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"Climate change risks, impact costs and strategies"

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Introduction

What is Climate Change?

Climate change is defined as "*Any statistically significant and prolonged alteration in either the variability or the mean of the climate, persisting for an extended time period (frequently defined as decades or longer), which is considered directly or indirectly to primarily occur from the anthropogenic causes; that modifies global atmosphere, land and oceanic conditions in contrast to climate variability which relates to natural causes.*" (Dyer, 2018:3)

Human activity has been the main cause of rapid global warming leading to extreme climate variations. According to the UFCCC Handbook (2006:16-17), global warming is now affecting rainfall, sea level, ice sheets and snow cover. Changes to regional climate patterns, due to rising air temperature, has already started to have an adverse effect on watersheds and ecosystems. The cost of coping with extreme weather events and crop failure as well as other destructions is on a steady rise due to an increase in the intensity and frequency of climate change factors. Most vulnerable to experiencing the adverse effects of climate change are low income households and economies.

Aim of Report

In this report I will be describing certain climate change risks that impact the Viking Fishing Group, which has now become a division under Sea Harvest Corporation. I will then discuss how these risks will impact the supply chain management of the company, thereafter I will progress onto other relevant financial costs. I will end of this report listing solutions and strategies that can be implemented, by the company, to mitigate and adapt to the described climate change risks.

Description of Company

The Viking Fishing Division of Sea Harvest Corporation operates a large fleet of fishing vessels and three HACCP- compliant seafood processing facilities. The company has six facilities in total; five in Cape Town and one in Durban. It supplies South African and international seafood retailers and wholesalers with a wide variety of quality frozen and fresh seafood products. They also export certain species, example: 30% of the West Coast Rock lobster harvested is exported to Asia and Western Europe. (Anon, n.d)

The company employs more than 1400 South Africans across its fishing, processing and marketing operations. Most of these employees are involved in the fishing operation. Mandatory training for all 1400 employees consists of safety and hygiene practices. (Anon, n.d)

The Viking Fishing Division's main activities are deep-sea and inshore fishing. Otter trawling is their main method of fishing and over 20 species are harvested daily. The company's main interests lie in South Africa's trawl fishery for hake; the small pelagic fishery for sardine and anchovy; the west coast rock lobster fishery and the South African and Mozambican fisheries for prawns. (Anon, n.d)

The fishing fleet for deep sea trawling consists of approximately 28 fresh fish trawlers (commonly called "wet fish" trawlers) with an average length of 45m and an average tonnage of 600 tons. Additionally, the fleet consists of 30 freezer trawlers of various lengths and gross tonnage, 30m to 90m and 300 GRT to 2 900 GRT respectively. Fishing is mainly at depths of 200m to 800m and in areas that have been previously fished. This ensures that lightly fished areas are not affected by trawlers. The deep-sea trawl fishery is by far the most valuable of South Africa's commercial fisheries as it is technologically advanced and globally competitive. It is certified to the Marine Stewardship Council (MSC) standard as "well managed and sustainable". (Anon, n.d)

The inshore trawling fleet consists of 30 trawlers that operates along the south coast between Cape Agulhas and Port Elizabeth. These vessels are smaller in size and less powerful than those used in the deep-sea trawl fishery; with lengths ranging from 14m to 36m. (Anon, n.d)

Viking Fishing is also registered as a training provider with the Transport Education and Training Authority (TETA) and the South African Maritime Safety Authority (SAMSA). As a result, the company is able to make a valuable contribution to the broader community within which it operates. They run a cadetship programme which allows students to pursue a career at sea, the programme introduces students to basic concepts of seamanship by means of practical training on board and classroom training. The company also has provided opportunities for the artisans who work in the company's electrical, diesel, carpentry and machining workshops to acquire or upgrade formal qualifications in their field of expertise. (Anon, n.d)

Climate Change Risks 20/20

Almost every division of the company will be affected by climate change, namely the trainees and employees, fish production, vessels and equipment, infrastructure of seafood processing facilities and technology used, finance and road transportation.

