Original Research Article

Porter's five forces analysis of Zanzibar's seaweed industry

Abstract

Aim/Purpose: This study aimed to examine Zanzibar's seaweed industry's structure, attractiveness and profitability potential using Porter's five forces framework to determine the underlying causes for its consistent low returns.

Methodology: The study was conducted on Zanzibar island in the United Republic of Tanzania. A case study design approach was adopted. A sample of 591 seaweed farmers, three major exporters, and nine government institutions' representatives were selected for the study. Seaweed farmers were selected through multistage and quota sampling. Exporters were chosen based on experience, i.e. at least five years of operations and above. Government officials were selected through purposive and convenience sampling. The study used focus group discussions and semi-structured interviews for data collection. Analysis of the data was done using the triangulation mixed method. Results were incorporated into Porter's framework.

Results: The study revealed that Zanzibar's seaweed industry is in perfect competition seaweed farmers produce a similar variety with no value-addition. The industry has no entry barriers, and information regarding the farming practice is widely available. Further, the industry faces low switching costs and high bargaining power of both buyers and suppliers. There also exist several cheap and high-performing substitutes. The government's role in promoting the industry's activities was non-existent. It was concluded that the seaweed farming business is an individual farmer's affair.

Conclusion: Overall, it can be commented that Zanzibar's seaweed industry attracts low profits due to the nature of its structure. The Revolutionary Government of Zanzibar (RGoZ) has a big task to revive the industry's activities enabling it to tap into the growing global demand for red seaweeds. Establishing domestic and regional demand is crucial for the performance improvement and sustainability of the Zanzibar seaweed industry. Additionally, diversification of its export products through the establishment of *carrageenan* extraction industries is vital.

Originality/value – Zanzibar's seaweed industry analysis was conducted using Porter's five forces framework, and recommendations were made for its improved performance.

Keywords: Porter's five forces, Zanzibar seaweed industry

Introduction

Zanzibar's seaweed industry is Africa's leading producer and exporter of red seaweeds and holds the fourth position in the global red seaweeds market. The industry has existed for over thirty-three years and employs about 25,000 seaweed farmers, of which women make up more than ninety per cent of the total number of farmers (Msuya *et al*., 2022). The island has exported wildly harvested seaweeds since the 1930s (Yahya, Mmochi and Jiddawi, 2020). However, due to the depletion of its natural wild stock, the island commenced commercial cultivation of seaweeds in 1989 in Unguja (Msuya, 2009). Successful experimental cultivation in Unguja led to the expansion of the farming practice to Pemba island and other parts of mainland URT, i.e. Bagamoyo, Tanga, Mafia, Mtwara, Lindi and Kilwa (Kalumanga, 2018).

Zanzibar's seaweed industry production is mainly for exports and is the second leading cash crop export next to cloves (OCGS, 2021). The industry is also the third largest source of revenue for the Revolutionary Government of Zanzibar (OCGS, 2021). The farming practice has significantly improved the livelihoods of rural women by enabling them to construct and enhance houses, pay children's school fees, meet personal needs and reduce over-reliance on spousal support (Msuya, 2009; Msuya, 2010; Songwe *et al*., 2016; Kalumanga, 2018; Shimba, Magombola and Ibrahim, 2021; Msuya *et al*., 2022). However, despite its significant contributions to the island's economy and rural livelihoods, the industry has failed to reach or tap into its profitability and sustainable production potential.

Despite its economic and socio-economic contributions, especially in improving the livelihoods of rural farmers, the industry has also failed to tap into the growing global demand for red seaweeds, thus underperforming compared to competitors in Asia (Msafiri, 2021). Current industry challenges include failed production and low returns (Msuya, 2009; Msuya, 2010; Songwe *et al*., 2017; Msafiri, 2021; Msuya *et al*., 2022). Production challenges have been attributed to severe ecological changes on the island that have led to poor thallus growth, epiphytes and diseases and high die-offs (ice-ice) (Yahya, Mmochi and Jiddawi, 2020; Makame *et al.,* 2021). The challenges are more pronounced in Unguja island than in Pemba. The low price challenges have been attributed to the hostile demand conditions in the global seaweed market and limited product utilisation properties (Msafiri, 2021; Shimba *et al*., 2021; Msuya *et al*., 2022).

