POLICY NOTE 03/2023

The Role of Deep-Water Seaweed Farming on economic empowerment in Zanzibar

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1. Introduction

In Zanzibar, thriving seaweed farming, as part of the Blue Economy, can be an effective instrument to combat income poverty, inequality and insecurity by creating significant employment especially for the communities who completely depend on the use of natural resources for their livelihoods. It could also be used to economically empower women, who are often more exposed to economic shocks and often live without being socially protected. This is important because women constitute a large proportion of people working under the seaweed farming sector.

For the most part of the previous two decades, as an attempt to foster the pro-poor economic growth, numerous policies measures for boosting the seaweed output were introduced in Zanzibar. In 2022, the Revolutionary Government of Zanzibar has reviewed the *Blue Economy Policy* of 2020, which among other things, intends to improve policies and administrative procedures to facilitate strategic investments in ocean-based industrial sectors such as fisheries, aquaculture, seaweed production, and related processing, storage and packaging facilities for exports. Trade Policy 2006 is supporting the industrial transformation of blue economy sectors, for example anchovy and seaweed processing facilities, and catalysing the establishment of industrial infrastructure and services to support blue economy growth. Additionally, Zanzibar Gender Policy 2016 regards the seaweed farming as one of the key sectors for eliminating all forms of discrimination among women and men; addresses gender gaps in access to marine resources, financial services and labour markets and promotes women's empowerment within the blue economy.

Undoubtedly, seaweed has a great potential, if well utilised, to create meaningful employment and decent livelihood to a substantial number of people employed by this strategic sector. In 2020, for instance, seaweed exports represented 17.8% of Zanzibar's total exports value, the farming has increased from 8,967 tons worth USD 2.7 million in 2020 to 10,530 tons with the value of USD 2.8 million in 2021[2] (OCGS, 2022). The quantity of seaweed farming has gone up during this observation period, yet its value has remained stagnant, which suggests the urgency of increasing seaweed value addition through a domestic industrialization.

As attempt to increase the value of seaweed and improve economic welfare of farmers, the RGoZ has financed semi-processed seaweed processing factory to produce carrageenan[3] that will be managed by the Zanzibar Seaweed Corporation (ZASCO) in Pemba. This company has started buying raw seaweed from farmers during the fiscal year 2022/23 and it is expected that the industry will commence the semi-processing industry in 2023/24, which highlights a strong commitment of RGoZ to transform this particular sector. Nonetheless, the mixture of an endogenous factors such as low value addition, lack of farmers' economic empowerment strategies, poor farming technology, uncoordinated policies and regulations, and an exogenous in terms of an increasing threat posed by a global

[2] Office of Chief Government Statistician (2022). *"Zanzibar Socio– Economic Survey 2021"*. Issued in May 2022 by OCGS Zanzibar

[3] Carrageenans are used to gel, thicken, or suspend; therefore they are used in emulsion stabilisation, for syneresis control, and for bodying, binding and dispersion. Major uses are in foods, particularly dairy applications. https://www.fao.org/3/x5822e/x5822e05.htm

warming is largely constraining the ability of seaweed farming to contribute substantially on economic growth.

Global warming is among the most serious challenges facing the seaweed industry as it causes diseases which in turn reduce the quality and market value of raw seaweed in Zanzibar and abroad. The escalating temperature due to climate change bleaches and damages the seaweed that eventually causes death. Moreover, the significant fresh water interaction during the rainy seasons causes the seaweed to be overgrown by other algae known as “Mashava” and eventually decay the seaweed. The shallow water traditional farming method often used in Zanzibar is the root cause of these diseases because it exposes the seaweeds to extreme heat and salinity fluctuations.

This situation therefore calls for the introduction of a deep water farming solution, like the one proposed by this Policy Brief, to raise seaweed output productivity and diminish the climate change threats. Along with enabling women who work under the seaweed farming to become empowered economically and earn decent income, the proposed initiative intends to assist the seaweed sector to increase national revenues and compliment the Blue Economy and tourism sector as the driving forces of Zanzibar’s economy.