Starting off with fish production, South Africa's inshore, coastal and estuarine ecosystems can be broadly divided into three biogeographic regions, namely cool-temperate (along the west coast), warm-temperate (along the east coast), and subtropical humid (along the south coast). As a result, climate change affects these regions differently. In a broad aspect, changes in wind, upwelling, sea surface temperature, reproduction, oxygen levels, storm frequency, precipitation, freshwater

flow and runoff patterns will have impacts on all the ecosystems, and in turn on the commercial fishing livelihoods. (SANBI Climate Change and Impacts Factsheet Series, 2013:6/7)

The main driver for coastal upwelling, which brings nutrient-rich cool water to the surface, is wind (direction, speed and frequency). An increase in wind factors above the optimum level has led to an increase in upwelling currents, namely the Benguela current off the Western Cape, causing severe reduction in oxygen content thereafter affecting fish mortality for fisheries such as hake, rock lobster and small pelagic fish. (SANBI Climate Change and Impacts Factsheet Series, 2013:6/7)

Alteration between extreme rainfall periods and dry spells coupled with a rising sea level causes a loss of nursey habitats important for the survival of prawns and estuarine fish. However, the increase in summer rainfall may have a positive effect on estuaries such as St Lucia Estuary. These estuaries will open more frequently allowing for the abundance of shallow water prawns on the trawl grounds. For this positive effect to take place existing water uses in catchments that are feeding these estuaries must be well maintained. (SANBI Climate Change and Impacts Factsheet Series, 2013:6/7)

Furthermore, changes in river flow, increased frequency of high-intensity coastal storms and high water events pose a threat to all types of fisheries with potential impacts on line fish, prawns and squid. KwaZulu-Natal and west coast estuaries are mostly affected in terms of their structure and functionality. (SANBI Climate Change and Impacts Factsheet Series, 2013:6/7)

On a more positive note, a variation in sea surface temperature may allow new fishing opportunities to occur. Commercially valuable species might become available for harvest, increasing fish yield and productivity. However, too high productivity levels could lead to increased hypoxia that may negatively impact certain resources within the area. (SANBI Climate Change and Impacts Factsheet Series, 2013:6/7)

Moving onto infrastructure and transportation, the Viking Division operates mainly from Cape Town and also has a Durban division in Maydon Wharf. According to the C40 Cities “Future We Don’t Want” Report, Durban and Cape town are at risk of flooding. Cape Town is also suffering from the effects of a drought which has caused water shortages (Alfreds, 2018). Durban had experienced a severe storm in October 2017 which caused extensive flooding and destruction of infrastructure. In the next 13 years these coastal cities will face catastrophic floods twice as often due to rising sea levels and the effect of cyclones in order regions of the world (Kings, 2017). Cape Town’s Energy Directorate (2017) states that a decrease in average annual rainfall and an increase in mean annual temperature, frequent and intense heat waves, average wind and maximum wind strength and intensity and frequency of storms has been identified.

Impact costs on the Supply Chain Management

The following impact costs have been formulated based on Dyer's 'Climate Change Risks, Costs and Opportunities for Global and Pacific Maritime Supply Chains', 2016:8.

The typical components of any supply chain are:

- Information, planning and communication;
- Source of raw material;
- Manufacturing - each location site and productivity levels of employees and equipment;
- Delivery – intermodal transportation from raw material site to manufacturer to point of sale;
- Return of products.

The planning of company operations is based on the information of the business's successes and failures. With a slow increase in climate change risks the information obtained could impact the long term planning and decision-making of operations. Now that frequency of these risks have increased, plans need to be revised accordingly. This is not an easy task as the impact of climate change is extremely unpredictable. Incorrect planning affects the functionality of the supply chain.

Due to the climate change risks described earlier the source of fish is influenced; the success of the Viking Fishing Group fish yield could be unpredictable. All their fisheries are not affected by climate change at the same level of intensity. An eastward shift in resource availability of West Coast Rock lobster has allowed an increase in yield therefore 30% is exported to Asia, this positively impacts the company as profits will be consistent. However, the maximum allowable 9000-ton annual yield of hake will reduce due to excessive increase in upwelling (Anon, n.d). An unpredictable change in prawn production along the east coast could lead to an increase or decrease in yield. The main consequence of changing sea surface temperature is the unpredictable behavior and migration patterns of existing fish along the coast.