Consequently, many seaweed farmers on the island have become discouraged, abandoning farms to pursue other viable economic opportunities. The challenge remains that rural Zanzibar remains underdeveloped, with limited economic opportunities, leaving its inhabitants predisposed to unemployment and poverty (World Bank, 2015). The observed negative response from farmers has also affected industry production; for instance, between 2015 and 2020, seaweed production in Zanzibar declined by 47.5%, from 16,724 tons in 2015 to 8784.6 tons in 2020 (RGoZ, 2020). This change does not originate from the dislike for seaweed farming but is compelled by need due to low returns (Songwe *et al*., 2016). The declining industry trends directly impact exports and pose a significant challenge of livelihood loss for coastal farmers, especially women. Further, the trends retrocede towards achieving Sustainable Development Goals 1, 2, 5, 8 and 10.

Therefore, this study intends to examine Zanzibar's seaweed industry's structure, attractiveness and profitability potential to link findings with its current returns challenges and recommend suitable strategies.

Materials and Methods

For the study, an industry is defined as "*an arena where several producers of seaweeds compete"*. Industry producers, in this case, are the seaweed farmers from Zanzibar and form the primary unit of analysis for the study.

This study was conducted on Zanzibar island. Zanzibar is located off the Indian Ocean coast in East Africa. It is a part of the United Republic of Tanzania (URT), about 30 km from the mainland. The island has two major sub-island; Unguja and Pemba. Unguja is commonly referred to as Zanzibar. A case study approach was adopted to develop a deeper understanding of the industry. Seaweed farming is practised in both islands, however, more intensively in Pemba than in Unguja.

This study used different population samples to collect primary data. The sample consisted of 591 seaweed farmers, three major exporters, and nine government institutions' representatives. Seaweed farmers were selected through multistage and quota sampling. A total of 291 farmers participated from Unguja and 301 from Pemba. Exporters were chosen based on experience, i.e. five years of operations and above. Government officials were selected through purposive and convenience sampling. The study used semi-structured interviews and focus group discussions for data collection. Analysis of the data was done using the triangulation mixed method. Results were incorporated into Porter's framework.

Porter's framework explained

The five forces framework is a qualitative industry analysis tool coined in 1979 by professor Michael E. Porter aimed at analysing forces/factors that determine the intensity of competition and profitability potential of an industry. The model owes its origin to industrial organisation theory (Karagiannopoulos, Georgopoulus and Nikolopoulus, 2005). The five competitive forces are; the threat of potential entrants, buyers' bargaining power, suppliers' bargaining power, the threat of substitute products and competitive rivalry. Porter (2008) also adds four additional factors in his original work, i.e. the rate of industry growth, the government role, technology and innovation and the role of complementary goods.

Bargaining power of buyers: Porter defines the bargaining power of buyers as the number of buyers in the industry and their power to influence the price. According to him, buyers' influence is expressed in their ability to command low prices in the industry. Powerful buyers bargain for high-quality products and services and compete with one another at the expense of the industry. Factors contributing to high buyer-power include; few numbers of buyers, low switching costs, high volume/quantity purchased, the possible threat of buyers' backward integration, undifferentiated products or services, and price significance to the buyer (e.g. high commitment/fraction of price purchase) (Porter, 2004; Porter, 2008).

Bargaining power of suppliers: Porter posits that powerful suppliers tend to capture more value by charging higher prices, shifting costs to industry participants, or limiting quality or services. He further elaborates that powerful suppliers can squeeze profitability out of an industry that cannot pass on costs. Porter points out circumstances that render suppliers become powerful, including; when they are few and concentrated; when the supplier does not depend heavily on the industry for its revenue; when buyers face high switching costs in the case of switching suppliers; and when suppliers' products are differentiated, no existing close substitute to supplier's products and, the possibility of supplier's forward integration (Porter, 2004; Porter, 2008).

The threat of substitute products: Porter defines a substitute as a product/service that performs the same or a similar function as an industry's a product/service by a different means (Porter, 2004; Porter, 2007; Porter, 2008). According to him, the threat of substitutes limits the industry's profit potential by placing a ceiling on prices. In contrast, industries producing unique products or services tend to enjoy higher or supernormal profits due to limited or absent competition (Porter, 2004; Porter, 2008). Porter points out that the industry's threat of substitutes is high when; there exists high-performing substitute products (price, quality) and low buyer-switching costs.

