ANALYSIS OF ZANZIBAR'S SEAWEED INDUSTRY COMPETITIVENESS AND STRATEGY IMPLICATION FOR ITS IMPROVED PERFORMANCE

By

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(2019-25-003)

THESIS

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2023

DECLARATION

DECLARATION

I hereby declare that this thesis titled **"Analysis of Zanzibar's seaweed industry competitiveness and strategy implication for its improved performance"** is a bonafide record of research work done by me independently and that has not previously formed the basis for an award of any degree, diploma, associateship, fellowship or another similar title, of any other university or society.

Place: Vellanikkara

Date: 14/02/2023

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CERTIFICATES

CERTIFICATE

Certified that this thesis, titled **"Analysis of Zanzibar's seaweed industry competitiveness and strategy implication for its improved performance"**, is a bonafide record of research work done independently by **Ms Nina Joan Burra (2019-25-003)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.

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LIST OF ABBREVIATIONS AND ACRONYMS

BOT	Central Bank of Tanzania
FAO	Food and Agricultural Organisation
HS	Harmonized System
ITC MAP	International Trade Centre Map
LGA	Local Government Authorities
MoBEaF	Ministry of Blue Economy and Fisheries, Zanzibar
mt	Metric tonnes
ppt	percentage parts per thousand
OCGS	Office of Chief Statistician, Zanzibar
REPOA	Research on Poverty Alleviation-Tanzania
RGoZ	The Revolutionary Government of Zanzibar
SDL	Skill Development Levy
TASAF	Tanzania Social Action Fund
TRA	Tanzania Revenues Authorities
UN COMTRADE	United Nations Commodity Trade
UNICTAD	United Nations Conference on Trade and Development
URT	The United Republic of Tanzania
VAT	Value-Added Tax
WB	World Bank
ZAFIRI Institute	Zanzibar Fisheries and Marine Resources Research
ZASCI	Zanzibar Seaweed Cluster Initiative
ZEMA	Zanzibar Environmental Management Authorities
ZIPA	Zanzibar Investment Promotion Authority

ZSI	Zanzibar Seaweed Industry
ZRB	Zanzibar Revenue Board

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INTRODUCTION

CHAPTER 1

INTRODUCTION

1.0 Background

Seaweed aquaculture is one of the fastest-growing components of global food production. Since the neolithic ages, coastal communities have been harvesting seaweed for food consumption (Buschmann *et al*., 2017). The production of seaweeds in the world comes from two primary sources, i.e., aquaculture/mariculture and wild harvests (West *et al*., 2016). However, ninety-nine per cent of world seaweed production is heavily supported by aquaculture (Cai, 2021). Between 1969 and 2019, seaweed aquaculture increased to 34.7 million tonnes from 1.1 million tonnes, while wild-harvest volume has remained relatively the same, i.e., 1.1 mil tonnes (Cai *et al*., 2021). Average production from seaweed aquaculture stands at 12mt, with China as the leading producer (Ferdouse *et al*., 2018). Regional imbalances exist in the production and trade of seaweeds, where Asia supplies about 97.4 per cent of world seaweed production. Similarly, seven of the top ten seaweed-producing countries are from South-Eastern and Eastern Asia.

The global seaweed industry is valued at US$ 2.65 billion per annum (Cai, 2021). China, Indonesia, the Philippines, and Norway are among the world's leading seaweed exporters (Cai, 2021). Africa is the world's fourth producer and exporter of seaweeds, headed by the United Republic of Tanzania: Zanzibar and mainland Tanzania (URT). However, the URT contribution is minute, i.e., only about 0.41 per cent of total seaweed production (Cai *et al*., 2021). About 443 Aquatic Sciences and Fisheries Information System (ASFIS) items in aquaculture are recorded in the Food and Agricultural Organisation (FAO), out of which about twenty-seven seaweed species are cultivated globally (Cai *et al*., 2021). Among the twenty-seven species, only *five* genera are heavily cultivated globally, which are; *Laminaria/Saccharina* species (34.65%);

Kappaphycus/Eucheuma (32.62%); *Gracilaria* (10.32%); *Porphyra* (8.33%) and *Undaria* (7.16%).

FAO recognises only three categories of seaweeds bearing economic/commercial value, i.e., brown seeds (*Laminaria/Saccharina* and, *Undaria*); red seaweeds (*Kappaphycus/Eucheuma*, *Gracilaria* and *Porphyra/Nori*) and the green seaweeds. Red seaweeds/*Rhodophytas* are the most produced among the three contributing to 51.48 per cent of the world's seaweed production (Cai, 2021). Asia is the leading producer of *Rhodophyta*, contributing to about 98.88 per cent of its total production, followed by Africa (0.99%) (Cai *et al*., 2021). In the western Indian Ocean region, five[1] countries are known to produce red seaweeds for exports, food and fishing (Msuya et al., 2014), out of which only the URT has significant community-based aquaculture (Ateweberhan *et al*., 2018). The URT is Africa's leading producer of *Rhodophytas* under genera *Eucheuma Denticulatum* (*spinosum* by trade name) and *Kappaphycus Alvarezii* (*cottonii* by trade name). The URT also has been found to have production potential for *Gracilaria* genera; however, initiations remain at the experimental stage (Msuya *et al*., 2014; Msuya, 2020; Msuya *et al*., 2022). *Rhodophyta*s are known for *carrageenan* extract, a valuable industry raw material/hydrocolloid (McHugh, 2003; Msuya, 2012) processed into food additives, fertilisers, biofuels, cosmetics, and medicines (Valderrama *et al*., 2015).

Zanzibar island is the leading producer and exporter of *Rhodophytas* in the URT (98.63%) (Cai *et al*., 2022, Msuya *et al*., 2022). The seaweed industry in Zanzibar (ZSI) is mainly for exports (99%) and is the second leading cash crop export to cloves (OCGS, 2021). The industry contributes US$ 6 million per annum in revenues to the Revolutionary Republic Government of Zanzibar (RGoZ) (Ferdouse *et al*., 2018). Less than one per cent of its total production is consumed domestically as value-addition (Msuya *et al*., 2022). The industry is also the third-largest source of revenue for the RGoZ (OCGS, 2021). The main

[1] Tanzania, Mozambique, Madagascar, Mauritius and Kenya

buyers of Zanzibar's seaweeds are *carrageenan* extracting industries found in Denmark, France, the USA, Chile, Belgium, the Philippines and China (ITC map, 2022). Limited regional buyers exist for the ZSI's outputs (e.g., Tunisia). Similarly, the market awareness level of ZSI activities in the URT is low (**Source:** primary data).

Seaweed aquaculture in Zanzibar provides employment and business opportunities for the rural inhabitants employing farmers, small-scale farmer processors and exporters. The industry employs about 25,000 independent smallholder farmers who are predominantly women (about 90%) (Msuya *et al*., 2022). The activity has significantly improved the livelihoods, especially of rural women farmers, by enabling them to construct and improve their houses, pay children's school fees, meet personal needs and reduce over-reliance on spousal support (Msuya, 2002;2009;2010; Songwe *et al*., 2016; Kalumanga, 2018; Shimba *et al*., 2021; Charisiadou *et al*., 2022; 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 (REPOA, 2018; Msafiri, 2021; Msuya *et al*., 2022). According to Ndawala *et al*. (2021), the development of the seaweed aquaculture sector in the URT remains behind that of animal aquaculture and terrestrial agriculture in terms of biosecurity and production technology.

Specifically, ZSI has failed to tap into the growing global demand for red seaweeds, thus underperforming compared to competitors in Asia (Msafiri, 2021). In context, ZSI export trends reveal that only a small part of produced industry output is being exported. Famers remain with large chunks of idle harvested load with no assurance of buyers. Further, ZSI also faces production and low returns challenges (Msuya, 2009;2010; Songwe *et al*., 2016; 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, diseases (ice-ice) and high die-offs (Msuya, 2020; Yahya *et al*., 2020; Makame *et al*., 2021; Charisiadou *et al*., 2022). The production 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 export product variety (Msafiri, 2021; Shimba et al., 2021; Msuya et al., 2022).

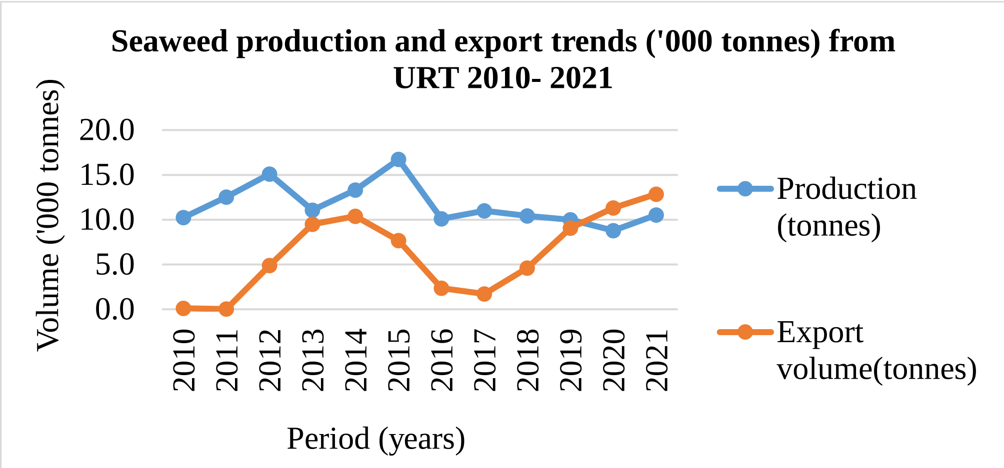


Figure 1.1: Production and export volume trends of ZSI 2010-2020 (**Sources**: Production data-The seaweed section, Dept. of Fisheries Development, Ministry of Blue Economy and Fisheries, Zanzibar; Export data-Tanzania Revenues Authority (TRA))

Thus, due to the challenges mentioned above, ZSI has been facing slow industry growth and declining production trends coupled with farm abandonment (Songwe *et al.*, 2016; REPOA, 2018; Msafiri, 2021; Charisiadou *et al.*, 2022; Msuya *et al.*, 2022). For instance, between 2015 and 2020, seaweed production in Zanzibar declined by 25% between 2015 and 2020 from 11,605t to 8,660t (Source: seaweed section, department of fisheries development, ministry of Blue Economy and Fisheries Zanzibar). Exports similarly reduced by 37% during the same period, from 18,430t to 11,605t per annum (Source: Tanzania Revenues Authority). Several studies have reported interventions required to tackle ZSI’s production challenges (Msuya, 2020; Shimba *et al.*, 2021; Makame *et al.*, 2021; Ndawala *et al.*, 2021; Yahya *et al.*, 2021; Charisiadou *et al.*, 2022). However, little remains known concerning the leading cause for ZSI’s low returns and subsequent interventions required to alleviate the same.

Therefore, this study was conducted to analyse ZSI's competitiveness by examining its structure, profitability potential, competitive advantages, business environment, production trends, export trends and comparative export performances of ZSI to major competitors. The study also analysed ZSI’s existing export marketing strategies and identified current industry constraints. Findings from this study were used to identify and recommend suitable strategies for ZSI’s improved and sustained performance.

1.1 Statement of the problem

Competitiveness analysis has been the focus of policymakers and economists for decades. Primarily, the concept indicates prosperity, especially at the national level. Further, it informs governments and strategists on effective policies and strategies for superior performance and welfare enhancement. Most competitiveness research works have been mainly found in industrialised nations rather than developing economies, with less priority on agriculture. In the context of the URT, its limited application also holds. For instance, limited competitiveness studies have been found with regard to ZSI, of which the main focus has been on the industry’s production challenges and how to enhance its productivity (Songwe *et al.*, 2016; REPOA, 2018; Msafiri, 2021). Further, limited knowledge exists about specific factors contributing to the ZSI’s primary challenge of low returns and interventions applied to alleviate the same. As a result, further deterioration of the industry's performance and loss of its socio-economic gains is inevitable for the island. Further, current negative industry trends of dwindling production and farm abandonment threaten the loss of URT’s competitive position in the global red seaweeds market.

Generally, coastal communities in the West Indian Ocean (WIO) region are said to be among the poorest and undeserving across and within countries (Ateweberhan *et al*., 2018). Rural Zanzibar is no different, with a poverty level of 40.2 per cent (World Bank, 2015). Further, agricultural workers across Zanzibar are reported to be the poorest group in contrast to other workforces (World Bank, 2015). The level of education in the island’s rural parts also is relatively lower compared to urban Zanzibar, thus leaving its inhabitants with few alternative economic prospects. Additionally, rural Zanzibari women, who make up the larger per cent of farmers, are already facing unequal employment opportunities and conditions (World bank, 2015). Moreover, they are also said to have relatively lower educational attainment than their male counterparts (World Bank, 2015).

Further, the deteriorating trends retrocede towards achieving Zanzibar development Agenda 2050 and Sustainable Development Goals 1, 2, 5, 8, 10 and 12. Therefore, bombarded by such socio-economic setbacks, rural Zanzibarians have limited economic alternatives to support livelihoods. Thus, competitive analysis of ZSI is vital to examine ZSI's performance, profitability potential and overall ability to compete in the international seaweed market. Further, the analysis will identify areas requiring immediate interventions and guide ZSI's stakeholders and the RGoZ on suitable strategies and policies to improve and sustain URT's prosperity in the international seaweeds market for its citizens' general welfare/livelihoods.

However, despite the challenges highlighted, seaweed aquaculture remains the most viable employment option for rural Zanzibarians, especially women, due to its relatively easy establishment requirements and frequent returns. The industry is said to be a *guaranteed* pathway to poverty reduction and rural development on the island (Songwe *et al*., 2016; REPOA, 2018; Msuya *et al*., 2022). It also remains one of the highest revenue and foreign exchange earning sources for the RGoZ.

1.2 Study objectives

The following objectives guided this study;

i. To perform a structural analysis of Zanzibar's seaweed industry
ii. To assess its trade performance between 2009 to 2019
iii. To evaluate the export marketing strategies applied by the industry, and

iv. To identify challenges faced by the industry's producers and exporters

1.3 Scope of the study

This study was implemented in Zanzibar (Unguja and Pemba) between September and November 2021 and followed a cross-sectional mixed-method survey strategy. The study was limited to analysing ZSI's structure, profitability potential, competitive advantages, business environment, export trends and comparative export performances of ZSI to major competitors. The study also examined ZSI's existing export marketing strategies and identified current industry constraints. Lastly, this study was guided theoretically by Porter's competitive advantage theory of 1980.

1.4 Rationale for the study

Zanzibar's seaweed industry is the most vital aquaculture sub-sector and the leading producer of seaweeds in the URT. It is also the leading exporter of seaweeds from Africa. Thus, its dwindling production trends and low returns negatively impact URT's aquaculture exports and revenues and negatively impact rural Zanzibar's livelihoods. Further, the negative trends threaten URT's competitive position in Africa's and the world's *Rhodotypa's* exports market. Thus, an analysis of ZSI's competitiveness as a study topic was selected based on its contribution to the global *Rhodotypa* industry, economic contributions to the RGoZ, socio-economic contributions to the rural Zanzibarians, and the industry's gender implication.