2. Existing Key Challenges facing Seaweed Farming and Gaps

Seaweed farming industry is primarily viewed as an alternative income to control environmental degradation and overexploitation of natural resources through conservation of biological diversity in Zanzibar. It may also encourage a sustainable use of natural resources and generate a new reliable income for communities that depend directly on the natural resources for their livelihoods, in particular women. This can reduce the extent of illegal fishing and forest degradation. Notably, the industry has benefited many farmers and motivated them to increase their production. Seaweed exports surpassed 15,000 MT worth US$10.24 million which accounts for 90% of marine exports and ranked third in foreign currency earnings by the end of 2012 (Msuya, 2012).

The seaweed industry, however, is currently facing huge challenges as a result of climate change and poor technology for drying the seaweeds. Particularly, intertidal seaweed farms are exposed to extremely high temperature and significant salinity fluctuations (through fresh water during rainy seasons) causing several diseases such as “ice ice”, decays and overgrowth by other plants and die offs. This has resulted in a low production and the price which negatively impacts many farmers.

Further to that, the lack of modern infrastructures for drying, transportation and screening technology affect the product quality of seaweed. Low entrepreneurship skills and poor business capacity increase the product value chain and contribute to low financial gain and hence low economic development. Mainly, due to very low levels of innovation, a large quantity of the seaweeds is sold raw materials to the exporter with a very low price that sometimes is unable to cover production cost or the amount of invested capital. In addition, low demand by a local market can be associated with poor branding and marketing of seaweed products.

These challenges result in farmers’ low financial gain and hence low livelihoods as

reflected by the fact most seaweed farmers do fall in the 30.4% of poor people who live below basic needs poverty line as they live on less than 1 USD per day. It is against this backdrop that the proposed integrated concept aims to create floating net method pyramid blocks deep water farming technology for seaweed.

This new farming technology will improve productivity by reducing the effect of high temperatures and freshwater. Subsequently, the farmers' productivity to produce the higher priced seaweed could be increased. Modern infrastructures, entrepreneurship skills and economic empowerment initiatives under this Note would help seaweed farmers to organise themselves into specialised groups that will effectively manage the quality of seaweed and broaden the access to innovation, technology, capital, high value markets, and business connections.

Due to limited post-harvest technology, Zanzibar seaweed farmers lack modern drying technology since the seaweeds are dried onshore and being exposed to sand and other contaminants while drying. Further, during rainy seasons the seaweed showered by the rain water consequently loses its quality. In addition, lack of other farming inputs such as screeners and transportation equipment, preservation and storage facilities have significantly affected the final quality of seaweed produced in Zanzibar.

In order to address some of these challenges, the government of Zanzibar developed the Seaweed Development Strategic Plan (SDSP) advocating the promotion of the high seaweed production with the focus of increasing farmers' income and government revenue. Similarly, members of the women's groups have now realised the importance of branding their seaweed based products. Indeed, this sector is expected to be an emblematic tool for improving livelihoods and reducing degradation of other coastal resources. Yet these initiatives lack convincing scientific production methods and financial strategies for farmers to expand their business by reaching into the international market.

Several researches have been undertaken based on socio-economic approaches, however, without considering feedback loops on ecosystem services in Zanzibar. Currently, there is a big gap in terms of significant research on the science of seaweed species, as well as a gap on scientific data showing the depth range, temperature and salinity range, habitat resistance, potential grazers or impacts of the business in ecosystem health. In summary, the seaweed is facing deficiencies in terms of business model and gaps in the scientific knowledge as well as impacts of the business to the environmental conservation and natural resources. A better management of the coastal environment and better understanding of the scientific knowledge of species, coastal ecosystem services and associated impact analysis on ecosystem health are still required. In addition, a general raise of community awareness on the impact of the business on environmental and coastal resources is highly desirable.