The threat of new entrants: The threat of new entrants to an industry brings new capacity and erodes profitability (Porter, 2004; Porter, 2008). According to Porter, when new entrants' threats are high, industry incumbents boost their investments and lower prices to discourage potential entrants from joining the industry. Major entry deterrents include; product/service differentiation, supply-side economies, network effects/demand-side economies, incumbency advantages irrespective of size, capital requirements/costs of entry, access to inputs and distribution channels, switching costs and existing government regulations (Porter, 2004; Porter, 2008). When entry barriers are low, the threats of new entrants are high, and as a consequence, there is considerable potential for the erosion of industry profits.

Competitive rivalry: According to Porter, rivalry in an industry can take different forms, including; new product introductions, price discounting, service campaigns and advertising campaigns. Industries with intense rivalry (low concentration) experience eroded profitability. Porter asserts that the degree to which rivalry drives down an industry's profit potential depends on two significant factors, i.e. the intensity and the basis with which businesses compete.

The intensity of competition is high if; competitors are numerous and equally balanced, the industry growth rate is slow, and exit barriers are high. The basis with which businesses compete also drives rivalry if; companies offer homogenous/undifferentiated products, marginal costs are low and fixed costs increased, and the product is perishable (Porter, 2004; Porter, 2008). Porter further elaborates that non-price factors such as product attributes, branding, support services, and delivery time impact the intensity of competition because they tend to improve customer value and command higher price margins (Porter, 2004; Porter, 2008).

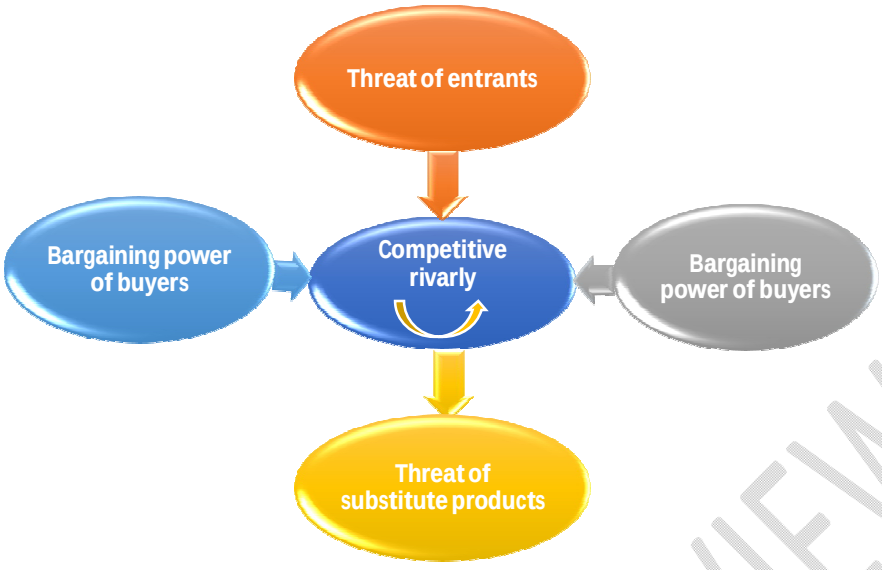

Figure 1: Porter's five forces

Results and discussion

Applying Porter's five forces framework in the Zanzibar seaweed industry

(Driving factors and level of threats parameters were adapted from *Dobbs,* 2014**)**

Table 1: Summary of critical driving factors affecting the industry's profits

S/N	Porter's forces	Industry's driving factors and level of threat
1	The threat of new entrants	• Low buyer switching costs • Low capital entry requirements • Limited government intervention in the industry • Lack of branding • Low supply-side economies of scale
2	Bargaining powers of buyers	• Few and concentrated buyers • Seasonal buyers • High buyer information • Low switching costs
3	The threat of substitute products	• Low switching costs • High buyer information • Low-priced substitutes • Available high-performing substitutes
4	Bargaining power of suppliers	• The seaweed industry is not considered an important customer • Suppliers' inputs are crucial to the industry's production process
5	Rivalry among existing competitors	• Numerous and similar competitors • Lack of branding • Lack of product differentiation

Source: Primary data

The study findings reveal that the Zanzibar seaweed industry is in the state of perfect competition, where numerous farmers produce the same variety. The industry also faces; high threats of potential

entrants, high bargaining power of buyers and suppliers, available low-priced and higher-performing substitutes and intense rivalry.