1.5 Significance of the study

The significance of this study is multi-fold. Primarily, the study aims to identify factors in ZSI structure affecting its performance outcomes. This study also intends to provide the RGoZ and ZSI industry stakeholders with suitable recommendations for developing appropriate measures to improve ZSI performance and contributions to Zanzibar's rural livelihoods. Significantly, the study aims to contribute to Zanzibar Development Agenda 2050 through its research, knowledge generation, and dissemination.

In the case of URT at large, Tanzania is on a journey towards becoming a middle-income economy by 2025. Efforts adopted by the government of Tanzania to promote such have included various policy implementations such as; The National Development Strategy 2025, Sustainable Industrial Policy 2020, Kilimo Kwanza Policy 2009, Tanzania SME policy 2002and National Trade Policy 2003, to name a few. These policies, in their totality, cannot work independently without relying on the agricultural sector as the primary provider of domestic industries' raw materials and the backbone of the country's economy.

The conclusions drawn from this study are also expected to promote more awareness of the socio-economic benefits of seaweed aquaculture and its contribution to improving livelihood, poverty reduction, and gender empowerment. The researcher intends for the URT government benefits from this study and uses its findings to grow and expand the seaweed aquaculture industry on the mainland, which is still at its primitive seaweed consumption stage. Recommendations from the study findings are also expected to aid the re-positioning of URT's seaweed aquaculture business in the global market. Further, knowledge generated by this study aims to support efforts to achieve the URT's development vision of 2025. Lastly, the study seeks to contribute to existing ZSI and global aquaculture literature and recommend areas for further exploration.

1.6 Limitations of the study

The industry exporter's financial details could not be obtained due to confidentiality issues; therefore, profits generated by exporters could not be established. Secondly, the researcher could not obtain seaweed exporting details, including the price paid/amount charged and volume sold. Third, almost ninety per cent of farmer participants do not keep farm records due to limited skills; hence, farm financial details derived are mainly based on estimations rather than actual values. The study was also limited to Zanzibar and not the URT. Lastly, no formal documentation exists of the number of seaweed farming villages and farmers by the seaweed section, the department of Fisheries Development, ministry of Blue Economy and Fisheries, Zanzibar (DFD-MoBEaF). Hence, the total number of farming villages surveyed was based on estimations given by the section.

1.7 Plan of the thesis

This thesis is divided into five chapters. The first chapter comprises the study's introduction, problem statement, scope, rationale, significance and limitations. The second chapter details reviews of literature related to industry and competitive analysis and provides a detailed description of the Zanzibar seaweed industry's history. The third chapter elaborates on the methodology adopted by the study, while the fourth chapter embodies the results and discussions of the study's survey. The last chapter summarises the research and its significant findings and proposes suitable strategies for ZSI's improved performance.

REVIEW OF LITERATURE

CHAPTER 2

LITERATURE REVIEW

This chapter has two aims; to provide background context on ZSI and its activities and introduce the concept of industry and competitive analysis. It also seeks to establish a theoretical framework that will guide the study. A research gap will also be identified accordingly, explaining why this study was implemented. Hence, the chapter is sub-divided into two main parts:

Section I Zanzibar's seaweed industry (ZSI) context

2.0 Background of ZSI

2.1 ZSI Production systems

2.2 Marketing channels of ZSI

2.3 Value chain of ZSI

2.4 Challenges facing the Zanzibar seaweed industry: Empirical evidence

Section II Industry and competitive analysis

2.5 Introduction

2.6 Definitions of industry

2.7 Classification of industries

2.8 Industry analysis

2.9 Theories of competitiveness

2.10 Defining competitiveness

2.11 Determinants of competitiveness

2.12 Measures of competitiveness

2.13 Export performance

2.14 Role of marketing strategies in enhancing export performance

2.15 Competitive analysis of industries: empirical evidence-world

2.16 Competitive analysis of industries: empirical evidence from the URT

2.17 Summary
2.18 Study's theoretical framework
2.19 Research gap

SECTION I

ZANZIBAR'S SEAWEED INDUSTRY

2.0 Background of ZSI

According to Bryceson (2002), coastal aquaculture had not existed in Tanzania before the 1980s. Most coastal resources were and still are mainly fished and gathered. Over time, wild seaweeds such as *Eucheuma spp*. started being collected and exported for sale from Zanzibar to France. This practice was replaced by seaweed farming after the species started depleting due to over-collection. Seaweed farming in Tanzania officially began with the University of Dar-es-Salaam's (UDSM) initial studies, including reporting the first seaweed farming experiments led by Professor Keto Mshigeni (Msuya, 2002;2012). In his report produced by FAO's department of fisheries and aquaculture, Sen (1991) stated that during the early 1980s, the UDSM had recognised the potential for *Eucheuma* farming in Tanzania and proceeded to initiate pilot farming activities for such being funded by USAID.

Three villages along the coast of Tanzania were chosen: Fundo Island in Pemba, Fumba Bay in Zanzibar, and Kigombe in the Tanga region (Bryceson, 2002). These model farms were to act as farming training centres for local communities in the area and offer extension services to improve the quality of dried seaweed (Sen, 1991). The sites were selected based on their localities which contained expansive reefs on the shores that supported dense seaweed populations. Initial pilot farming activities focused on *Eucheuma Striatum* and *Eucheuma spinosum* using the fixed-bottom cultivation method (commonly called *off-bottom*). However, all three pilot farms became unsuccessful due to two significant reasons; ocean-current changes and insufficient funds to cover the running costs of the farms. However, Sen (1991) highlights that the pilot farms were seaweed testing sites since they were never operational.

Commercial cultivation of seaweed in Tanzania then officially began in 1989 initially with seaweed type *Eucheuma* (incorporating scientific names *E.*

spinosum and *E. cottonii*) imported from the Philippines by private entrepreneurs (Msuya, 2002;2012; Msuya *et al*., 2016). The importation of the *Eucheuma* strain was necessary because the native strain could not grow under cultivation. The imported seaweed strain was planted in Paje and Jambiani on the East Coast of Unguja Island, Zanzibar (Msuya, 2002;2012). Seaweed farming in Tanzania then expanded to the Island of Pemba and then the mainland in 1992. More expansion experiments were conducted, and nursery farms were established in mainland Tanzania in Tanga, Bagamoyo, Mtwara, and Lindi regions and the Mafia islands (Msuya, 2002;2012**).** However, successful commercial cultivation of seaweed on a large scale is observed in Zanzibar more than in the other regions in mainland Tanzania.

2.1 Seaweed production system in Zanzibar

Cultivation of seaweed in Zanzibar is mainly practised using a peg-line method (the *off-bottom* method), where suspended lines derived from wooden stakes are driven into the seafloor and are used to plant the crop. Seaweed farmers tend their farms around daylight hours when ocean tides are lowest. Production of seaweed in Zanzibar is highest around the cooler months of June to August and lowest in the hotter months of December to February (Msuya and Neish, 2013). To grow, ingredients such as water temperature of between 25^{C} and 35^{C}, water salinity of about 28ppt, a white sandy bottom with the presence of a limited amount of natural seaweed, moderate water movement in the sea, sufficient sunlight, and a 0.5m depth of water for cultivation at minimum are essential to seaweed growth (Foscarini and Prakash, 1990).

Seeds are available locally and in areas with unavailability due to environmental challenges; they are given by export companies (Msuya et al., 2022). Suppose, for some reason, additional seedlings are required; in that case, neighbouring farmers typically share seedlings (Msuya *et al*., 2022). The cultivation of seaweed is mainly a family affair where children, wives, and husbands contribute to farming. Seaweed harvests in Zanzibar take place four to six weeks (or 45 days) after cultivation depending on farming sites' growth rates. Harvesting is done by retaining a proportion of the crop. Seaweed farmers depending on the distance from farming areas to collection points, may hire local harvesters and canoes to harvest and transport the wet produce to the nearby collection points (Msuya *et al*., 2022).

Alternative farming methods to peg and line have been experimented with on the island to counteract the inadequacy of the peg and line technique which faces severe ecological challenges. These are, namely, the floating line and casting techniques. In the floating line technique, farmers usually tie seaweed on nylon ropes and deploy floating devices in the deeper water of two to five meters depth, depending on the tidal level (Msuya, 2012; Valderrama *et al*., 2015.). In contrast, in the casting method, farmers use rubber bands to attach seaweed to rocks, hoping the seaweed will further vine and connect (Msuya, 2012).

2.2 Value-addition activities of ZSI

Value-addition of ZSI is reported to be less than one per cent of its total production (REPOA, 2018; Msafiri, 2021; Msuya *et al*., 2022). There have been efforts to add value-addition to Zanzibar's seaweed into soaps, cakes, hand lotion, shampoo, and other similar products, these efforts are still minimal, and their effects are marginal in the industry. For instance, the creation of ZASCI[2] in 2006 to promote Zanzibar's seaweed value-addition and innovation in production methods (Msafiri, 2021). Despite its presence in Zanzibar, value addition remains relatively scarce due to financial constraints, lack of prioritisation and support, limited training and lack of coherent industry strategy.

2.3 Value chain of ZSI

The main actors in the ZSI value chain can be categorised into four groups; production facilitators, seaweed farmers, collection centres and exporters (Msuya and Neish, 2013). The ZSI value chain begins with production facilitation to farmers by exporters, the seaweed section-DFD-MoBEaF, Zanzibar, and technical assistance from the Marine Institute, Zanzibar.

[2] Zanzibar Seaweed Cluster Initiative

Production facilitation involves input supplying, capital supply, farm-extension services, and transportation from suppliers to sites. The local individual smallholder seaweed farmers then implement production. They produce, harvest, dry, clean and pack. The dried seaweed is then taken to collection centres for sale. Collection centres are found at almost every seaweed farming village in Zanzibar and are representatives of seaweed exporters in Zanzibar-urban.

The officials at collection centres collect seaweed from farmers for pay until capacity, and then the load is balled and transported to exporters in Zanzibar-urban. The exporters perform re-cleaning, sorting, balling and storing for exports. The processes are different depending on buyers' needs. Seaweed exports from Zanzibar are then shipped to carrageenan extractors found in Denmark (CP Kelco), the USA (FMC), Chile (Gelymar), France (Cargill), Spain (CEAMSA), the Philippines (ShemBerg biotech), Japan (Mitsubishi), Korea (MSC. CO ltd) and China (Unknown) (Msuya and Neish, 2013).

2.4 Challenges of ZSI

Msuya (2012) conducted a study to examine the working conditions of seaweed farmers in Zanzibar. The study was conducted in Paje, Bweleo, Kidoti, Uzi, Uroa and Jambiani areas and revealed that farmers face environmental challenges and decreasing returns. Further, she points out that even though the seaweed business is under a free trade system, farmers do not have to negotiate leverage due to a few buying companies on the island. Further, she asserts that the farmers lack institutional structures to regulate their working conditions, including their occupational health and safety. Lastly, Msuya reveals that most men farmers have been abandoning the farming practice due to low returns in pursuit of other higher-earning economic alternatives.

Msuya *et al*. (2014) analysed the challenges of red seaweed producers in the WIO region and found unreliable demand, which has led to low prices, diseases, fouling, epiphytes, increased salinity, and failure of *Kappaphycus* growth were the leading challenges for the region. Among recommendations to counteract such unfavourable conditions, the authors proposed a deeper-line floating farming technique to circumvent increased sea temperatures at shallow waters where traditional off-bottom is practised.

In their study, Msuya *et al*. (2016) researched the state of the aquaculture industry in Zanzibar. They found that Pemba island produced over seventy-five per cent of total animal aquaculture production and ninety-one per cent of seaweed in Zanzibar. Their study also found marked differences in the seaweed farmers' gender, with more women farmers in Unguja (93%) than in Pemba (36%). Similarly, there were fewer farming villages in Pemba (33) than in Unguja (50) island. It was also found that Pemba had more male farmers than Unguja. The differences are explained as the result of developmental differences between the two islands, which lead men in Unguja to engage in other higher-paying economic activities than in Pemba. The authors also found that aquaculture farmers face environmental and price challenges.

REPOA's (2018) brief investigating ZSI's competitive potential revealed several industry challenges. The report revealed that; the industry is at a declining stage and experiencing production without replenishment, diseases and epiphytes attacking seaweed plants leading to poor thallus growth and high die-offs. Further, the report revealed that the industry lacks specific strategies, policies and operational mechanisms, so the farming practice has been left to self-operate. The regulatory gaps led to duplicating charges (levies, taxes), overregulation of export procedures, production inefficiency, and eroded profits.

Ateweberhan *et al*., (2018) investigating challenges inhibiting community-based aquaculture in the WIO region, found biophysical factors (diseases and epiphytes), infrastructural and poor governance, farming sites availability, regional and international market demand. Msuya (2020) studied ZSI's status, farmed species and existing challenges and found that; farming technology adopted on the island is still a traditional off-bottom method facing severe environmental challenges. Further, the author found an ongoing challenge of epiphytes, ice-ice diseases, and occurrences of macro and microalgae blooms that have been attacking *spinosum* and also causing skin and eye irritations to farmers.

In his study, Msafiri (2021) analysed constraints that hinder ZSI trade and market competitiveness and found that ZSI produces low-priced *spinosum* leading to constrained returns. His report also revealed that the industry faces low value-addition growth, limited market information, limited seaweed distribution channels and slugging development. Msafiri recommended developing a ZSI industry policy, further research into ZSI activities, scaling up education and training programs for the seaweed farmers and investing in seaweed processing industries.

According to Ndawala *et al*. (2021), ZSI has been experiencing declining production due to diseases and epiphytes. The authors posit that the widespread nature of pests and diseases in the seaweed farming industry is a consequence of undeveloped biosecurity measures at the national level. They expound that no single causative agent has been identified despite multiple reports of diseases attacking seaweed plants since the early 2000s. The authors postulated that the development of the seaweed aquaculture sector in the URT dwindles behind that of animal aquaculture and terrestrial agriculture in terms of biosecurity and production technology.

According to Msuya *et al*. (2022), ZSI was found to practise traditional off-bottom, non-resilient to increased sea temperatures and salinity levels. Further, the authors found that prices paid to farmers in Zanzibar were still low in comparison to competitors in Asia. The study also found that other farming techniques have been experimented with to explore their resilience to ecological attacks, including the floating line system, bamboo rafts, net bags and tubular nets; however, the efforts remain experimental. No concrete trials have been conducted yet.

SECTION II

COMPETITIVENESS OF AN INDUSTRY

2.5 Introduction

The industry environment dramatically influences business operations. A business must therefore ensure that its strategy matches the background of its industry. If it becomes exceptionally challenging or impossible, it must attempt to change the industry's climate to its benefit by implementing the right strategy. Because of this, it is widely accepted among business strategists that a comprehensive industry and competition study should precede developing a solid plan. Intense competition in local and global markets places greater demands on firms in terms of their competitiveness. In smaller open economies, such as the URT's, competitiveness enables businesses to increase their potential, which could not be fully exploited within the domestic market. Additionally, businesses benefit from competitive growth and positively impact the whole economy's competitiveness and the nation's standard of living.