The Viking Fishing Group is well known for their sardine products, they are the leading supplier of boxed, frozen sardines and high quality fishmeal. Recently there has been an obvious change in the sardine run along the South African coast line, this could lead to the reduction of sardine harvesting along the east coast but increase in harvest along the west coast. This balance will keep productivity levels of sardine processing more or less the same.

Harvesting of fish does not impact the business alone, there are other factors mentioned at the beginning of this section that could suffer and put a dent in the supply chain management of the company. It is important to note that when one component of a supply chain is directly affected, the rest of the supply chain will be indirectly affected (ripple effect).

Severe adverse weather occurrences, increased floods and storm surges could damage the company's fleet of approximately 80 vessels as well as the equipment on board each vessel. If these vital features of harvesting fish are destroyed it indirectly slows down productivity levels at the manufacturing stage.

Most importantly, fish need to be handled carefully and correctly in order for it to be safe for consumption. This means that the 30 freezer trawlers and the refrigerators or freezers at the 6 manufacturing facilities must be at full working capacity. If there is an increase in air temperature this essential equipment will need to work over time to ensure the right internal temperature of fish is being maintained, indirectly putting strain on their productivity level. Fresh water is also required during the processing operation (in liquid or solid form) to maintain the internal temperature of all fish. An increase in heat will allow bacteria to grow, wasting the fish and rendering it unsafe for sale. As implied previously, in order for the supply chain to be function optimally finance is needed to maintain each component, which mostly comes from sale of products.

Furthermore, the threat of injury and death of employees ashore and on board becomes a greater concern and will reduce productivity level. This in turn slows down harvesting as fish need to be fresh at each stage as well as transportation from boats to facilities to retailers since many vehicles may not be operational, therefore resources are wasted. The above factors, together with droughts and heatwaves, could impact the 1400 employees across the country. An uncomfortable working environment leads to a further delay in productivity level. The wholesalers and retailers will then have less product to sell to customers. Rapid changes in temperature lead to the spread of illnesses that could affect employee productivity levels as well.

Not forgetting the damage to the six offshore loading and processing facilities along the west coast and east coast as well as the company's road transportation. Not having a facility to manufacture products can cause the entire supply chain to fail, as this is the heart of the supply chain. Not having vehicles to transport sources and products pauses the supply chain at the harvesting and manufacturing stage causing further wastage of company resources.

Other Relevant Impacts

All damages result in extremely high repair, replacement, maintenance and insurance costs and collectively could creep into the million-rand bracket. If operating costs increase, then price of the final product will have to be increased which will discourage consumers from purchasing the product. This has a backward, adverse effect on the supply chain.

When vessels and road vehicles are damaged, they pollute the environment, especially from the waste and fuel they have on board which introduces salvage costs and clean-up costs. This in turn may pose as a threat to navigation of other vessels or road vehicles in the vicinity.

Increase in intensity and frequency of extreme weather conditions also limits the number of viable fishing days due to safety reasons and therefore reduces harvesting putting a cap on the success of the company. Vessels need to be constantly maintained, if they are not working then they are not producing the money needed to cover the company's expenses. One can conclude that resources are being wasted while vessels remain alongside.

Apart from the increased water and electricity bills, the amount of electricity and water being used on such a large scale could impact the country's natural resources.

If Viking Fishing suffers from the above impacts, the slowdown in production gives competitors in the fish industry the chance to take over their customer-base. Other fishing companies will also be affected by the same risks, and this could collectively impact South Africa's food security by a certain percentage.

Solutions and strategies

By implementation of climate-proofing and adaptation strategies, the company can reduce the effect of climate change risks. The following are appropriate methods that can be put into place by Viking Fishing (Dyer, 2018:81-91).