The threat of new entrants

It was found that the threat of potential entrants emanates from; low capital entry requirements, limited (or almost absent/silent) role of government, low buyer-switching costs, lack of branding and low supply-side economies of scale. Porter (2008) posits that capital requirements serve as a barrier to entry if the capital is unrecoverable and difficult to finance expenditures. However, he cautions that if industry returns appear attractive and are expected to remain so, and if capital markets are efficient, entrants may secure the investment from interested investors.

In the case of the Zanzibar seaweed industry, capital and entry requirements of the industry were found to be attainable. For instance, a potential entrant (farmer) requires a minimum capital of about US$ 117[1] and the ability to locate an unfarmed seashore line. Most farmers accumulate capital through bootstrapping methods, self-help groups, and spousal support (female farmers). However, given the economic background of rural Zanzibar, where poverty is at 40.2% (World Bank, 2015), even with minimal capital requirements, potential entrants may still face difficulties raising the amount required to establish their activity, capital requirements may pose as a deterrent.

Further threats arise from the industry's lack of brand identity and product differentiation. According to Porter (2008), branding and differentiation create barriers to potential entrants by forcing them to invest heavily in thwarting existing customer loyalties. Hence with a lack of industry branding and limited differentiation, price and profit margins are affected due to a high buyer propensity to seek substitutes (low switching costs). Zanzibar's seaweed industry produces two species of seaweed, *Eucheuma Denticulatum* (*Spinosum*) and *Kappaphycus Alvarezii* (*Cottonii*). Both species possess similar utilisation capacity, i.e. used to extract *carrageenan,* a binding agent used in meat, dairy, cosmetics, pharmaceuticals and industries. However, *Cottonii* fetches a better price than *Spinosum* due to the quality of the hydrocolloid it produces (*kappa-carrageenan*) being superior to *Spinosum's iota carrageenan.* However, since 2012, *cottonii* has failed to grow on the island due to ecological changes, primarily raised oceanic-water temperatures and salinity due to rains (Msuya *et al*., 2022).

The industry is also characterised by low supply-side scale economies mainly experienced in Unguja. According to Porter (2008), producing on large scales reduces average unit costs of production. As a result, supply-side economies of scale deter potential entrants by forcing them to enter as mass producers or accept cost disadvantages. In the case of Zanzibar's seaweed industry, production is very low compared to competitors in Asia. The low-scale economies in the case of Zanzibar are attributed to the island's factor conditions.

Potential entrants may also be deterred by existing first mover advantages/incumbency cost advantages. According to Porter (2004), cost advantages may arise from; favourable access to raw materials, favourable locations, government subsidies, learning/experiential curves and proprietary

[1] Estimations from study survey results

product technology (p.11). Porter expounds that the cost advantages enjoyed by incumbents may not be replicable by potential entrants of whichever size or attained economies of scale. In the case of the Zanzibar seaweed industry, farmers enjoy first-mover advantages from access to farming locations, raw materials, learning curve experiences, and government/non-governmental assistance, e.g. inputs.

Compounded by the abovementioned issues is the lack of government policy to oversee the industry's operations despite being the third revenue earner for the Republic government of Zanzibar (RgoZ). Porter (2004, p.13) posits that government can limit or even foreclose entry to the industry by imposing controls such as limited access to raw materials and licensing requirements. Considering that Zanzibar's international trade is ninety-eight per cent from sea-based activities, efforts have been put in place in Zanzibar to support the Blue economy activities, e.g., creating Zanzibar Blue Economy 2020, taking into consideration Zanzibar's Development Agenda 2050. However, specific policies and mandates for the seaweed industry are yet to be pronounced. Unfortunately, Zanzibar's seaweed business is considered an individual affair despite its existence for more than thirty-three years.

The threat of high bargaining power of buyers:

The threat of high bargaining power of buyers in Zanzibar's seaweed industry emanates from; standardised/undifferentiated industry output, low switching costs, few large-volume buyers and price sensitivity. Seaweed produced in Zanzibar is mainly an export crop (to about 99%) used as industrial raw material. Only about one per cent is consumed domestically for value-addition (Msuya *et al*., 2022). Thus, buyer power for the industry comes from the few existing exporters (eight) against many seaweed suppliers (25,000). The farmer's primary buyers are collection centres of seaweed exporters in nearly every village. The collection centres buy on set quotas as allocated by the exporters determined by existing demand conditions at the global level. Therefore, exporters pre-determine prices and volume to be purchased, and farmers have no negotiating leverage.