2.6 Definition of industry

Gorton (2003) defines an industry as grouping businesses/firms based on similar business activities. The author posits several ways of grouping businesses in the industry, but the commonly applied criteria are products/services produced/offered and the largest revenue sources. The Oxford dictionary defines an industry in three ways: first, as an activity which involves the production of goods from raw materials; second, a physical setting where activities and people are employed in producing particular services or goods and lastly, a working-hard quality/ability. Merriam-Webster's dictionary has several definitions for the term industry, including; an activity of manufacturing, a distinct group of profit-making and productive organisations, systematic employment of labour for some valuable purposes and or a department/branch of some craft.

Britannica website defines an industry as a group of productive organisations producing or supplying goods/services and sources of income. Aithal (2017) delineate an industry as a system of businesses or manufacturers with a shared objective of creating goods/services. Porter (1980) defines an industry as "*a group of competitors producing goods/services that compete directly with each other*". According to him, the industry is the basic unit for understanding competition and is considered an arena through which competitive advantage is won or lost (p. 33 & 34).

2.7 Classification of Industries

Britannica's website categorises industries into four economic groups: primary, secondary, tertiary, and quaternary. Primary industries include agriculture, fishing, forestry, mineral extraction, mining and quarrying. The website further categorises primary industries into genetic and extractive industries. Genetic primary industries produce raw materials applicable in the production processes (agriculture, fishing, livestock management). In contrast, extractive industries comprise exhaustible raw materials production that cannot be developed through cultivation (extraction of mineral fuels and quarrying). These types of industries tend to dominate under-developed countries (Britannica, 2020).

Secondary industries tend to perform three essential functions, i.e. initially consuming and transforming primary industries' raw materials into consumer goods. Second, they further processed the materials to be used by secondary industries for further processing into finishing products. Lastly, it creates capital goods that will be used to produce both consumer and non-consumer goods. Secondary industries are further subdivided into large and small-scale industries. Heavy secondary industries are primarily complex, have significant capital requirements (for both machinery and plants), require specialised human resources and generate large outputs (e.g. steel and iron industries, cement industries, petroleum). In contrast, light secondary industries employ a relatively minor amount of capital investment and usually produce non-durable/standard products (e.g. textiles, food processing) (Britannica, 2020).

The OCGS 2020 report classifies Zanzibar's economy into four major industries, i.e., agriculture, fishing and forestry; services, industries and taxes on products. The services industry is the most significant contributing sector to Zanzibar's GDP (43.9%), followed by the agriculture, fishing and forestry industries (27.4%) (OCGS, 2020). The industries and taxes on products sectors contribute to 19.3 and 9.2 per cent, respectively, of the GDP (OCGS, 2020). Under the agriculture, fishing and forestry industry, there are four sub-industries recognised by the RGoZ: forestry, crop, livestock and fisheries.

The crop sub-industry is further subdivided into two categories, i.e. food crops, fruits and vegetable production and cash crops. There are mainly three cash crops produced in Zanzibar: cloves, stems and seaweeds. Cloves production is the leading cultivated cash crop on the island; however, between 2015 and 2020, the production of cash crops reduced by 38.8%, from 20,263 tons in 2015 to 12,299 tons in 2020. The reduction was majorly observed in seaweed production, which decreased by 47.5% from 16,724 tons in 2015 to 8784.6 tons in 2020. Clove production reduced by 7.5%, from 3322 tons in 2015 to 3072 tons in 2020 (OCGS, 2021).

2.8 Industry analysis

Business environments consist of all the external influences that affect a business's performance and decisions. Business environmental effects can be classified by source, e.g., social-cultural, economic, political, and technological factors (commonly referred to as PESTEL) or by proximity to the business's micro and macro-environment. An analysis of the business environment becomes an initial step for business strategists when deciding what strategy a company should pursue. Blackwell Publishing, 2022 posits that the prerequisite for a practical environmental analysis is to distinguish vital from the merely important factors affecting the business. According to them, the process would entail understanding customers, suppliers, nature of competition at the micro-level and PESTEL at the macro-level.

An industry is considered to be a business's immediate environment and is defined industry as an arena where firms where several firms/businesses offering products or services of close substitution compete (Porter, 2004). Porter found that the forces shaping competition intensity and profitability potential for each industry remained the same despite several contrasting industries with differing structures (Porter, 2004). The five competitive forces shaping the industry's competitive rivalry and profitability potential are; the threat of potential entrants, buyers' bargaining power, suppliers' bargaining power, the threat of substitute products and competitive rivalry (commonly referred to as Porter's five forces). According to Grundy (2006), Porter's five forces model is suitable for predicting an industry's long-run returns as it summarizes microeconomic theory into five main factors.

In testing the applicability of Porter's framework in contemporary times, Narayanan and Fahel (2005) tested Porter's Framework in emerging economies' institutional context. Their study found that the model's transaction costs, rivalry rules, and capital flow qualifying assumptions did not hold for the economies. The authors concluded that businesses in emerging economies adopt unique strategies to suit their unique institutional context rather than deriving from Porter's framework. Karagiannopoulos *et al*. (2005), studying the suitability of Porter's model in the internet era, concluded that the model could be enhanced by considering adding, i.e. innovation intensity. However, Dälken (2014) hold that the model still applies in modern times. In their studies, the author investigated the role of deregulation, globalisation and digitisation in the new internet era. His findings concluded that the new forces change industry structures but do not restructure the original Porter's model.

Further, Porter posits that business strategies should organically emerge from a deep understanding of the structure of an industry within which a business/firm exists. Three generic industry strategies were proposed by Porter in his 1979 work, i.e. low-cost producer, differentiation and focus. A low-cost strategy involves production on a large scale, enabling businesses to exploit economies of scale and thus be able to price their products/services relatively cheaper than competitors. On the other hand, a differentiation strategy is achieved by providing products with quality and branding, which commands strong customer recognition, sustained promotion, and wide distribution, ensuring the firm's wide availability of products. Lastly, a focus strategy, in contrast, is adapted to serve a specific target market well by focusing on a particular segment of the business's product line, buyer/ buyer group, or geographic market. (Porter, 2004, p. 12-15).

Arize et al. (2012) conclude that industry analysis is a phenomenon taken seriously by business practitioners. The authors posit that practitioners emphasise including all the vital aspects of analysis, including; industry life cycle, business cycles, competitive environment and external environment analysis. The authors conclude that a thorough approach to industry analysis should be considered. Aithal (2017) posits that industry analysis is a type of case method research that analyses specific industries to create new knowledge about them. He identifies various kinds of industry analysis that can help business researchers to understand a particular industry. These include but are not limited to; industry-sector analysis, industry trend analysis, competitor analysis, product/service analysis, financial performance analysis, SWOC and PEST analysis, and investment analysis.

Despite the existence of numerous industry analysis tools, consensus remains among authors that the five forces framework remains widely applied (Karagiannopoulos *et al*., 2005; Grundy, 2006; Pringle and Huisman, 2011; Indiatsy *et al*., 2014; Ural, 2014; Wellner and Lakotta, 2020). The framework applications can be observed across several industries' research, for instance, higher education (Pringle and Huisman, 2011; Ural, 2014); Cooperative banks (Indiatsy, Mwangi and Mandera, 2014); railway industries (Wellner and Jakotta, 2020); natural gas (Hafezi *et al*., 2020); airport industries (Tanriverdi and Lezki, 2021); manufacturing industry (Soraya *et al*., 2022) and, tourism education (Schweinsberg *et al*., 2022)

2.8.1 Porter's five forces industry analysis

Porter considered an industry as a business's immediate environment and defined industry as an arena where firms where several firms/businesses offering products or services of close substitution compete (Porter, 2004). The five competitive forces shaping the industry's competitive rivalry and profitability potential are; the threat of substitute products, suppliers' bargaining power, buyers' bargaining power, the threat of potential entrants and competitive rivalry. The model owes its origin to industrial organisation theory (Karagiannopoulos *et al*., 2005).

The model owes its origin to industrial organisation theory (Karagiannopoulos *et al*., 2005). However, the model received criticisms from some researchers regarding assuming that industry is static; it also ignored the crucial roles of complementary goods and government (Dalken, 2014; Ural, 2014). Further, the model is said to have over-emphasised macro-environmental analysis at the industry level rather than the specific product/services category at the micro-analysis level (Grundy, 2006). Such criticisms led to Porter's addition of four forces in 2008: the role of complementary goods, the rate of industry growth, the government role, technology, innovation and the government role.

Bargaining power of buyers

Porter defines bargaining power 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 (Porter, 2004;2008).

Bargaining power of suppliers

According to Porter, certain circumstances may render suppliers powerful. For instance, 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 when switching suppliers, and when suppliers' products are differentiated. Additionally, suppliers may become powerful when there is no close substitute to the supplier's products and the likelihood of the supplier's forward integration exists (Porter, 2004;2008).

The threat of substitute products

According to Porter, 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;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;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).

Competitive rivalry

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;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;2008).

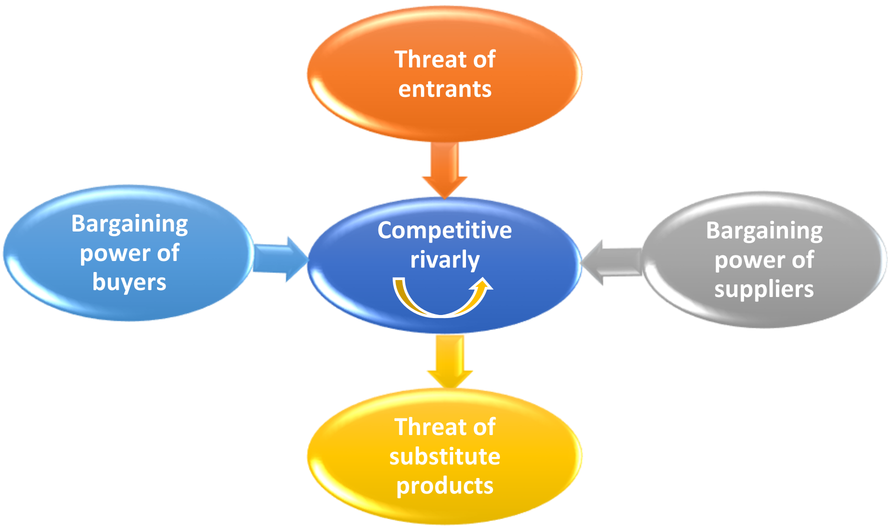


Figure 2.1: Porter's five forces (**Source:** Adapted from Porter, 1980)

2.9 Theories of competitiveness

The term *competitiveness* originates from the Latin word *competer*, which refers to being involved in business rivalry for markets (Siudek and Zawojska, 2014; Bhawsar and Chattopadhyay, 2015; Jambor and Babu, 2016). It is an economic term that owes its popularisation from the eighteenth century and has been evolving in terms of definition, scope, and measures. There is a consensus among scholars in economics that there exists no single description, determinant or measure for competitiveness; instead, it is more of a subjective topic (Porter, 1985; Feurer and Chaharbaghi, 1994; Henricsson *et al*., 2004; Aiginger, 2006; Arslan and Tathdil, 2012; Bhawsar and Chattopadhyay, 2015; Jambor and Babu, 2016; Cronjé and Plessis, 2020).

Although the idea of competitiveness is a relatively new field of research, it has roots in earlier economic theories dating back to Adam Smith's (1776) "absolute advantage theory" (Bhawsar and Chattopadhyay, 2015). In Smith's approach, countries can trade when absolute advantages in producing different commodities would lead to gains *simultaneously* through exports and imports. According to the authors, Smith's view of inter-country trade would e solely determined by differences in labour costs (productivity) of producing the commodities. Thus, a country should export that commodity with less labour hours in production and import commodities that use more labour hours than competitors. Smith's theory assumes that for export to attract gains, an exporting country should spend fewer labour hours and materials, and the labour employed should be cheap compared to competitors.

Among the criticisms of Smith's theory of Absolute advantage was that he assumed international trade could only happen between two nations and only in two commodities. Such an assumption was significantly challenged when countries' trade and needs increased. To address the problem with Smith's theory, Ricardo (1817) developed the "comparative advantage theory," which discoursed the issue of what would happen if one of the two countries had an absolute competitive advantage in both goods. Ricardo also utilised a two-country, two-product model to illustrate the concept (Bhawsar and Chattopadhyay, 2015). His proposition stated that mutually beneficial trade is still conceivable if the favourable nation deals in a good with a more considerable comparative advantage. The country with the more significant comparative disadvantage (least opportunity cost) in one of the two items should engage in trade in that product. (Bhawsar and Chattopadhyay, 2015)

However, according to Bhawsar and Chattopadhyay (2015), Ricardo's theory was predicated on several constrained premises. The explanation provided by Ricardo's theory for why labour productivity varies between countries fell short. The authors posited that Hamel and Prahalad (1989) proposed that competency-based competition could explain shortages in Ricardo's comparative theory. According to their perspective, a firm's resource endowment determined by its current products' price/performance characteristics gives it a competitive edge in a short time. However, a competitive edge would depend on its capacity to produce goods faster and at a lower cost than rivals (Bhawsar and Chattopadhyay, 2015). Hamel and Prahalad (1989) considered a combination of corporate production skills and savvy technology sources of the organisation's core competency.

However, Heckscher (1919) and Ohlin (1933) (popularly referred to as the Heckscher-Ohlin model) proposed a modification to the Ricardian competitiveness theory. The economists agreed that variations in factor endowments lead to comparative advantage; however, international trade should occur between capital-intensive and labour-intensive countries. Specifically, countries with abundant capital (e.g. industrialised nations) should export capital-intensive goods to countries with fewer capital resources. Similarly, countries with plenty of labour should export labour-intensive goods to capital-intensive countries and import the same (Bhawsar and Chattopadhyay, 2015). However, the *Leontief paradox* disproved the thesis in 1953, when it was found that the US (a capital-intensive country) was exporting labour-intensive goods and importing capital-intensive goods (Bhawsar and Chattopadhyay, 2015). Leontief explained the inconsistencies as a result of inefficiency, i.e. countries will export what they can produce most efficiently, contingent upon factors endowments. Importation of goods will occur for those that they cannot produce efficiently.

However, the Leontief paradox was also shown to be less pronounced in research by Stern and Maskus (1981) using US foreign trade data for 1958–1976 (Bhawsar and Chattopadhyay, 2015). According to the authors, its shortcoming was that it could not fully explain intra-industry trading. The Krugman model came into existence in the 1980s and attempted to explain commerce between countries with identical factor endowments. The model assumed that customers prefer product variety and projected imperfect competition. Due to their imperfect competition, two economies specialising in a particular product variety can trade. Thus, a nation may be a net exporter of a good whose manufacturing benefits from economies of scale.

According to Krugman's approach, only businesses with better productivity supply domestic and international markets, while the others leave the market. Krugman (1994) laid out the two competing views for defining competitiveness, i.e. the ability to export (cost) and productivity. Under the cost share view, companies' ability to compete globally is influenced by their location (or external balances). Locations of firms were therefore considered competitive if their macroeconomic aggregates were balanced. Krugman's production view of competitiveness hypothesized that a location's level of productivity drives the standard of living for the individuals in that particular location. (Ketels, 2016)

Hence, a specific location is considered competitive if it can raise living standards and sustenance levels. Porter (1990) and Delgado et al., (2013) shared the same views. However, between the two arguments, the cost view received several criticisms from translation differences (Ketels, 2016). For instance, Ketel expounds that, unlike firms, locations do not go out of business and can adjust factors (e.g. prices) to accommodate revenue changes. He expounds that the cost view definition is essential for organisations with specific mandates to track and manage their macroeconomic imbalances.

