GDP, respectively (Mogaka et al., 2006). Floods and droughts are estimated to cost Kenya about 2.4% of GDP annually at mid-century, and water resources degradation a further 0.5% (Mogaka et al., 2006). The experience of Peru during this same El Niño event provides an indication of the benefit of good preparation (Glantz 2001; Mogaka et al., 2006). The government took the six months of advance warning to construct levees, acquire pumps, plant rice and other water-tolerant crops, and strengthen bridges. Not all these preparations were successful, and the floods still affected the economy. Nevertheless, the impacts were less than would have been the case with no preparation (Mogaka et al., 2006).

2.3: Impacts of Climate Change to Manufacturing Sector

Estimating climate change economic impacts is a difficult task, because of the complexity of the interface between climate change, society and the world economy. Kuznets 1971, points out that economic development and expansion of the manufacturing sector are strongly related. For most countries, the economic development strategy is to expand the manufacturing sector at an early economic development stage, which is the main engine of its economic growth (Farla et al. 1998). Then, the production in the service sector is gradually increased, as the economy advances, consequently, if the manufacturing sector is jeopardised, the rest of the economic sectors are likely to collapse.

The UNDP-UNEP report highlights the following climate change impacts on key economic sectors which consequently affect the manufacturing sector: A temperature increase of two degree Celsius (2°C) would dramatically reduce the total area available for growing Robusta coffee in Uganda, and restrict it to higher altitude areas. Economic modeling studies of farm incomes in India suggest that a 2-3.5°C increase in temperature would result in decline in farm net revenues by 9-25 percent; Rainfall in the wet season in Pakistan could increase by 5-50 percent by 2070, with a doubling in the frequency of high-intensity rainfall events. These changes may have significant economic effects owing to the vulnerability of cotton, Pakistan's main cash crop, to flooding in its early stages of growth; In Honduras, 1998's hurricane Mitch affected more than 25 percent of households and caused an estimated seven percent drop in agriculture output. In the absence

of the hurricane, predicted gross domestic product (GDP) growth would have lifted half a million people out of poverty between 1998 and 2018. This was a major interruption on the development plant and worse scenarios are likely to occur if proper resilience is not build.

These cases demonstrate the effect of climate change impacts in the industrial sector and thus the importance of mainstreaming adaptation in the business strategy.

2.4: Climate change as a business risk

The world economic forum report on global risks, 2012 places the risk posed by rising emission of greenhouse gases third in terms of likelihood. Atmospheric concentration of anthropogenic greenhouse gases is one of the leading contributors of climate change. The 2013 World Economic Forum report on global risks points out climate change as one of the game changers in the global risks landscapes. It also shows that water supply crisis which is one of the impacts of climate change rose from position five in 2012 to position four in 2013 in terms of likelihood. Further, Failure of climate change mitigation and adaptation is identified as one of the top ten global risks of highest concern in 2014 world economic forum global risks report. This shows the threat posed by climate change in the economic sectors and specifically the manufacturing industry

Adger et al. 2007, points out that previous vulnerability assessments focused on adaptation capacity, which refers to the ability or potential of a system to respond successfully to climate variability and change. However, the presence of adaptation capacity alone is not sufficient condition for design and implementation of effective adaptation strategies. A rise in weatherrelated disaster risk may drive the need for more riskbased capital to cover the losses (IPCC, 2014). As cited in the IPCC 5th assessment report, direct and insured losses from weather-related disasters have increased substantially in recent decades both globally and regionally(IPCC, 2012); (Bouweret al., 2007); (Swiss Re, 2013c); (Munich Re, 2013);(Crompton and McAneney, 2008); (Smith and Katz, 2013). Global insured weather-related losses in the period 1980-2008 increased by US\$1.4bn per year on average (Barthel and Neumayer, 2012). More frequent or more severe extreme weather events, and increased uncertainty about such hazards, would lead to higher insurance premiums and reduced coverin several regions, to the detriment of the insured, and perhaps to reduced profitability of insurers, and to the detriment of their shareholders (IPCC, 2014). Therefore, with growing threat of climate change in the manufacturing sector, business will not be as usual especially on insurance related cost.

Some of the climate change related business risks likely to impact on the manufacturing sector include:

- i. **Climate Change Policy Risk** -With climate change mitigation driven by lawmakers, the risk of politically motivated changes to public policy towards climate change is high. Businesses that are in a carbon-intensive industry or reliant on climate change-motivated subsidies or other favourable regulation are particularly vulnerable. Conversely, most investors avoid projects with high policy risk due to its unpredictability.