At the time of this study, it was found that the number of exporters had reduced from fifteen (Msuya and Neish, 2013) to about eight[2] companies (Source: Seaweed section-Department of Fisheries Development, Ministry of Blue Economy and Fisheries, Zanzibar). The reduction of exporters is mainly due to the seaweed export business's highly unpredictable nature, primarily due to hostile demand conditions in the international seaweed market. At a global level, there are also only a few buyers of Zanzibar seaweed, i.e. Denmark, the USA, China, France, Chile, Belgium and to a small extent, the Philippines and Korea Rep. The buyers also purchase similar produce from Zanzibar's competitors in Asia, i.e. Indonesia, the Philippines and Malaysia. The Asian producers supply about 98.8% of global red seaweeds and export them in dry and value-added forms (Cai *et al*., 2021). Hence, left to market conditions, Zanzibar is in an unfavourable position due to its scale of

[2] The companies identified[2] by this survey are Zanea Seaweed Co. ltd, C-Weed Corporation Co ltd, Zanque Aquafarm, SM Rashid Co. ltd, Maabadi International Exporter Co ltd, Selt-Marine Co. ltd, Ledo Co ltd, and Hamad Enterprises. Of these, only Zanea Seaweed co ltd and C-Weed corporation co ltd are the dominant and most frequent buyers on the island of Unguja and Pemba, respectively

production, lack of export product differentiation, higher-buyer power and proximity to buyers (Zanzibar being further compared to competitors).

Moreover, the industry faces the high-buyer (exporters) propensity to switch when individual farmers do not accept price offers at the farm gate. Since farmers offload at the same time due to storage challenges, they face competition and potential reduction in profitability should buyers decide to drop buying prices further. Even if farmers are to find alternative buyers in Zanzibar, the nature of the product act as a constraint. Red seaweeds obtain their commercial value through their utilisation properties. They are mainly used as industrial raw materials. With the lack of seaweed processing industries in the URT (Zanzibar included), farmers are constrained. No processing industries have been established in Zanzibar yet, even though efforts were made to collaborate with UNIDO and RGoZ (Msuya and Neish, 2013). However, to date, such efforts have not materialised.

However, there also exists a different set of buyers for the farmers, i.e. small-scale seaweed processing groups, passing tourists and, to some extent, individual buyers from mainland Tanzania; however, they are seasonal and purchase in small volumes. This challenge is intensified by the lack of established domestic demand in both Zanzibar and mainland Tanzania. Domestic consumption is less than one per cent of the total industry production.

The threat of substitute products

The study established that substitute products exist at domestic and international levels. Red seaweeds/Rhodophytes have various nutritional, medical and industrial benefits. Nutritional-wise, they can be used as human food, providing both micro and macronutrients (Zinc, Sodium, Phosphorous, Potassium etc.), protein, vitamins and polyunsaturated fatty acids. They are also the source of hydrocolloids such as *carrageenan*, a gelling substance applied in bio-fertilisers/bio-stimulants, a binding agent in dairy and meat industries, and applications in the pharmaceuticals and cosmetics industries (McHugh, 2003; Ismail, Alotaiibu and El-Sheekh, 2020; Cai *et al*., 2021). Recent studies, such as those of Ismail, Alotaiibu and El-Sheekh (2020), have established therapeutic benefits related to red seaweeds. The authors also recommend that red seaweeds can be sources of natural ingredients that contribute to a broad range of bioactivities, such as anti-inflammatory agents, cancer therapy, and acetylcholinesterase inhibitory.

Hence, the industry faces threats from products/foods that offer similar utilisations as outlined above. However, since domestic consumption is almost non-existent, the threat of substitutes is observed globally. At an international level, Zanzibar's seaweed competes mainly with *cottonii* species that have failed to grow locally but are produced in abundance in Asia. *Cottonii* is more preferred and fetches a better price because of the quality of its carrageenan, i.e. *kappa-carrageenan*. Similarly, seaweeds from Zanzibar compete with other species in utilisation, e.g., *Nori/Porphyra* and *Kelp* in human foods and *Sargassum* in bio-fertilisers (Cai, 2021).