2.9.1 Porter's Diamond model

Porter (1980) presented a new paradigm to define a nation's competitive position and described it as the ability of countries (and businesses) to pursue policies that would enable them to create goods of superior quality and sell them at higher prices. In addition, he described the need for a new paradigm due to the changing nature of competition (highly skilled labourers, advanced technologies) and globalisation, making labour highly mobile and promoting the internationalisation of businesses. Given similarities in, for instance, a nation's possession of high technology and skilled labour, there arose a need for a new theory to explain why some firms from these nations choose better business strategies than others.

A new approach was needed to explain why certain countries are considered a home base for successful global competitors who engage in foreign investment and trade. Previous theories had only attempted to explain from the context of either one of them but not both. Porter argues that any business's ability to compete globally is rooted in locational advantages that specific industries possess differently from competitors. The locational advantages are the set of interconnected factors' network commonly referred to as *Porter's Diamond Model*. These factors are; factor conditions, demand conditions, industry structure, strategy and rivalry, and government and chance conditions.

According to him, countries excel in industries or segments where determinants/locational advantages are most favourable. However, Porter (1990, p. 72) cautions that possessing local advantages does not necessarily warrant success except when industries have been able to exploit their national environment and available skills and resources well. Industries or firms utilising their national advantages effectively and competitively tend to prosper in international competition (Porter, 1990, p.72). Competitive advantages based on a few determinants (one or two) are also said to be possible by Porter in industries whose production processes are dependent upon natural resources to a large extent, skill levels and low unsophisticated technology. However, the advantages will only be gained short run since competitors can easily circumvent them in the long run (Porter, 1990, p.73).

Factor conditions

Porter defines factor conditions as a country’s position regarding its natural and created factors necessary for production processes. These factors include; capital, human capital, physical, infrastructure, technology, and knowledge resources. He asserts that competitive advantage is earned through efficient and effective deployment of factors rather than mere endowment (Porter, 1990). According to Porter, factors can be alienated into two groups, i.e. basic versus advanced factors. Basic production factors comprise a country's location, its set of natural resources, its unskilled and semi-skilled labour, and debt capital. Advanced factors comprise a country’s highly skilled labour, modern infrastructures and technology. Basic production factors are passively inherited by countries and require modest investments; however, in the context of national competitive advantages, they are considered unimportant (Porter 1990, p.77). Nevertheless, the labour-intensive agricultural and extraction industry relies heavily on basic factors.

Factor conditions can also be delineated into specialised versus generalised factors. According to Porter, specialised factors include specific infrastructures and highly skilled labour, while generalised factors may include a narrowly trained but motivated labour pool and debt capital supply. Specialised factors provide more sustainable bases than generalised factors in harnessing national advantages. Factors can also be differentiated based on whether they are inherited or created.

Demand conditions

These are home-based demand conditions for products or services. According to him, three crucial factors explain home conditions; composition (character, nature, segments), demand size, growth patterns, and the means the conditions translate to international markets (Porter, 1980).

Firm structure, strategy, and rivalry

Refers to the context in which businesses are built, organised, and managed. This force also affects the nature of domestic competition (Porter, 1980). Domestic rivalry is instrumental to international competitiveness since it forces companies to develop unique and sustainable strengths and capabilities. The more intense the domestic rivalry is, the more companies are being pushed to innovate and improve to maintain their competitive advantage. In the end, this will only help companies when entering the international arena.

Related and supporting industries

Refers to the supplier or associated industries within a country that are competitive internationally (Porter, 1980). The presence of related and supporting industries provides the foundation for the focal industry to excel. Especially suppliers are crucial to enhancing innovation through more efficient and higher-quality inputs, timely feedback and short lines of communication. A nation's companies benefit most when these suppliers are, in fact, global competitors. It can often take years (or even decades) of hard work and investments to create related solid and supporting industries that assist domestic companies in becoming globally competitive. However, once these factors are in place, the entire region or nation can often benefit from its presence.

Porter posits that when the factor conditions are favourable to a particular nation, they continuously force domestic businesses to innovate and upgrade. Experiences gained by businesses will build them to be able to tackle competitors at the international level. As a result, he posits that businesses generally seek to establish and define appropriate tactics to compete profitably and sustainably. Porter further elaborates that no global approach/strategy exists for businesses in an industry arena; hence, creating a competitive strategy must consider industry structure and positioning. Thus, a competitive strategy organically grows from what he calls a "*sophisticated understanding*" of an industry structure and how it is changing (p. 34). According to Porter, the four advantages are regulated by the government and chance conditions.

Porter asserts that the government's role in determining a nation's competitive position is rather an *influencer,* e.g. through offering subsidies and creating policies (towards education, capital markets, for instance). At an industry level (local), Porter posits that the government's role is rather subtle but can be witnessed, for example, through setting local product/service standards and buying products produced within the country. Chance conditions, on the other hand, can also influence competitiveness positively or negatively. For instance, an act of pure invention in the market can create new needs/buyers, and discontinuity of technologies erodes business profits and directly affects both supply and demand of products. Political decisions of foreign governments can harm or enhance competition. Porter states that chance events are crucial because they tend to create discontinuities that shift competitive positions

The industry forces can either be strong or weak regarding their effect/level of threat to the industry's competition and profitability potential. A weak competitive force may serve as an opportunity, while a strong force may threaten the industry. For instance, low industry profits are associated with the strong bargaining power of suppliers and buyers, intense rivalry, low entry barriers, and cheap but high-performing substitute products. On the other hand, high industry profits are associated with weak buyer and supplier power, high entry barriers, little or no rivalry, and few opportunities for substitutes (Porter, 2008).

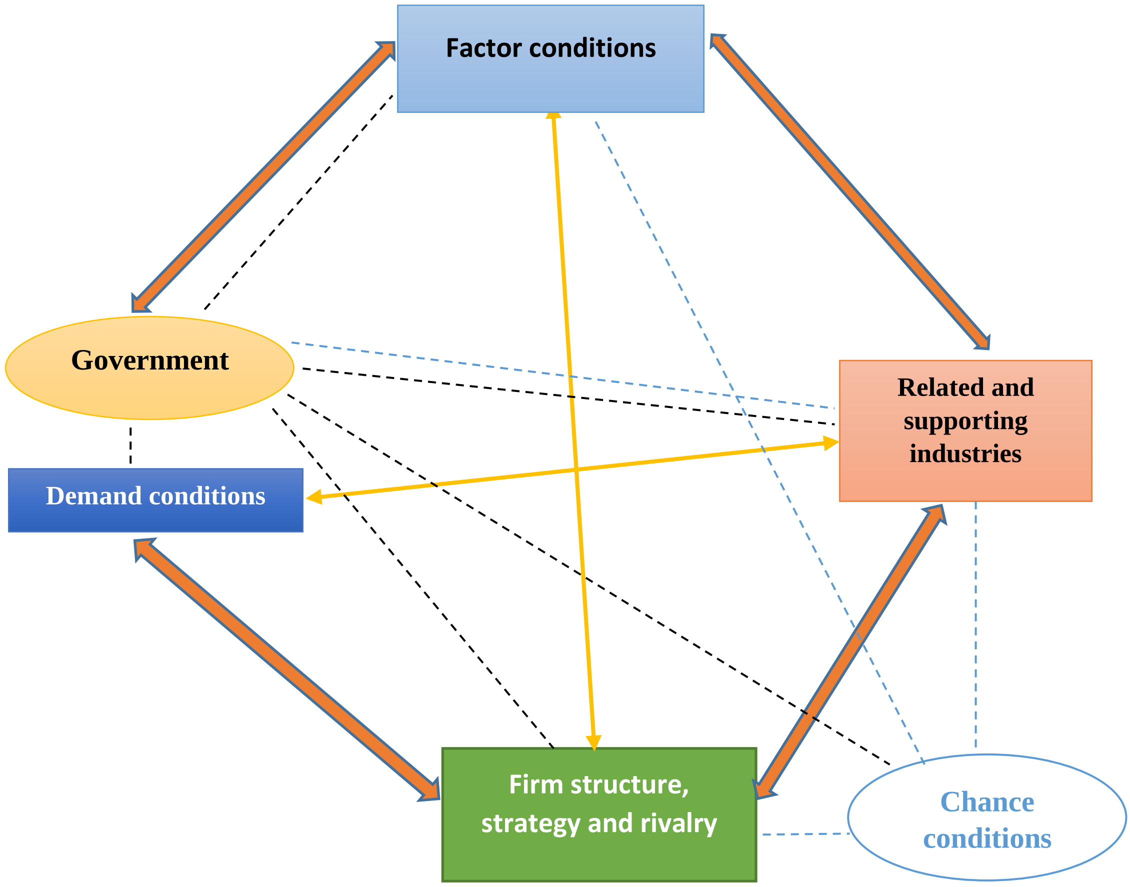


Figure 2.2: Porter's Diamond model (**Source:** Adapted from Porter, 1980)

2.10 Defining competitiveness

Buckley et al. (1988) described competitiveness as a process that embodies both an end (desired goals) and a means to achieve such ends (resources, operations, management). The authors further expounded on the concept as a function of both efficiency (optimal allocation of a firm's resources) and appropriate objectives (right goals). The authors also point out that competitiveness as a concept is relative, i.e., it has to be defined in relation to another part of the world (different historical points in time, competitors, counter-factual position).

According to Porter (1990), "national productivity" is the only valid definition of competitiveness at the national level. He presented a new paradigm to define nations' competitiveness as *an ability to pursue policies that would enable them to create superior goods or services and sell them at higher prices*.

He described the need for a new paradigm due to the changing nature of competition and globalisation, making factors highly mobile and promoting the internationalisation of businesses. Porter contended that productivity is a poetic way of meaning "*competitiveness*", which is rhetoric. His view was that rivalry between nations had little to do with competitiveness.

Further, he emphasised that businesses, not countries, struggle for market share. Given similarities in, for instance, a nation's possession of high technology and skilled labour, there arose a need for a new theory to explain why some firms from these nations choose better business strategies than others. Thus, a new approach was proposed by Porter to explain why certain countries are considered a home base for successful global competitors who engage in foreign investment and trade (i.e. Porter's Diamond model).

Newall et al. (1991) defined competitiveness as a production process that produces superior goods and services and markets them successfully internally and in foreign markets.

Feurer and Chaharbaghi (1994) defined competitiveness as the ability of an organisation to persuade its customers to choose its offering over the competitors; another is an ongoing effort and commitment to continuously improving process capabilities and core competencies. The authors elaborate that the concept carries different meanings among economic agents. For instance, among managers, competitiveness is viewed as an organisation's ability to convince customers to buy superior goods than available alternatives.

Rugman and D'Cruz (1993) criticised Porter's diamond model for being unsuitable for small and open trade economies. In contrast to Porter, they considered the function of trade agreements and overseas subsidiaries in their *double diamond model*. Their model took into account the global environment of national competitiveness. The generalised *double diamond model* put out by Moon et al. (1998) combines domestic and foreign diamonds to analyse a nation's level of global competitiveness. Thus a country's competitiveness is a product of the two key highlighted factors. The domestic diamond depends on the country's size and competitiveness, while the outer diamond stands for the global diamond. What separates Rugman and D'Cruz's 1993 and Moon et al.'s 1998 models is the nation's outbound and inbound foreign direct investment.

In contrast, Moon and Peery (1995) asserted that competitiveness is the organisation's relative position versus rivals. McFetridge (1995) described a competitive industry as having locally or globally competitive enterprises. If a business continuously makes money in an open market, it is interregional or globally competitive. An expanded definition of industrial competitiveness that takes stakeholders into account was offered by Momaya (1998). He claims that it is determined by how well an industry satisfies the interests of many stakeholders, such as providing workers with a safe working environment and the wants of consumers. If a sector has businesses that offer sizable returns on investment, it may be assumed that the industry is competitive.

Moon *et al*. (1998) have defined national competitiveness as "*the capacity of enterprises engaged in value-added activities in a given industry in a particular country to sustain this value-added over lengthy periods notwithstanding worldwide competition*". The definition is the collection of institutions, guidelines, and other elements that affect a nation's degree of productivity (Global Competitiveness Report [GCR], World Economic Forum, 2013).

According to Henricsson et al. (2004), competition at the national level is summarised as a country's ability to have successful trade performance while earning increasing returns on both employed resources and welfare creation in the long run. At the firm level, the authors summarise competition as the sustained superior market performance of a firm under conditions of higher productivity. The goal is to ensure the firm's long-run existence and increase shareholder returns. Carraresi and Banterle (2008) point out that competitiveness is an industry's ability to compete and maintain its market share domestically or at the international level under conditions of free trade.

Aiginger (2006) defined competitiveness as an ability of a particular location or nation to create welfare. He further proposed a process and output evaluation to measure this ability. According to the author, the concept of competitiveness has long shifted focus from its traditional view of a firm's competitiveness (market shares and external balances) to the national level (welfare creation). However, he alienates that the concept remains vague and its theoretical backgrounds are lacking, thereby rendering it dangerous for use in policy creation which has been a common practice for many governments.

According to Chikan (2008), a company's capacity to stably fulfil its dual purpose of meeting consumer needs while making a profit makes it competitive. Offering products and services that customers value more highly than those provided by rivals is one way to realise this capacity. "*Competitiveness is a capability, and its potency has to be realised in a firm's daily activities*," claim Cetindamar and Kilitcioglu (2013). The criteria mentioned above suggest that a firm's competitiveness depends on its capacity for adaptation and the realisation of long-term profit.

In comparison, Amone (2015) defines competitiveness as a set of factors, policies, and institutions determining the productivity levels of a country/economy, while Saha *et al*. (2019) relate competitiveness to an organisation's effectiveness that aims to fulfil its performance development goals predicated on its operational and managerial growth. Hernandez et al. (2015) defined competitiveness as an organisation/country's performance and ability to sell and supply goods/services in a given market in relation to other organisations/countries. According to Nowack and Kaminska (2016), competitiveness is a rivalry process to befit from particular economic activity and is derived from the comparative advantage theory.

Another adopted view of competitiveness is the ability to create and sustain superior performance, the ability to develop welfare in society, and the ability for a nation to prosper in trade (Karpova and Lee, 2018). Peneder and Rammer (2018) posit that an industry level of competitiveness refers to competitive strengths and weaknesses in the international market compared to competitors. Louati (2018) defines competitiveness as firms' ability to offer goods and services at prices relatively lower than competitors while creating competitive market positions that ensure superior economic performances.

Maravilhas *et al*. (2019) define competitiveness as an organisation/country's competence to be able to produce and sell products (and services) at lower prices (in comparison to competitors) while maintaining market quality standards and ensuring maximum returns.