- First and foremost, the company should invest in early-warning and detection systems so that they can prepare for a natural disaster, monitoring systems will also help identify patterns leading to a natural disaster occurrence;
- These systems can allow the company to plan flexible working hours of fishing crew to ensure there is no wastage of resources;
- Investing in a research team that will monitor the changing patterns of fisheries will allow the fishing operation to adapt easily without resource wastage and encourage consistent high productivity levels;
- Ensure funding is set-up for resilience against natural disasters from climate change factors;
- Each vessel and vehicle should be used to its full capacity with every single use, to ensure resources and harvested fish are reaching the shore based processing facilities;
- Maintenance and servicing of all vessels, vehicles and infrastructure should be done frequently so that repair and maintenance costs do not convert to replacement costs.
- An enclosed parking area for road vehicles will protect these vehicles against bad weather;

- Unfortunately, Viking Fishing facilities cannot be elevated or relocated to higher grounds in order to avoid floods. However, their buildings can be strengthened with advanced materials or flood proofed by building barriers to resist entry of water or allowing water to pass through certain areas of buildings so that it does not collapse;
- A safe room can be introduced in all facilities so that employees can retreat into these spaces and be protected if a disaster strikes;
- Natural vegetation, such as mangrove trees, can act as an absorption ground to reduce the effects of floods at the offloading site in port;
- The company should invest in education and training of employees, especially their cadets on climate change, risk management and disaster response;
- Switch to renewable energy resources for powering refrigeration and freezers as well as lighting on all facility sites;
- All equipment should be secured and fastened to solid structures so that it can be resistant to the movement of water, on board vessels and also on company sites;
- Invest in good quality equipment and technology that is resilient or modify existing equipment and machinery;
- Introduce an increased amount of shaded areas at each facility to reduce the effects of the sun and heat on employees;
- Introduce methods to increase fuel efficiency on all vessels. Such methods are explained by Eco Marine Power (Anon, n.d): advanced electrical propulsion systems, low power LED lighting, air lubrication, optimised hull design, waste heat recovery technologies and fuel cell technology. These methods could reduce fuel consumption by 40% and thereafter control emissions.

In order for Viking Fishing, or any other business, to reduce the long term impacts of climate change they must also contribute to sustainable development in order to bring global warming back to a reasonable level and eliminate the human cause of climate change. The following methods can be implemented in long term to reduce expenses.

- Introducing solar panels to buildings to reduce their dependence on municipal resources;
- Introducing water tanks, to become independent and non-reliant on municipal resources;
- Recycling and reusing waste;
- Introduce more greenery within facilities to assist in maintaining well balanced air quality.

Conclusion

Climate change is an area that is well over looked by businesses, small economies and individuals, as it is a risk that develops over time. The effects of climate change cannot be detected at once; it must be monitored to witness the changes within our environment over time. With the increasing intensity and frequency of severe weather conditions, the need for adaption and climate proofing has become rather apparent in South Africa. What individuals fail to realise is that climate change is affecting everything and everyone at the same time, so the bigger picture of climate change impacts is as extreme concern for the livelihood of the world we live in.

Viking Fishing owners, operators and directors need to realise that reducing their impact on the environment is not enough to combat climate change in the long run. They must admit that climate change factors such as rising sea level, air and sea surface temperature, change in wind patterns (frequency, direction and speed), droughts, heatwaves, cyclones and storms, floods and tsunamis do exist and are occurring more frequently.

The company mostly invests in education and training, this is not enough either, as the attitude of individuals cannot be controlled.

After admitting and opening their minds to the bigger picture, implementation of the solutions and strategies mentioned in this report will help Viking Fishing to protect itself against large impacts on their supply chain management and the costs that follow natural disasters.

After ensuring these strategies are in place the company can focus on methods to incorporate green living and sustainable development into their fishing, processing and marketing operations.

Unnatural changes to the environment has ripple effects: Treating the environment poorly > global warming > climate change > severe weather conditions > adverse effects and impact costs on earth and every individual, business or economy.

Once Viking Fishing makes the effort and commits to investing their time and finance into reducing their footprint, along with other companies and economies, the Earth will eventually be able to restore itself to a sustainable state. This will increase quality of life for future generations and reduce the impact of climate change, which in turn will slowly eliminate the extensive need for climate change mitigation and adaptation.

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