Other substitutes include; *Chondrus crispus*, which produces *kappa* and *lambda carrageenan*; *Gigartina skottsbergii*, which makes mainly *kappa* and, to some extent, *lambda carrageenan*; and; *Sarcothalia crispate*, which makes a mixture of *lambda* and *kappa-carrageenan* (McHugh, 2003).

According to Porter, the threat of substitutes is high when price-performing substitutes (cheap) and low switching costs exist for buyers. In this case, it can be concluded that both conditions apply in Zanzibar's context, and thus the industry faces a high threat of substitutes.

The threat of high bargaining power of suppliers

Porter (2004) explains suppliers are considered a threat when they are few and concentrated since they can raise prices or reduce quality. Additionally, they may pose a threat when the industry supplied to is considered an unimportant customer of the supplier's business or offers supplies thought an essential input to the customer's business. Other factors may include supplier groups, built-up switching costs such as differentiation in inputs (quality) and the absence of contending products (p.27).

In the case of the Zanzibar seaweed industry, inputs are obtained from local shops, RGoZ through its ministry of Blue economy and Fisheries, some exporters and other non-governmental institutions. Local input suppliers are many and widely available in rural and urban areas, but supplies (tieties, ropes) differ in quality and price. Prices also vary widely between local shops and those located in urban Zanzibar. However, the seaweed industry is considered an unimportant customer to suppliers' business lines as inputs purchased by the industry have multiple competing uses. In addition, the suppliers' inputs are regarded as the most crucial resources for the industry's production process. Hence, based on the above two crucial criteria, suppliers of inputs to the industry are a threat since their position in the industry gives them the power to raise prices or temper quality to obtain more value.

The threat of intense competitive rivalry

There is intense rivalry in Zanzibar's seaweed industry due to numerous producers offering undifferentiated and unbranded products. At the time of this study, it was found that approximately 25,000 seaweed farmers on the island produced only two varieties of seaweeds, i.e. *spinosum* and *cottonii*. Value-addition activities are also scant, as previously discussed. Thus, due to a lack of differentiation and industry branding, farmers face low buyer-switching costs, which predisposes them to low price margins.

Conclusion

Therefore, based on the study findings, it is established that Zanzibar's seaweed industry attracts low profits due to its structure. The industry is in perfect competition market condition where numerous producers of the same/homogenous product exist. The industry has no entry barriers, and information regarding the farming practice is widely available. Further, the industry faces low switching costs and high bargaining power of both buyers and suppliers. There also exist several cheap and high-performing substitutes. Overall, it can be commented that the industry appears unprofitable and is in a disadvantageous position to experience a further drop in profits *ceteris paribus.*

Although several studies from Zanzibar recommend upscaling production to remedy the challenge of low returns, the findings of this study contradict their recommendations. This is because even though production challenges exist due to ecological changes, upscaling production would not guarantee demand should conditions remain the same. The potential for an increase in profits exists if farmers' customer base is diversified to expand buyer options and minimise risks associated with the global seaweed market's oligopolistic conditions. Porter stresses that only those businesses with home-based competitors can compete effectively in international markets. Thus, establishing domestic and regional demand is crucial for the performance improvement and sustainability of the Zanzibar seaweed industry. This can be achieved by creating a domestic customer base by strategically positioning the seaweed industry in the domestic food industry and other industries that utilise red seaweeds as raw material (toothpaste, dairy and meat, pet food, and fertiliser-making industries).

The creation of awareness and promotion of the seaweed's numerous health and industrial benefits should be a preliminary step to establishing a domestic customer base. Secondly, suitable market strategies should be set to tap at potential customer base regionally, i.e. individuals and industries. This strategy can be achieved by establishing processing units, upscaling innovation, and value addition processes. Further, expanding international markets by identifying other potential users of Zanzibar's produce and diversifying the export products by establishing *carrageenan* extraction industries. Msafiri (2021) highlights a growing demand for seaweeds at the global level due to the increased demand for cosmetics products; hence the seaweed industry in Zanzibar can strategically position itself to tap into this growing trend. Lastly, it is high time that the RGoZ takes Zanzibar's seaweed industry seriously by collaborating with its stakeholders to establish the industry's regulating policy and guiding business strategy for its sustainable performance.

Competing interests

Authors have declared that no competing interests exist.

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