Strukelj *et al*. (2020) have defined competitiveness as a process organisations adopt to achieve advantages over competitors. Firmansyah (2020) defined competitiveness as the ability of a producer to produce a product at a low cost compared to prevailing prices in the international market. The author further argues that the export demand in the importing country will increase only if the exporter has a high competitiveness capability.

2.11 Determinants of competitiveness

In an attempt to study competitiveness, several authors agree that it is noteworthy to determine the unit of assessment and measures, e.g., at the business/firm level, industry/sectoral, national level, regional or international levels. Criteria and determining factors for competitiveness across these levels differ significantly (Henricsson *et al*., 2004; Carraresi and Banterle, 2008; Siudek and Zawojska, 2014; Karpova and Lee, 2018). However, the most current and widely applied approach to measuring competitiveness is the one proposed by Porter (1980), commonly referred to as *Porter's theory of competitive advantage* (Feurer and Chaharbaghi, 1994; Henricsson *et al*., 2004; Aiginger, 2006; Shafaei, 2007; Lee and Karpova, 2009; Hassan, 2011; Arslan and Tathdil, 2012; Jambor and Babu, 2016; Cronjé and Plessis, 2020).

Porter (1980) argued that any business's ability to compete globally is rooted in locational advantages that specific industries possess different from competitors. The locational advantages are interconnected factors commonly referred to as Porter's Diamond Model. These factors are; factor conditions, demand conditions, industry structure, strategy and rivalry, and government and chance conditions. When these conditions are favourable to a particular nation, they continuously force domestic businesses to innovate and upgrade. Experiences gained by businesses from this will build them to be able to tackle competitors at the international level. His research, however, was limited to firm-level competition and researched only in developed countries.

Grant (1991) put out a framework for developing strategies based on resources to acquire a competitive edge. Ambastha and Momaya (2004) highlighted the significance of strategic processes in raising company competitiveness in a model. The asset, process, and performance (APP) model considered critical functions' importance, including strategy, human resources, and operations. In contrast, the resource-based approach is limited to resources (assets) and capabilities. According to several academics (Frain, 1992; Porter, 1998), mutual reliance and networking between businesses and allied organisations, such as the government, institutes of higher learning, etc., are essential for regional competitiveness.

Newall *et al*. (1991) posit that several factors affect an organisation's disposition to become competitive. They mention; escalating innovation and entrepreneurship activities, upgrading human resources skills set, removing barriers to free trade, reducing government debt, creating and diffusion of technology, having an improved political system, and focusing on competing sustainably contribute significantly to enhancing a country's competitive position.

Feurer and Chaharbaghi (1994) point out that competitiveness has three vital components; customers, shareholders, and the organisation. Customers demand value from organisations, being explained as a perceived benefit with the price demanded. Shareholders are suppliers of capital to the organisation but drive competition by demanding satisfactory returns compared to competitors in the short, medium and long –terms. As a result, organisations improve their capabilities and processes, creating superior offerings and potential.

The capacity of institutions and people to interact in an economy effectively and efficiently is positively correlated with better economic performance, according to Nielsen (2000) and Bronisz and Heijman (2009). Although Rodriguez-Pose and Storper (2006) argue that the two components have a considerable impact on economic performance, the indicators they use are frequently dominated by fairly conventional measures of the existence of human capital.

Bloom and Van Reenen (2010) developed a new collection of indicators assessing many aspects of an organisation's operational success, including contemporary management practices. Their research showed that a firm's complexity varies significantly between nations and is crucial in determining an economy's overall capacity to increase its productivity and prosperity.

Delgado *et al*. 2012 identified a broad range of factors under the productivity view that drives competitiveness. Their work is considered an extension of Porter's (1990) competitive advantage of nations. The drivers, as elaborated by the authors, are broadly categorised into three; microeconomic factors, macroeconomic factors and national endowments. Macroeconomic factors include; the quality of organisations, their business environment and clusters, while macroeconomic factors include; macroeconomic policies, political institutions and social infrastructures. National endowments factors driving competitiveness include; the size of the country, its natural resources and geographic location.

Hernandez *et al.* (2015) assert that innovation is critical to sustaining global competitiveness. The authors explored consumers' socio-economic behaviours in Spain based on the anticipated measurement of how they would behave when exposed to specific innovative actions implemented by an organisation. As a result, the authors concluded on the potentiality of experimental-behavioural methods application in gaining competitive advantages.

According to Nowack and Kaminska (2016), factors such as agricultural policy, state intervention and socio-economic development have a substantial bearing on agrarian competitiveness. The authors generalise that productivity, division of labour, specialisation, investments in physical resources, infrastructures, education, technology, good governance and overall macro-economic stability positively affect competitiveness.

Ketel (2016) posits that traditional drivers for competitiveness include rules and regulations, financial markets, physical infrastructures, the scale of the economy, macroeconomic policies, culture and trust, institutional quality and capacity. Altomonte and Bekes (2016) discovered that company performance variability adds to cross-country variances in average productivity levels, which differ considerably among regions. The author found that even when top-performing firms from different nations achieve comparable performance levels, the least-performing firms of businesses tend to vary greatly. The ability to distinguish between factors that affect the distribution of high performance across all firms and the market process is crucial for determining whether weaknesses in a firm's competitiveness relate to the overall context that drives all firms' productivity.

Louati (2018) states that business knowledge management is necessary to enhance an organisation's competitiveness. The author posits that combining knowledge management and competitiveness ensures a sustainable competitive advantage, increased conclusive results, superior performances that can be quantified (compared to competitors), distinctive business competencies, and better business adaptation to its environment.

Similarly, Maravilhas *et al*. (2019) state that information is a necessary expedient and strategic weapon to ensure market competitiveness in the current information era. Strategic information enables organisations to efficiently utilise obtained market information as an economic resource to identify opportunities and threats in the market and arrive at sound business decisions (market intelligence). Saha *et al*. (2019) posit that considering current trends in the global business environment, organisations' agility and strategic human resources management are among the vital factors for driving and sustaining competitiveness.

2.12 Measures of competitiveness

There is an existing consensus among scholars that to analyse competitiveness appropriately, there should be a specification of level to be scrutinised, i.e. whether at business/firm/level, industry, sector, national, regional or international level. Further, it is noted by most authors that no similar measure of competitiveness can capture all the highlighted attributes; hence, specific criteria must be adopted at each level of competitiveness (Siudek and Zawojska, 2014; Feurer and Chaharbaghi, 1994; Henricsson *et al.*, 2004; Aiginger, 2006; Siudek and Zawojska, 2014; Karpova and Lee, 2018).

Buckley *et al*. (1988) categorised measures of competitiveness into three specific groups, i.e., competitive performance, competitive potential and management process. According to the authors, competitive-performance measures analyse the outcome of the economic activity/operation, e.g. profits, products/services produced, dividends, and revenues. In contrast, competitive-potential measures analyse an organisation's inputs, such as labour, physical resources, technology and other related factors of production. Management-process measures examine the willingness and openness of management towards supporting and enabling the competitive goals/objectives of the organisation (Buckley *et al.*, 1988).

The authors further differentiate competitive performance measures among product, firm, industry and country levels. The authors specify measures to include market share analysis, sales growth, and profitability at the product level. The authors further prescribe export market share, export dependency, export growth, and profitability analysis as measures at the firm level. At the industry level, measures recommended by the authors include; export market share, export growth, profitability, and trade balance. Finally, at the country level, measures recommended include export market share, export growth, profitability, the balance of trade, and manufacturing percentage in total outputs.

Further, the authors point out that measures of competitiveness potential at the product level should include price and cost competitiveness, productivity, quality competitiveness, and technology indicators. Likewise, price and cost competitiveness, productivity, and technology indicators are at the firm and industry levels. Finally, at the national level, the authors point to comparative advantage and access to resources and price and cost competitiveness, productivity, quality competitiveness, and technology indicators as indicative of competitiveness potential.

Finally, the authors describe the measurement of management process competitiveness at the same four levels. At the product level, measures include a product's ability to become a champion among similar products at domestic and international levels. At the firm level, measures include; economies of scale, proximity to customers, management relations, ownership management, marketing aptitude, and commitment to international business. Finally, at the industry level, the authors outlined measures that include a commitment to international business, while at the national level, measures include; commitment to international business, education and training, and government policies.

Feurer and Chaharbaghi (1994) posit that different measures should be adopted for every component of competitiveness to determine the organisation's competitive position. For instance, measurements of competitiveness for customer value should entail cost, dependability, speed, and flexibility analysis, where the outcome value should lead to the correct segmentation of competitive environments. The segments are then rated on a scale of 0 to 10. The value obtained combined with the segmenting indicates the organisation's competitive position concerning customer values within the competitive environment.

The return on investment concerning the risks involved is computed to evaluate shareholders' value in the organisation. Again, different measures exist, e.g., return on equity, earnings per share, dividend yield, and payout ratio (Feurer and Chaharbaghi, 1994). In contrast, Carraresi and Banterle (2008) point out that competitiveness is achieved by analysing the industry's trade indices and trends and comparing them to competitors.

The "nine-factor model" proposed by Cho and Moon (2000) is a development of the diamond model, just like the versions that have gone before them. In addition to four exogenous variables, the diamond model also incorporates four endogenous variables (the workers, politicians and bureaucrats, businesspeople and professionals, and one external variable, chance/events) (the workers, entrepreneurs and professionals). This paradigm emphasises the significance of human resources in building global competitiveness. As with the previously described models, the "nine-factor model" proposed by Moon and Cho (2000) is a development of the diamond model. This paradigm highlighted the importance of human resources in establishing global competitiveness.

A more thorough model, the "dual double diamond," was presented by Cho *et al.*, (2009) to explain the competitiveness of nations with diverse characteristics. This model combined human components from the nine-factor model with the global context from the generalised double diamond model. Domestic physical factors, domestic human factors, international human factors, and international physical factors are the four variables covered by the model. The expanded diamond models consider the role of foreign direct investment (FDI), human resources, and global issues relevant at the national and industry levels.

Aiginger (2004) differentiates between output and process measures of competitiveness. According to the author, output measurement of competitiveness assesses key economic (living standard, employment opportunities, per capita income) and non-economic indicators (stability, security, equity and other national socio-cultural goals). He further defines process measurement as assessing a nation's capabilities, technology levels, production levels, capital and other physical resources, trust, and institutions in the country.

Nowack and Kaminska (2016) analysed the agricultural competitiveness of 27 European countries; the authors used GDP per capita, the share of agriculture in global value analysis (GVA), the percentage of people employed in agriculture, rural area, and the share of crop and animal production as synthetic measures for competitiveness.

Ketel (2016) outlines several competitiveness metrics, such as rankings, e.g., the IPS Competitiveness Report (IPSR), the World Competitiveness Yearbook (WCY), and the Global Competitiveness Report (GCR) of the World Economic Forum), but argues that academicians have harsh criticisms of the metrics. Ketel outlines several objections, such as emphasising the zero-sum aspect of competition, grouping several indications into a single synthetic indicator, and translating competition into a discrete variable that enforces equal distances between rankings.

2.13 Export performance

Export performance as a field has been receiving considerable attention among authors. This field's popularity is due to its perceived importance and relevance in international trade and marketing. Arguably, it is a common understanding that if a business wants to grow, expand and survive its economic prosperity over time, internationalization is crucial. As one of the strategic modes of the internalization process, exporting, whether directly or indirectly, remains the best viable option with minimum risks involved (Sousa *et al*., 2008).

According to Shoham (1998), differences exist in defining export performance such that definitions tend to fall between two broad groups, i.e. conceptual and operational definitions. Conceptual descriptions of export performance describe it as the effectiveness and efficiency of export as well as the ongoing firm's engagement in exports. On the other hand, operational definitions tend to reflect on measures of export performance, including; export propensity and perceived profitability (Shiham, 1998). Shiham emphasizes that any definition of export performance should address two fundamental constructs embodied in it, i.e. export as an internationalisation strategy and performance.

A plethora of studies has attempted to explore the concept of export performance. However, the results remain vague due to the authors' inconsistencies in conceptualizing and operationalizing the concept, and no consensus exists on specific measurement techniques of export performance (Katsikeas *et al*., 2000; Sousa, 2004; Gertner *et al*., 2014). Spasova (2014) summarizes the challenges facing the theoretical literature of export performance literature and articulates that various diverse methods of measuring export performance had contradicting results.

In addition, numerous indicators and determinants have been used to study and operationalize the concept conceptually, indicating a lack of consensus among scholars in the field. However, Gertner *et al*. (2014) posit that most scholars in the field agree that the measurement of export performance should encompass more than one specific dimension and incorporate multiple performance measures. Theoretical approaches to classifying determinants of export performance have been primarily categorized into two, i.e., the resource-based and contingency-based approaches.

The resource-based approach provides internal factors (firm's and industry's specific characteristics, export market strategy, management characteristics, and organizational capabilities) inherent to a business, giving it a competitive advantage over rivals. On the other hand, the contingency-based approach, which stems from the structure-conduct-performance (SCP) approach, looks at factors external to the business that may affect its performance, such as; legal-political characteristics, market competitiveness, and cultural similarity (Sousa *et al*. 2008; Gertner *et al*. 2014; Spasova, 2014).

According to Hongxin and Shaoming (2002), the traditional theoretical approaches treat the determining factors distinctively and do not have a sound theoretical ground. Hence quoting from Zou and Stan (1998), the authors support the expansion of export performance determinants to embody a set of controllable and uncontrollable factors and the internal versus traditional external approach.

Katsekias (2002) concludes that the measurement of export performance is constrained by several factors, including; the unwillingness of export managers to disclose data specifically about profits, sales, and other aspects of their export activities. Other challenges include different accounting and taxing systems across countries, challenges in collecting export data by necessary authorities, and subjective bias in reporting results. Therefore, Katsekias et al. 2000 assert that the export performance measure should be contextual, i.e., research-method and export-business specific.

Research-method specific factors refer to the ability of a particular research design to overcome measurement problems, while export-business specific factor refers to the uniqueness of the organization and environmental factors affecting it; target-market specific (individuals with interest in the exporting activities. For researchers, export performance is still under-researched, providing opportunities for further improvement in theory building and empirical research (Katsikeas *et al.*, 2000; Sousa, 2004).

In contrast, other scholars have categorised export performance measurement techniques into two broad groups, i.e., objective and subjective methods. The objective methods of export performance assessment refer to financial measures of the economic aspects of the business, such as export propensity, export intensity, export volume, export volume growth, export market share, export sales, and export sales growth. In contrast, subjective methods measures include reviews such as satisfaction levels of overseas customers, management perceptions, and product and service quality issues (Sousa, 2004; Gertner, 2014).

Spasova (2014) defines export performance as specific resources and capabilities leveraging behaviour of a business/firm/industry or economy in an international context at a given time. Analysis of export performance is also of vital interest to policymakers, business owners, and researchers. For policymakers, the significance of evaluating the performance of a nation's exports includes identifying employment opportunities, the country's productivity levels, and the overall economy country's prosperity. Business owners require performance evaluation of their operations abroad to boost growth and ensure the overall survival of their activities abroad. According to her, determinants of export performance are categorised into two broad groups, i.e. internal and external determinants.

Spasova alienates internal determinants to include; perceptions and characteristics of management, organisational capabilities, export strategies, marketing mix, knowledge-based factors, institutional and business linkages, and firm/industry/economy characteristics. External determinants of export performance include domestic and export market characteristics.