- ii. **Market Risk**—Manufacturing sector is heavily dependent oil, gas and electricity as a source of energy whose supply is likely to be interrupted by climate change. Therefore, they face the risk of changes in the prices of these commodities. To mitigate these risks, companies can either reduce their exposure or hedge the risk.
- iii. **Infrastructure Risk** -With adverse weather conditions, changes in climate may cause damages to buildings, roads, power supply lines and interruptions materials and finished goods supply chains. It may also change travel and migration patterns leading to market interruptions.
- iv. **Reputational Risk** -The risks of climate change to an organisation to its reputation as a reliable provider of products or services or its ability to meet its statutory mandate may not arise directly from changes to climate and climate related variables per se, but from the likely chain of consequences which may directly affect the organisation's capacity to serve its customers or clients or affect other stakeholders of the organisation (Australian Government, 2006)
- v. **Credit Risk** -Due to increased business risk exposure to fluctuating energy prices and likely infrastructure interruptions which manufacturing sector may face due to climate change, credit rating of such entities may be at risk.
- vi. **Financial Risk**—Climate change related economic imbalances can lead to financial crisis. The current unsustainable use of our environment is such an imbalance. Financial shocks can be triggered by either intensified environmental policies, cleantech breakthroughs (both resulting in the stranding of unsustainable assets), or the economic costs of crossing ecological boundaries like floods and droughts due to climate change. Further, financial supervisors and risk managers have so far paid little attention to this ecological dimension, allowing systemic financial imbalances resulting from ecological pressures to build up (Schoenmaker D., 2016)

These risks are likely to impact on the manufacturing firms operating environment therefore it would be prudent to invest in adaptation strategy. To invest in an adaptation strategy, the business must consider it to be potentially profitable. A business may be reluctant to adapt because of the additional uncertainty surrounding future climate change as well as uncertainty associated with market conditions. The challenge of evaluating potential profitability can make business reluctant to make an adaptation decision, especially if the decision is not easily reversible (Winler et al. 2009)

2.5: Risk Management

Risk management is the process by which organizations try to ensure that the risk to which they are exposed are the risk to which they think they are and need to be exposed to operate their primary business. It is thus the process by which firms identify their risks and then take any ex ante or ex post actions required to control deviations of actual risk exposures from predefined tolerances to those risks (Culp, 2002). Risk management has an established role in business, and is applied at a wide range of levels, including management of strategic risk, corporate governance, operational risk, project risk and health, safety and environment (HSE) (Murray and Hillson, 2008).

The inability to manage risk properly leads to crises and missed opportunities. There is substantial evidence that recognizing and preparing for risk can pay off abundantly. Protecting hard-won development gains by building resilience to risk is essential to achieving prosperity, whether one is grappling with natural disasters, pandemics, financial crises, a wave of crime at the community level, or the severe illness of a household's provider (World Bank, 2014).

These apply to the scenario presented by climate change. Manufacturing firms can turn threats presented by climate change related impacts into opportunities through prudent management. On the other hand, if the threats are not identified and properly managed, the firm's products and services can easily be rendered uncompetitive in the market.

2.6: Kenya Policy Development in Climate Change

The Intergovernmental Panel on Climate Change was created in 1988. It was set up by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) to prepare, based on available scientific information, assessments on all aspects of climate change and its impacts, with a view of formulating realistic response strategies. The initial task for the IPCC as outlined in UN General Assembly Resolution 43/53 of 6 December 1988 was to prepare a comprehensive review and recommendations with respect to the state of knowledge of the science of climate change; the social and economic impact of climate change, and possible response strategies and elements for inclusion in a possible future international convention on climate. The scientific evidence brought up by the first IPCC Assessment Report of 1990 underlined the importance of climate change as a challenge requiring international cooperation to tackle its consequences. It therefore played a decisive role in leading to the creation of the United Nations Framework Convention on Climate Change (UNFCCC). Since then the IPCC has delivered on a regular basis the most comprehensive scientific reports about climate change produced worldwide, the Assessment Reports. The IPCC Second Assessment Report of 1995 provided important material drawn on by negotiators in the run-up to adoption of the Kyoto Protocol in 1997. The Third Assessment Report came out in 2001, the Fourth in 2007 and the Fifth in 2014 (IPCC, 2014)

The global climate change policies are governed by various Multilateral Environmental Agreements (MEAs), especially by the UN Framework Convention on Climate Change (UNFCCC). The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty negotiated at the United Nations Conference on Environment and Development (UNCED), which is sometimes referred to as the Earth Summit, held in Rio de Janeiro from 3 to 14 June 1992. The objective of the treaty was to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The treaty does not set any binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. In that sense, the treaty is considered legally non-binding. Instead, the treaty provides a framework for negotiating specific international treaties or protocols that may set binding limits on greenhouse gases.