3. Objectives of the Policy Note

This Note proposes an integrated approach for new deep water farming technology for enhancing seaweed market quality and productivity by reducing disease caused by heat and direct fresh water interaction to enhance women's economic empowerment through seaweed value chain

enhancement. More specifically, the proposed integrated Concept intends to:

i. Propose the need for having policy actions to foster the use of new deep water "floating net method" for innovative farming practices.
ii. Promote best post-harvest handling practices and processing technologies for value addition and ensure quality and safety of the products.
iii. Develop measures for building farmers' financial skills, marketing skills, entrepreneurship skills and chain for value addition.
iv. Create strategies for extending farmers' access to finance by reducing asymmetric information between farmers and financers.
v. Perform impact assessment of seaweed farming practices on marine ecosystem health.
vi. Create community awareness on ecosystem services and environmental conservation.
vii. Foster researches on habitat range and environmental conditions of seaweeds.

Policy Relevance

The proposed innovative seaweed farming approach under this Policy Note is in line with the Zanzibar Development Plan (ZADEP 2021-2026) and Zanzibar Development Vision 2050 that proposed the use of large scale and technology based seaweed farming as an appropriate solution in creating reliable income by transforming communities' livelihoods, ensuring sustainability of biodiversity conservation efforts. By placing the blue economy as the main enablers for facilitating women's economic empowerment and sustainable socio-economic development in Zanzibar, the Policy Note also pertains to various important Sustainable Development Goals (SDGs) 2030.

The initiatives under this Note can help to translate the seaweed farming from its current standing whereby, in general, the quality is poor and the production scale is relatively low toward more promising spectrums involving a greater output (via new farming methods application) and higher product valuation by enhancing the quality of seaweed and improving market factors.

4. Proposed Approach and Potential Outcomes

Approach

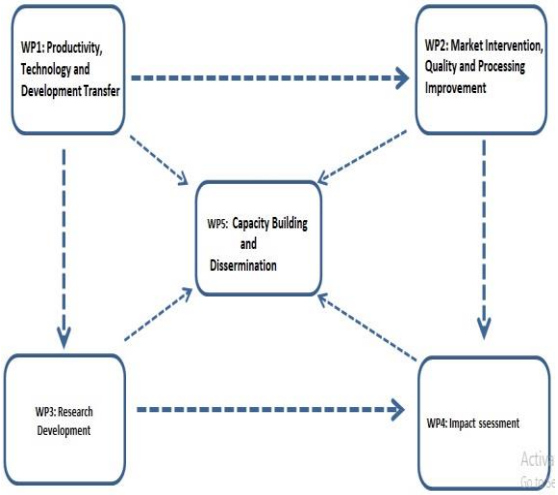
The approach could be organised into five work packages (see Fig. 1). WP 1 and 2 are characterised by the deep water farming technology development and transfer to local communities with market intervention and post-harvest quality improvement for growth economic potential of the seaweed farmers in Zanzibar.

As demonstrated in the diagram below, WP1 (enhancement of productivity, via new technology) and WP2 (Market penetration through quality improvement), WP 3 needs to deal with research the habitat range, such depth of the seaweeds relative to light exposure and environmental conditions like temperature, salinity, nutrient and oxygen. In WP 4, impact analysis of seaweed farming practices on marine ecosystem health for predicting future impact of the business to marine ecosystem health will be performed.

Finally, in WP5 the obtained knowledge is communicated locally via training , workshops, leaflets, reports and broadcasting in the local media (TV, radios) and website, and internationally via meetings, conferences, and publication of scientific papers and a book. These materials based on the local

evidence can be used in the marine economy institutes and technical training centres.

Diagram 1



Source: Authors´ reconstruction of integrated seaweed Business Model

Expected outcomes

To the government and scientific communities, the proposed integrated approach will provide scientific information which will have important contributions to the marine ecosystem management, Blue Economy and to the country development at large.

Specifically the proposed approach will enable Zanzibar to:

1) Improve capability to farmers on effective deep water seaweed farming methods that will improve their productivity and improve their livelihoods.

2) Improve quality and market value of the seaweed by reducing postharvest loss, expanding farmers' business capacity and entrepreneurship skills.

3) Generate knowledge based information to stakeholders on improved management and sustainable use of marine resources.

4) Facilitate knowledge sharing to scientific communities on seaweed habitat range, and environmental conditions that will help in tracking the actual source of the diseases and reduced productivity.

5) Educate people on marine resource management.