2.14 Role of marketing strategies in enhancing export competitiveness

Export marketing strategies are a subset of marketing that refers to specific marketing actions of companies with export venturing goals geared towards meeting international market needs. These actions are developed by carefully analyzing the interplay between internal and external environmental forces that shape the business. Therefore, export marketing strategies are crucial to the export venture's success. Furthermore, a planned market strategy is critical to a company's export performance. Implementation strategies can be categorized into two, i.e., internal and external. Internal implementation strategies refer to how a company utilizes its resources and skills to implement its export marketing strategies. In contrast, external implementation refers to how the target market responds to a company's implemented actions or strategy (Morgan *et al*., 2011).

The authors concluded that internal implementation capabilities are insufficient for a company to succeed overseas in their study. However, deploying resources on export marketing strategies and evaluating how export markets react to such efforts are vital to the company's ability to achieve its desired export financial goals. Similarly, their study revealed that the company's capabilities (architectural, specialized, and integrated export marketing capabilities) had a significant effect on export performance.

On what determines export marketing strategies, Moghaddam et al., (2011) in their comprehensive literature review (1993-2010), found a consensus among most international marketing scholars on determinants of export marketing strategies. The authors identified that having the right marketing mix (pricing, product, place, and promotion strategy) significantly contributed to exporting success. On the other hand, Joshi (2014) points out that although marketing strategies fundamentally remain the same in international markets, they are constrained by uncontrollable macro-environmental elements (economic, socio-cultural, political, technical, and legal factors), requiring adaptation.

Kotler and Keller (2016, p. 234-260) present four major entry strategies for companies with export venturing goals, i.e., direct exporting, indirect exporting, acquisitions, direct investment, and joint venturing. The authors further state that it becomes crucial for international companies to plan how much adaptation of their marketing strategy should be considered to meet local demands in foreign markets (localization). Hence, the authors posit four major global strategies for adaptation, i.e., global product strategies (product adaptation versus standardization), global communication/promotion strategies (adaptation versus dual adaptation), global pricing strategies (price escalations, transfer prices /dumping), and global distribution strategies (channel entry versus channel differences).

2.15 Competitive analysis of industries: Empirical evidence-world

In their study, Gopinath *et al.* (1997) compared agriculture and the competitiveness of the US against that of the US using TFP. In determining the drivers of competitiveness, the study concluded; that public infrastructures, technology, public investments in research and development and learning by doing were the primary sources. For the EU countries under study (Denmark, Germany, France and the UK), TFP was the main contributor to the agriculture growth in the region. In comparison to the EU, US change was found to be relatively lower.

Slater and Olson (2002) examined the application of Porter's five forces model by studying its underlying premises. They concluded that the model's assumptions are valid but do not fully represent market factors influencing business and industry. Therefore, the authors proposed a new augmented version of Porter's model for industry and market analysis that considers market elements not discussed in the model. In their improved version, the authors introduced four key factors, i.e. complementors' role/network effect, changing market conditions (market growth and market turbulence) and the impact of market structure on competing parties' risk. The authors concluded that although Porter's framework did not discuss market elements, its applicability and conclusions still hold in the current business era.

Nawrocki and Carter (2010) adopted the Herfindahl market and entropy concentration methods to study and determine the competitiveness of thirteen industries in the USA between 1971 and 2001. Their findings revealed that whenever competition declined, it positively affected the company's return conditioned on industry returns. The authors concluded that most firms view their risk relative to the industry's increase as competitiveness declines.

Pringle and Huisman (2011) adopted Porter's five forces framework to analyse the Universities in Ontario, Canada. According to the authors, despite various models to analyse industries, most do not consider keywords/factors such as competitiveness and economy. Hence, they endorse using Porter's five forces framework to counteract deficiencies and better understand industries. From their analysis, the authors recommended that when seeking competitive positions for the Ontarian higher education system, stakeholders should take more seriously into consideration consider the impact of globalisation and technology.

In their study, Damelia and Soesilowati (2016) adopted comparative advantage, specialised index, commodity concentration index and import dependency ratio to stud Indonesia's competitiveness in seaweed exports. The findings revealed that the RCA and IDR have been increasing but with fluctuations. The observed change was attributed to Indonesia's inability to produce plus value of ferments. STI was positive, while CCI of exports and imports showed an increasing trend but fluctuated.

Gascon *et al*. (2017) analysed thirty-seven large pharmaceutical companies in Spain by measuring their relative efficiencies in the pharmaceutical industry. The authors adopted a Data Envelopment non-parametric technique by considering the inputs (investment analysis), outputs (performance indicators) and other related dimensions considered vital for large laboratories' efficiency. The outcome of DEA techniques revealed that laboratories deemed efficient tend to make more financial transactions which are relatively larger on average than the inefficient ones. The study further revealed that companies that invest more internally in research and development activities and are more efficient in the industry than others tend to declare smaller transactions relative to their total assets.

Firmansyah (2020) defines competitiveness as the ability of a producer to produce a product at a low cost compared to prevailing prices in the international market. The author further argues that the export demand in the importing country will increase only if the exporter has a high competitiveness capability. The author examined the competitiveness of Indonesia's seaweed exports between 2012-2018 using the revealed comparative advantage index (RCA) and export product dynamics (EPD). The study's results showed that RCA, GDP and trade openness indices were significantly indicative during the said period, while the consumer price index, local currency unit and seaweed prices were significantly negative. RCA analysis revealed that Indonesia's seaweed exports strongly competed in its major export destinations, except in Japan. While EPD analysis revealed the following results; the competitive position of Indonesia's seaweed exports in China was in the *rising star* position while France, Chile and Korea occupied the *falling star* position. In Hong Kong, Denmark, Vietnam, Spain, and Tunisia, the exports occupied a Retreat position. It occupied the lost opportunity position in the United States and the Philippines.

In assessing the Chinese seaweed industry's competitiveness between 2002 and 2017, Kang *et al*. (2021) adopted three measures, i.e. trade competitive index (TCI), revealed comparative advantage (RCA) and the international market share index (IMS). The study found that the total trade value of the industry has been increasing, and imports have been exceeding exports; however, the industry's competitiveness had decreased, and the trade deficit had widened during the period. The observed trends were attributed to limited product differentiation, changes in global seaweed trade commodity structure, increased government support in competing partners, and trading barriers among trading partners.

Yulisti *et al*. (2021) studied the competitiveness of Indonesian seaweed exports in the global market using comparative advantage and export product dynamics. Their findings revealed that the exports were highly competitive in some export destinations but not all. Further, it was found that Indonesia occupied a *rising star, falling star, lost opportunity and retreated market* positions in its various export destinations. As a result, the authors recommended that Indonesia strengthen collaborations with some export destination countries that have revealed market potential, such as; Japan, the Republic of Korea, China, Japan, and Singapore.

Dvoulety and Blazkova (2021), determining sources of competitiveness for Czech SMEs, found a significant relationship between a firm's size and competitiveness. The authors also confirmed that the least competitive firms are those operating in the agricultural sector. Further, their study confirmed that regional location plays a vital role in determining firm competitiveness. In contrast, Paul and Dhiman (2021) conducted a systematic review of factors determining export competitiveness and concluded that crucial determinants included; capital and labour productivity, real effective exchange rate, labour costs, domestic gross domestic product and trade liberalisation and barriers.

Tsai *et al*. (2021) analysed the competitiveness of Taiwan's solar photovoltaic industry using Porter's diamond model. The authors applied the decision-making trial and evaluation laboratory (DEMATEL) procedure to determine the significant relationship between competitiveness indicators per the model. The DEMATEL-based analytic network process was also adopted to obtain dominant weights, and the modified VIKOR process was used to assess the industry development performance gaps. Their results demonstrated that Porter's diamond model's factors should be upgraded from (in order of priority) firm strategy; government, structure, and rivalry; demand conditions; chance; factor conditions; and related/supporting industries.

Dawut and Tian (2021) used Porter's Diamond model to qualitatively and quantitatively analyse the Xinjiang mutton industry's competitiveness among the top ten leading production provinces. Their quantitative findings revealed that Inner Mongolia province was leading in competitiveness whilst Henan was the least. Qualitative results indicated that the industry is inferior in strategies, related and supporting industries and production-related factors. The industry was also found to have performed moderately in government-related factors.

Babic *et al*. (2022) studied factors contributing to the competitiveness of agricultural producers in the Republic of Serbia. They found that consolidation of agricultural holdings and quality of agricultural produce, management and marketing were key sources. Further, their study found that favourable climatic conditions and natural endowments did not sufficiently explain sources of competitiveness for the producers.

In their study, Chikan et al. (2022) attempted to provide a theoretical background and framework for empirically analysing firm-level competitiveness in Budapest, Hungary. Theoretically, the authors comprehensively defined competitiveness at the firm level as a capability that provides two dual outcomes, i.e., meeting customers' demands and making a profit. The authors adopted two fundamental approaches to understanding firm-level competitiveness, i.e., the Resource-Based View (RBV) and strategic management. They categorised building blocks of competitiveness at the firm level into three, i.e., enablers, drivers and outcomes. The authors defined enablers of competitiveness as macro-level factors (country's specific advantages) that emanate from the macro-business environment. They link enablers to Porter's diamond model framework of competitive analysis.

Further, they explained drivers as capabilities (ordinary and dynamic) of the organisation to manage resources available to be utilised by the firm. In addition, the authors define outcomes of competitiveness as a firm's operational results, such as profits, revenues, market shares and dividends. Furthermore, they investigated the contribution of firm capabilities (production capabilities) to firm-level competitiveness and concluded that production capabilities enhance firm-level competitiveness. That is, the higher the level of production capabilities, the higher the firm competitiveness.

In their study of factors influencing the development of Brazil's hybrid and electric vehicles industry, De Sousa and Castaneda-Ayarza (2022) applied PESTEL and macro-environmental factors analysis as analytical methods. The authors posit that the various macro-environmental factors (economic, socio-cultural, technical, political) influence the industry's performance. Hence, their monitoring allows for scanning various opportunities and threats for the industry in the business environment. Further, they consider the analysis vital for strategy formulation, identification of competitive advantages and formulation of an economic sector. The authors also recognised the applicability of Porter's five forces framework in analysing the competitive dynamics and choosing how companies can strategically position themselves in the industry.

Sotiros *et al*. (2022) adopted a Data Envelopment Analysis (DAE) framework to analyse the Portuguese footwear industry's export potential to identify trading potentials with existing partners in the industry. The study's results revealed that higher market potentials were found to be existing in EEA countries. Langford *et al*. (2022) analysed Indonesia's seaweed industry using the price analysis technique. Their study revealed that international carrageenan processors' demand drives long-term price trends. In addition, seaweed prices follow a consistent intra-year pattern across the country despite differing seasonal production patterns. Thirdly, the prices are not significantly related to the product's attributes (sand and salt content, moisture), suggesting low price grade differentials. Finally, the price levels are determined by vital central transport and aggregation hubs transmitted to remote areas. The authors conclude that a substantial opportunity exists for Indonesia's seaweed industry's upgrade through improved coordination between the industry's value chain actors.

2.16 Competitive analysis: A Tanzanian context

Msanjila and Kamuzora (2012) studied the potential of applying collaborative networks to enhance the collective capital and capability of small and medium enterprises (SMEs) and non-state actors (NSAs) in Tanzania. Their study found that SMEs lack competitive capital and inability to acquire complex opportunities. The authors further expound that most SMEs and NSAs find it difficult to cope with the required speed of change. However, their research revealed that dynamic time (also cost-effective) and fluid creation of temporary collaborative networks wrought by ICTs is an enabler for the small and medium enterprises SMEs and NSAs in quest of enhancing competitiveness in the marketplace.

Sabarwal (2013), investigating skills for competitiveness in SMEs in Tanzania, found a weak linkage between SMEs and educational institutions in Tanzania to recruit workers. Even while the country's overall access to education has increased, the availability of a more educated cohort in the labour market has not materialised in the context of Tanzania's SME labour force. The survey also demonstrates that behavioural and numeracy abilities appear particularly in short supply in Tanzania. The author claims that the nation's ICT, reading, and communication were uncommon. The study indicates that if targeted and well-designed policy and programme initiatives are implemented, there is a possibility for unlocking worker capabilities for SME development and broader economic growth in Tanzania.

Urassa (2014) examined the effect of the regulatory framework on the competitiveness of the dairy sector in Tanzania and found that; there are several regulatory obstacles the industry must overcome, which drive up the cost of doing business. Numerous product tests, various inspections of facilities, multiple licences for facilities and goods, and the exploitation of rules to collect money are the industry's primary regulatory burdens. In addition to increased firm expenses, bureaucratic obstacles limit business growth and employment development opportunities. Although the business sector seems to be successful in raising awareness of the problem, it has not yet been able to persuade the government to take action to modify policy.

Kangile and Mpenda (2016) studied the price competitiveness of smallholder rice farmers under cooperative irrigation schemes in the Morogoro and coastal regions of Tanzania. Their study used a two-staged sampling technique and translog stochastic cost frontier for cost efficiency analysis. Their study's production costs were estimated quantitatively using the enterprise budgeting technique. The authors found that the two selected regions were not competitive in rice production due to high production costs. Factors such as labour price, fertilizer costs and irrigation water significantly affected regional production costs.

Songwe *et al*. (2016) studied the competitive and innovative potential of commercial seaweed farming in Zanzibar by analysing farmers' business management capacity, the industry's existing business model, farmers' economic returns, and the level of value-addition initiatives. Their study applied descriptive statistics and regression analysis and found that seaweed farmers on the island did not have significant financial returns because most of the production was below the breakeven point of 1,439 kgs of dry seaweed per cycle. Their study identified factors impeding farmers' competitiveness, such as small farm size, lack of technology, low innovation upscaling, and limited entrepreneurship skills.

REPOA's brief (2018) assessed the competitiveness of ZSI by looking at its production and export trends, value-addition and regulatory framework of the island. The report revealed that a combination of unsustainable production techniques, weak export capacity and slow industry growth impedes the competitiveness of ZSI. The report also exposed an imminent collapse of seaweed exports. Further, the information also revealed that the value-addition of ZSI remains untapped. The report also mentioned other factors impeding the industry activities, including poor postharvest handling and limited capacity for processing, packaging, storage and failure to meet product quality standards for export markets. Weak and incoherent policy and regulatory frameworks have been found to undermine the competitiveness and growth of ZSI. As recommendations, the report suggests a separate seaweed development policy framework with specific mechanisms, concrete actions and resources for implementation is required. Capacity-building was also recommended to build seaweed value chain actors' production and trade capacity. Further, standards compliance and value chain upgrading are recommended.

Further, the authors revealed that ZSI is not linked to multi-stakeholders such as financial institutions, research, science and technology. As a result, it lacks support from other sectors due to farmers' consistent dependence on exporters for the seaweed market. Value-addition activities were found to lack scale-up mechanisms compared to other seaweed producers in Asia, for instance. Despite the industry's challenges, the authors posit that the potential for commercializing ZSI activities exists. However, developing a seaweed policy and strategic plan is crucial to guide the industry. Further, the authors recommend promoting entrepreneurship, research, technology and innovative upscaling system; youth and men are motivated to engage in seaweed farming, and access to market information and financing is increased.