The UNFCCC was opened for signature on 9 May 1992, after an Intergovernmental Negotiating Committee produced the text of the Framework Convention as a report following its meeting in New York from 30 April to 9 May 1992. It entered into force on 21 March 1994 and currently has 195 parties.

The parties to the convention have met annually from 1995 in Conferences of the Parties (COP) to assess progress in dealing with climate change. One of the major achievements for the conference of parties was the Kyoto Protocol which was signed in 1997. It established legally binding obligations for developed countries to reduce their greenhouse gas emissions. The Kyoto protocol's first commitment period started in 2008 and ended in 2012. The second commitment period began on 1st January 2013 and will end in December 2020. The protocol now has 192 parties.

The Committee of African Heads of States on Climate Change (CAHOSCC) was established in 2009 by the African Union Assembly of Heads of State and Government to spearhead African Common Position on Climate Change and to ensure that Africa speaks with one voice in global climate change negotiations. It began its work with COP15 in Copenhagen and has participated in all subsequent COP meetings. The nineteenth session of the conference of the parties (COP 19) was held from 11th to 22nd November 2013 in Warsaw, Poland. The African Ministers of the Environment agreed on a unified African position that the continent will continue engaging the global community on negotiations relating to climate change adaptation measures which Africa, led by the Committee of African Heads of States on Climate Change (CAHOSCC) has consistently flagged as a priority for the continent.

Article 4(f) of the UNFCCC requires all Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances to take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change. This commitment is reiterated in the Kyoto protocol Article 3(2), which states that "each Party included in Annex I shall, by 2005, have made demonstrable progress in achieving its commitments under this Protocol.

Kenya has been integrating climate considerations into various legal and governance instruments for some time. Notably, there has been progress made in planning and implementing policies, projects and programs in key economic sectors in order to align Kenya with the international community's approach to reducing greenhouse gas emissions and promote climate resilience. The scope of climate change governance in the country is encompassed in diverse, though interrelated, policy and regulatory frameworks that guide the coordination of various sectors dealing with management of climate sensitive natural resources (Heinrich B. S, Kenya Country Report, 2013).

A number of bodies and organizations are involved in supporting adaptation to climate change in Kenya. The most prominent among these is the National Climate Change Activities Coordinating Committee (NCCACC), composed of 25 representatives from several ministries as well as municipalities, public universities, the private sector and NGOs. It was established in 1992, and it's instrumental in coordinating the government's

activities on climate change (Mutimba et al., 2010). The Climate Change Coordination Unit was established in the Office of the Prime Minister in 2008 to provide high level political support for climate change activities in Kenya (Mutimba et al., 2010). It has since been renamed the Environment and Climate Change Coordination Unit under Ministry of Environment, Water and Natural Resources.

Some of the proactive policies, regulations or legislative initiatives ongoing or completed in Kenya include; Constitutional recognition of sustainable development, public participation in environmental decision making and equal socioeconomic rights as contained in the Constitution of Kenya, 2010; Development of a long-term national development blueprint to transform Kenya into an industrialized, middle-income country providing a high quality of life to all its citizens in a clean and secure environment pursuant to Vision 2030 and subsequent Medium Term Plans; Preparation of the National Climate Change Response Strategy (NCCRS), which is focused on developing comprehensive and robust adaptation and mitigation interventions to address the adverse impacts of climate change in the country; Development of the National Climate Change Action Plan (NCCPA), 2013 -2017 to effectively implement and operationalize the NCCRS; Enactment of the Environmental Management and Coordination Act (EMCA), Act No. 8 of 1999, the key legislative authority on environmental coordination and management in Kenya; Development of a National Environment Policy, 2013 which proposes a broad range of measures and actions responding to key environmental issues and challenges; the climate change act, 2016 which provide for the legal and institutional framework for coordination of climate change policies, strategies and action plans; and operationalization of the National climate change policy in September 2014 which is designed to provide a framework to guide the development, and implementation of specific, detailed and costed climate change interventions through regular and periodic climate change action plans.

3.0 Conclusion

Based on the foregoing discussion, it's evident that the manufacturing sector is a critical segment to the country's economic contribution. Further, the Kenya manufacturing sector is largely agricultural dependent and highly susceptible to climate variability. Therefore climate change presents a greater risk to the Kenya manufacturing. However, climate change also presents numerous opportunities for growth and development of new products. Unless manufacturing firm's leadership realizes this in good time they may find themselves unable to compete in the current market due to increased production cost and raw materials supply interruptions.

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