In his brief, Msafiri (2021) used production and export trend analysis to study the competitiveness of Zanzibar's seaweed industry. The report revealed that the industry's production trend has fluctuated with growth between 2013 and 2015 and declined between 2016 and 2018, with *cottonii* least produced compared to *spinosum* due to environmental challenges and diseases. Further, his report revealed that exports also fluctuated due to production trends. However, he asserts that there is still a potential for the industry to widen its export base due to the growing demand for seaweed and related products. However, the study also revealed that the industry is experiencing surplus production. Among the recommendations given by the author included increased education, training and research, the creation of seaweed industry policy, and further investments in the industry, i.e. creation of processing industries.

Lwesya (2021) studied the challenges hindering Tanzanian SMEs' participation in international trade and possible integration into global value chains (GVCs) using descriptive analysis. His results show that the major challenges for SMEs' internationalization are international marketing-related challenges and global competition, supply-side limitations, unfriendly investment climate, and financial constraints. He posits that trade policies remain vital in mitigating some difficulties outlined.

2.17 The theoretical framework guiding the study

The study adopts the following theoretical framework to analyse the competitiveness of ZSI.

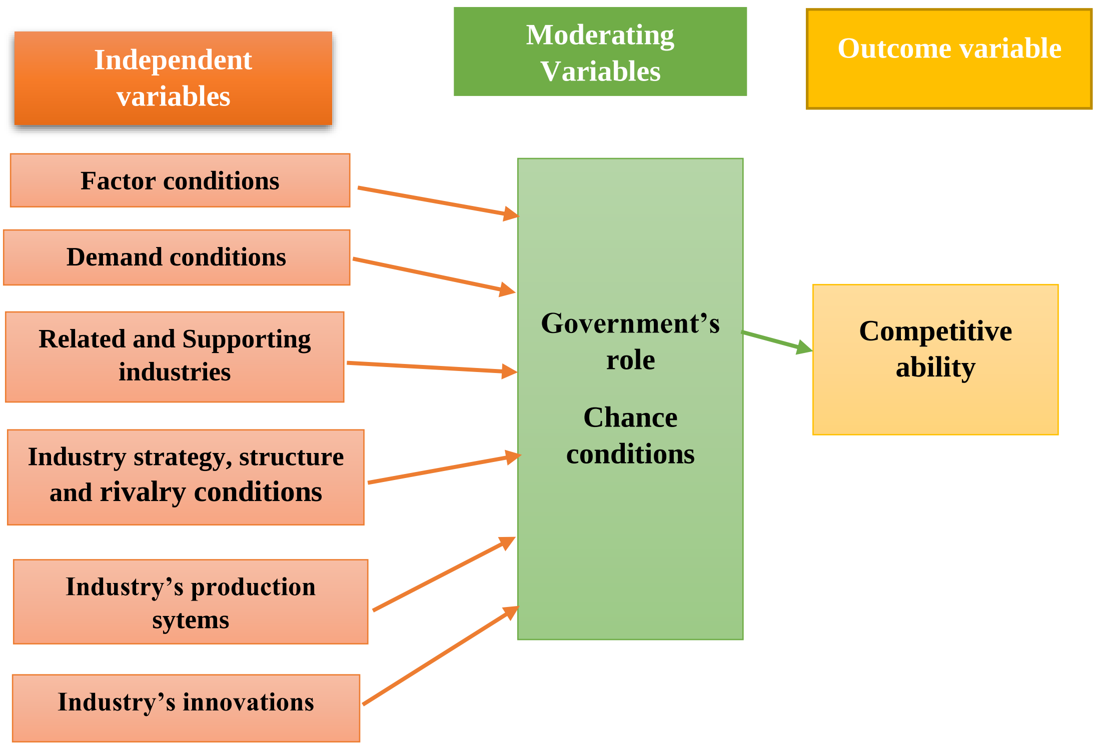


Figure 2.3: Study's theoretical framework (**Source:** adapted from Porter (1980))

2.18 Research gap

Even though *competitiveness* as an economic concept has seen wide applications across sectors of economies in industrialised and developing economies, its applications in developing economies are still limited. Especially in the context of URT, its applications are limited. Further, in the context of ZSI, competitive analysis research works are scant (e.g., in Songwe et al., 2016; REPOA, 2018; Msafiri, 2021). In addition, the methodologies adopted for competitive analysis in the context of URT are less diversified/robust. Thus, this study intends to contribute to the existing knowledge gap of *competitive* analysis in the URT (and mostly with regard to ZSI) by widening the scope of application (at the sector/industry level) and methodological approach.

2.19 Summary

This chapter sought to give a background context on ZSI and introduce the concept of the industry's competitiveness. Background context on ZSI revealed that the sector remains hugely untapped. The industry production system remains the traditional off-bottom/peg and line method. Its value and marketing chains are quite underdeveloped. It was found that the industry relies mainly on exporters for its marketing information and prices. Reviews on competitiveness showed that there is a consensus among authors that no exact definitions, set of determinants or measuring stick exists for the competitiveness construct. However, there are common recurring themes in defining and measuring competitiveness among authors. Common themes emanating from the review of competitiveness literature explaining the term *competitiveness* amount to the ability to produce superior products and sell at higher margins than rivals.

With regards to factors that create the competitive ability of businesses, there is an overwhelming convergence of literature pointing to the quality of labour/overall human skills, natural factor endowments, locational advantages, quality of organisations, social infrastructures, and country political institutions/governance system. Further, strategic processes, entrepreneurial and innovation activities, free trade conditions, contemporary management practices and suitable supportive policies are also considered to enhance a business's competitive ability.

Lastly, most authors agree that the competitiveness measurement depends on the level analysed, i.e. product/firm/industry/national level. However, standard measurement techniques mentioned throughout the literature include market share analysis, export share analysis, growth analysis, return on investment analysis, profitability analysis, cost competitiveness analysis, analysis of the company’s proximity to customers, and trade balance analysis. Further, methods also include; export dependency analysis, diamond model analysis, double diamond model analysis, marketing aptitude analysis and analysis of government policies.

MATERIALS AND METHODS

CHAPTER 3

MATERIALS AND METHODS

The present study intended to analyse the competitiveness of the Zanzibar seaweed industry by examining its structure, trade performance, export marketing strategies, and constraints faced by its producers and exporters. This chapter outlines research methods, materials, and procedures adopted by the researcher. It also specifies how different variables were measured and analysed. Thus, it is sub-divided into the following parts:

3.1 Description of the study's locale

3.2 Zanzibar's area size

3.3 Zanzibar's population

3.4 Zanzibar's administrative divisions

3.5 Research strategy

3.6 Research approach

3.7 Research design

3.8 Research methods

3.9 Definitions of the study's key constructs

3.10 Variables, measurement levels, and analysis techniques for the constructs Types of data collected and collection tools

3.11 Sampling procedure

3.12 Data collection procedure

3.13 Data analysis procedures

3.14 Analytical tools adopted in the study

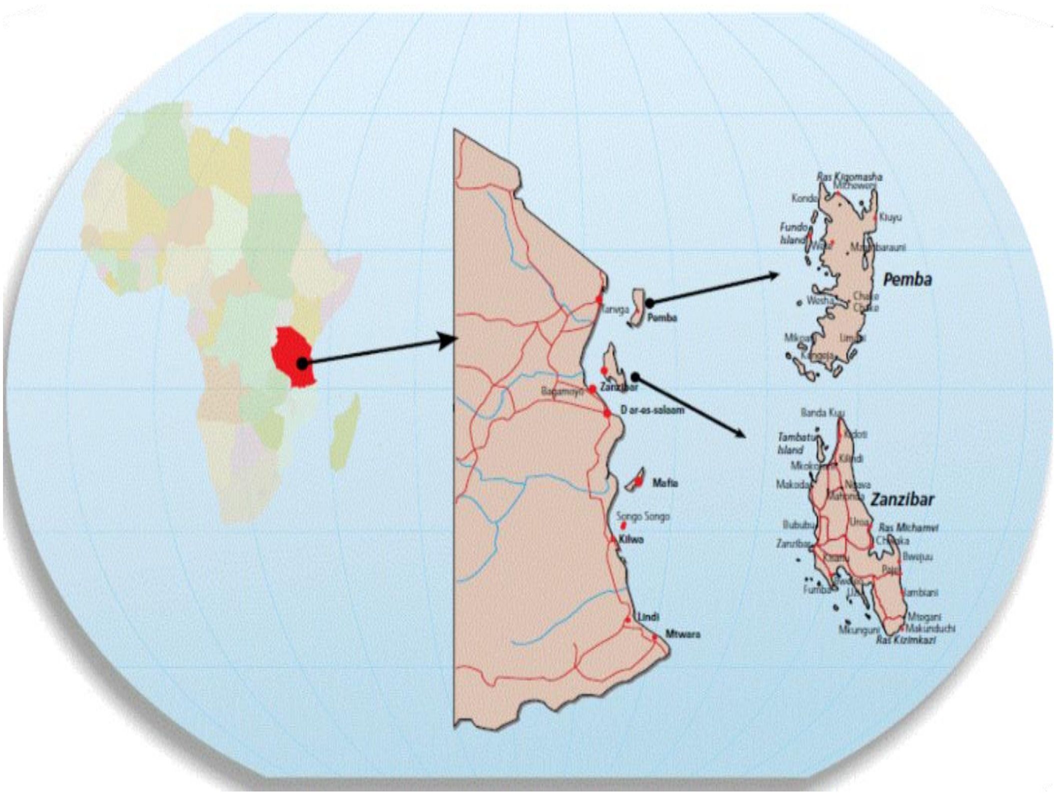
3.15 Study's ethical consideration

3.1 Description of the study's locale

Zanzibar Islands lies in the Indian Ocean off the coast of Eastern Africa. It is situated about 30 kilometres from the mainland of East Africa. The island is part of the United Republic of Tanzania (URT).

3.2 Area size

According to OCGS 2021 report, the Zanzibar islands have a total area of about 2,654 square kilometres, of which 1,666 square kilometres are for Unguja island and 988 square kilometres are for Pemba. There are also several habitats and un-habitat islets.



Map of Africa, URT, and Zanzibar (**Source:** Msuya and Neish, 2013)

3.3 Zanzibar's Population

According to OCGS 2021 report, the population of Zanzibar, as of 2012, was 1,303,569. About 68.8% of the population is in Unguja island, while the remaining 31.2% is in Pemba.

3.4 Zanzibar's administrative sub-divisions

Zanzibar island is sub-divided administratively as follows:

Table 3.1: Administrative sub-divisions of Zanzibar

Island	Regions	Districts
Unguja	North Unguja	North Unguja "A" North Unguja "B"
	South Unguja	Central South Unhuja South-South Unguja
	West Unguja	West Unguja West Unguja "A" West Unguja "B" Unguja "town"
Pemba	North Pemba	Wete Micheweni
	South Pemba	Chake-Chake Mkoani

Source: OCGS, 2021

3.5 Research Strategy

Research strategy is defined by Bryman and Bell (2015) as the general orientation of the research. The orientation can take qualitative, quantitative, or mixed directions. This study adopted a mixed-method research strategy. Creswell (2022) defines mixed-method research design as a procedure in which qualitative and quantitative analysis methods are adopted (triangulated) to better understand the research problem (p. 535). Specifically, this study adopted a convergent QUAN+QUAL mixed-method design. In a QUAN+QUAL design, quantitative and qualitative data are collected simultaneously/concurrently (Creswell, 2022, p. 538). According to Creswell, a convergent/parallel mixed method design draws from its ability to substitute each source's (quantitative or qualitative) weaknesses with the strength of the other (p. 540). However, priority was given to quantitative than qualitative data.

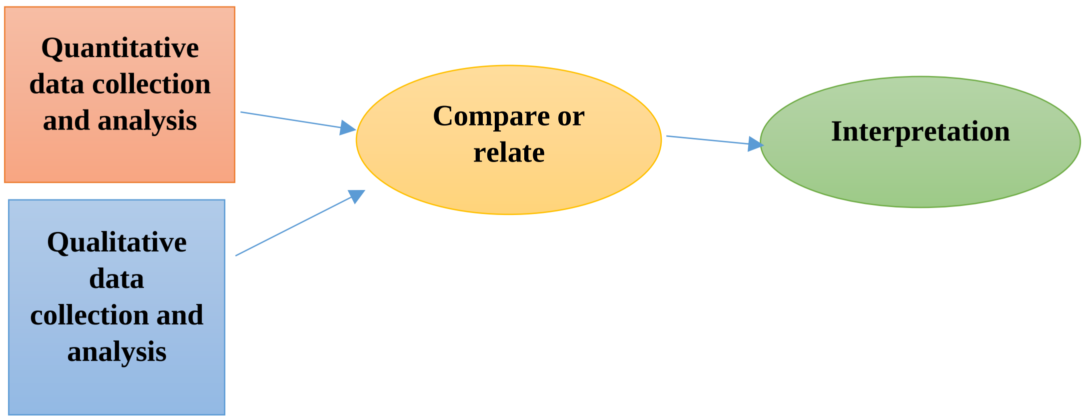


Figure 3.1: Convergent parallel design (**Source:** Adapted from Creswell, 2022, p. 541)

3.6 Research approach

The study adopted a cross-sectional approach due to limitations in time and cost. A cross-sectional research approach entails collecting data on more than one case at a time (Creswell, 2022, p.40). The period for this study was between September and November 2021.

3.7 Research design

A research design is elaborated by Bryman and Bell (2015) as a framework adopted for collecting and analysing data (p. 28). Several research designs exist, including but not limited to survey research, experiments and case studies (Bryman and Bell, 2011, p.32-46). This study followed a mixed-method survey research design defined by Bryman and Bell (2015) as a form of a cross-sectional study in which data are collected predominantly through questionnaires or structured interviews on more than one case at a time. The purpose is to collect quantitative or qualitative data or both in connection to more than one research variable assessed to determine association (p. 41).

3.8 Research methods

A research method is elaborated by Bryman and Bell (2015) as a framework adopted for collecting and analysing data (p. 28). Creswell (2022) expounds on them as specific research procedures, including; data collection procedures, data analysis and report writing (p.20).

3.9 Definition of study's constructs:

Seaweeds: Refer to a type of marine macro-algae, which are photosynthetic aquatic organisms living in ponds, rivers, seas and oceans. It comes in various pigments, including red, brown and green. Seaweeds have various utilisations, including human foods, hydrocolloids, abalone feeds, livestock feeds, biostimulants and other applications (in cosmetics, pharmaceuticals, textile fibres, waste treatment, carbon capture and bio-energy) (Cai, 2021). In this study, seaweeds refer to red seaweeds.

Competitiveness: There is no uniform definition of competitiveness as authors view competitiveness differently depending on the level, business, industry, or economy measured. For instance, Buckley et al. (1988) describe competitiveness as a process that embodies both an end (desired goals) and a means to achieve such ends (resources, operations, management). Porter (1990) defines it as the ability to pursue policies that enable them to create superior goods or services and sell them at higher prices. Feurer and Chaharbaghi (1994) expound that competitiveness refers to the ability of an organisation to persuade its customers to choose its offering over the competitors.

Moon and Peery (1995) assert that competitiveness is the organisation's relative position versus rivals. Peneder and Rammer (2018) posit that an industry level of competitiveness refers to competitive strengths and weaknesses in the international market compared to competitors. Strukelj et al., (2020) have defined competitiveness as a process organisations adopt to achieve advantages over competitors. In contrast, Firmansyah (2020) defined competitiveness as the ability of a producer to produce a product at a low cost compared to prevailing prices in the international market.

This study, therefore, adopts the following definition as influenced by Karpova and Lee's (2018) descriptions of competitiveness: **Zanzibar seaweed industry's competitiveness** is therefore described as "*the ability of the industry to create and sustain superior performance/national prosperity at the international level while developing welfare in its society*".

Industry structure: For purposes of this study, the definition of industry structure is adopted from Porter (1990) to embody forces that shape ZSI, determining its overall profitability potential and degree of rivalry. The forces identified by Porter include the bargaining power of buyers and suppliers, competitive rivalry, the threat of substitute products and the threat of new entry. Together, the five forces are said to shape the shape of a particular industry.

Export performance: According to Shoham (1998), there exist differences in defining export performance such that definitions tend to fall between two broad groups, i.e. conceptual and operational definitions. Conceptual descriptions of export performance describe it as the effectiveness and efficiency of export as well as the ongoing firm's engagement in exports. On the other hand, operational definitions tend to reflect on measures of export performance, including; export propensity and perceived profitability (Shiham, 1998). Shiham emphasizes that any definition of export performance should address two fundamental constructs embodied in it, i.e. export as an internationalisation strategy and performance. Spasova (2014) defines it as specific resources and capabilities leveraging the behaviour of a business/firm/industry or economy in an international context at a given time. For this study, the operational definition of export performance is adapted from Spasova (2014).

Export marketing strategies: Refer to marketing strategies adopted by companies when selling goods overseas/cross-borders. The strategies identified were adapted from Morgan et al., (2012) and modified accordingly. A detailed list of the strategies can be found in the Seaweed exporters' schedule in the annexure section of this thesis.

Farmers' technical skills: Refers to abilities and skills that enable farmers to run their farms smoothly daily. Skills analysed in this study included farm management, financial, marketing, and record-keeping skills. A detailed list of the skills can be found in the Seaweed farmers' schedule in the annexure section of this thesis.

Constraints: Refers to challenges faced by ZSI producers and exporters that impede successful operations of their economic activities. Constraints for this study were first identified through a literature review and were subsequently improved through pilot studies. A detailed list of the constraints can be found in the Seaweed farmers' and exporters' schedules in the annexure section of this thesis.

3.10 Variables, measurement levels, and analysis techniques for the constructs

According to Creswell (2022, p. 112), a variable is an attribute or characteristic of an organisation or individual that can be measurable and observable by the researcher. It varies among such institutions and individuals.

Table 3.2: Summary of variables under study

Objective	Variables	Analytical techniques
To perform a structural analysis of Zanzibar's seaweed industry	• Socio-demographic profile of ZSI farmers • Number and intensity of buyers	• Frequencies and percentage analysis • Independent t-test • ANOVA • Mann-Whitney U test • Kruskal Wallis test • Porter's Five Forces framework

	• Number and intensity of suppliers/sellers • Number and intensity of competitors • Existing entry barriers • Existing substitute products • Factor conditions • Demand conditions • Related and Supporting Industries • Firm structure, strategy and rivalry • Government role and chance conditions • Strengths, Weaknesses, opportunities and challenges of ZSI • Legal framework and government support programmes related to the seaweed farming business	• Porter's Diamond Model • SWOC analysis • PESTEL analysis
To analyse the trade performance of Zanzibar's seaweed industry (2009-2019)	• Zanzibar seaweed exports' volume and value • Global seaweed export volume and value • Regional seaweed export volume and value • Zanzibar seaweed exports' share, growth rate • Other relevant factors	• Holt-Winters' smoothing exponential trend analysis and forecasting technique • Least square method • Export share analysis • Exports' growth rates • Exports' annual growth rates analysis • Exports' compound growth rates analysis, • Instability analysis (Cuddy

		Della Valle instability) • Trade dependence ratio index • Competitive index • Concentration ratio analysis • RCA index • Market share performance analysis • Proximity to customer analysis • Economic profiling analysis
To evaluate the export marketing strategies of Zanzibar's seaweed industry	• Existing export market marketing mix strategies effectiveness • Existing export market screening and entry strategies effectiveness • Existing segmentation, targeting, and positioning strategy effectiveness • Internal and external implementation effectiveness	• Perceived effectiveness score • Kendall's W coefficient of concordance
To identify challenges faced by seaweed farmers and exporting companies in Zanzibar	• Farmers' specific problems: ➢ Production and technology-related factors ➢ Labour, seeds, farming, and harvesting tools ➢ Seed and growth capital, ➢ Market screening strategies ➢ Farming contracts/trade agreements	• Garrett ranking technique • Mann-Whitney U-test

	➢ Market planning skills ➢ Market information acquisition and interpretation skills ➢ Product development, pricing, channel management, and delivery management skills ➢ Marketing communication and selling skills • Exporting companies' specific problems: ➢ Market screening strategies ➢ Market planning skills ➢ Market information acquisition and interpretation skills ➢ Price setting ➢ Market Price fluctuations of seaweed ➢ Marketing communication and selling skills	

Source: Study’s approved technical programme

3.11 Sampling procedure

The researcher's sampling procedure refers to specific techniques adopted in selecting the study’s sample. For purposes of this study, the following procedures were followed:

i. Determination of seaweed farmers' population
ii. Determination of seaweed exporters' population
iii. Determination of the number of institutions linked to ZSI
iv. Determination of sample sizes

v. Obtaining relevant permits
vi. Sampling
vii. Pilot studies
viii. Data collection

The seaweed section supplied the data for the above procedures, department of Fisheries Development, Ministry of Blue Economy and Fisheries, Zanzibar.

3.11.1 Sample 1: Seaweed farmers

A total of 25,000 seaweed farmers are estimated to be in Zanzibar. The Cochran method of sample size calculation when the population is known was adopted to obtain the study's sample size. The Cochran technique is useful when having large populations in research, allowing the researcher to calculate ideal sample sizes with the desired precision and confidence level. Similarly, the method takes into consideration the estimated proportion of the attribute present in the population

Cochran formula:

$$N_o = \frac{Z^2 pq}{E^2}$$

Where;

N_o = Required sample size

Z^2 = Z-value

P = Estimated proportion of the population which has the attribute in question (50%)

Q = 1-p

E^2 = Desired level of precision/margin of error (5%)

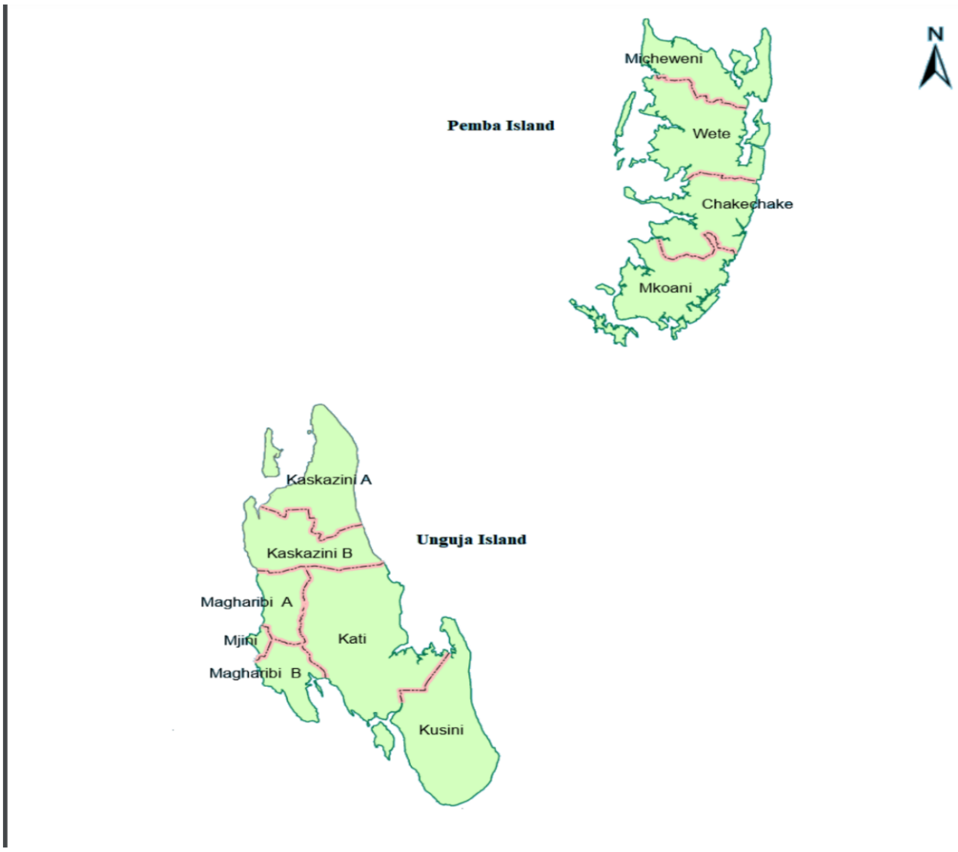
Therefore,

$$N_o = \frac{(1.96)\,(0.5)\,(0.5)}{0.05}$$

N_0 = 379 seaweed farmers

3.11.2 Sampling procedure for seaweed farmers

The seaweed farmers were selected through multistage, quota and convenience sampling. Below is the summary of the selection process:



Map of surveyed regions, Zanzibar (**Source**: OCGS, 2021)

Table 3.3: Seaweed farmers' sample selection

Island	**Regions**	**Districts**	**Villages**	**Number of farmers**
Unguja	North Unguja	North Unguja "A" North Unguja "B"	Kiwengwa	11
			Pwani Mchangani	5
			Matembwe	15
			Kidoti (Tusife Moyo)	12
			Mwambale	17
			Kidoti (Ulezi ni Kazi)	9
			Sub-total (i)	**69**
			Pongwe	16

	South Unguja	Central South Unguja South-South Unguja	Marumbwi	11
			Urowa	10
			Kajengwa	16
			Nganani-Makunduchi	12
			Kiongoni-Makunduchi	8
			Muyuni A	16
			Mungoni	16
			Pete	13
			Ukongoroni	11
			Kikungwi	12
			Unguja-Ukuu	5
			Paje	12
			Bwejuu	15
			Jambiani	13
			Sub-total (ii)	**186**
	West Unguja	West Unguja West Unguja "A" West Unguja "B" Unguja "town"	Bweleo Dimani Nyamanzi **Sub-total (iii)**	17 10 9 **36**
Pemba	North Pemba	Wete Micheweni	Kojani	5
			Kambini	10
			Mjini Kiuyu	15
			Mchanga Mdogo	13
			Chwale	12
			Kiwani	15
			Masota	9
			Shengejuu	7
			Kiungoni	15
			Maziwa Ng'ombe	15
			Wingwi Chokaningayo	15
			Kiuyu Mbuyuni	13
			Sizini	9
			Tumbe	15
			Kijichame	12
			Shumba Mjini	10
			Pwani Kidongo	14
			Sub-total	**204**
	South Pemba	Chake chake Mkoani	Kichungwani (K)	18
			Kitope	15
			Kwa Mjibwa	15
			Maungani (K)	9

			Ng'ambu Kwema	13
			Pungua	12
			Kidutani	10
			Mtemani	5
			Sub-total	**97**
			Grand-total	**592**

Source: Primary data

3.11.3 Sample 2: Seaweed exporters

About eight known seaweed exporters in Zanzibar by the seaweed section, DFD-MoBEaF). Four seaweed exporting companies were selected through convenience and purposive sampling based on population proportion and operational experience, i.e. five years and above. Key informants from the companies were managing directors of the following seaweed exporting companies based in Zanzibar-urban:

i. ZANEA Co. ltd
ii. C-WEED Co. ltd
iii. Kisiwani Pvt ltd
iv. LEDO Biashara Pvt ltd

3.11.4 Sample 3: Government representatives of institutions linked to ZSI

Twelve institutions are linked to ZSI (the seaweed section, DFD-MoBEaF). Nine government representatives participated in the study from the following institutions linked to ZSI. The representatives were selected through convenience and purposive sampling. Below is the list of institutions that participated in the survey:

i. Ministry of Blue Economy and Fisheries (3)
ii. Ministry of State, Office of the Second Vice President, Policy, Coordination and House of representatives (1)
iii. Ministry of State, Presidents Office, Finance and Planning (1)
iv. Zanzibar Bureau Of Standards (ZBS) (1)
v. Zanzibar Food and Drug Agency (ZFDA) (1)

vi. Zanzibar Fisheries and Marine Resources Research Institute (ZAFIRI) (1)
vii. Ministry of lands and housing development (1)

3.12 Data collection

This study utilised both primary and secondary data sources. Data was collected using pretested schedules, direct observation, group interviews, focus group discussions and panel discussions. Secondary data were collected from official websites as summarised in the table below:

Table 3.4: Summary of types of data collected and collection tools

S/N	Type of data	Source of data	Data collection tools
1	Primary	• Seaweed farmers • Seaweed exporters • Government institutions representatives	• Pre-tested schedules, direct observations, group interviews, focus group discussions • Pre-tested schedules • Expert panel discussion
2	Secondary	• The seaweed section, Department of Fisheries Development, Ministry of Blue Economy and Fisheries, Zanzibar • Zanzibar Revenue Board (ZRB) • Office of Chief Government Statistician (OCGS International Trade Centre-Trade map (ITC-Trade Map), • United Nations Commodity Trade (UN-COMTRADE),	• HS121220[3], • HS121221[4] and, • HS 121229[5]

[3] Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground
[4] Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground, fit for human consumption
[5] Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground, unfit for human consumption

		• United Nations Conference on Trade and Development (UNICTAD)	

Source: Primary data

3.12.1 International trade classification of red seaweeds

Since 2012, red seaweeds are internationally categorised into the harmonised system (HS) codes 121221 and 121229. Before 2012, red seaweeds were traded in the international market under trade code HS 121220. The HS codes are divided into two-digit (chapters), four-digit (headings), six digits (sub-heading) and eight to ten-digit categories (actual product at national tariff line). The 2012 revision was done to distinguish seaweeds fit for human consumption from those unfit for human consumption.

In the 2022 revision, the distinction has remained the same as follows:

HS 12 Oil seeds and oleaginous fruits, miscellaneous grains, seeds and fruits, industrial or medicinal plants, straw and fodder

HS 1212 Locust beans, seaweeds and other algae, sugar beet, sugarcanes, fresh and frozen or dried whether or not grounded, fruit stones and kernels and other vegetables and products including unroasted chicory roots of variety Cichorium intybus sativium of a kind used primarily for human consumption n.e.s

HS 121220 Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground

HS 121221 Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground, fit for human consumption

HS121229 Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground, unfit for human consumption

Below are the revised harmonised system codes correspondences for red seaweeds:

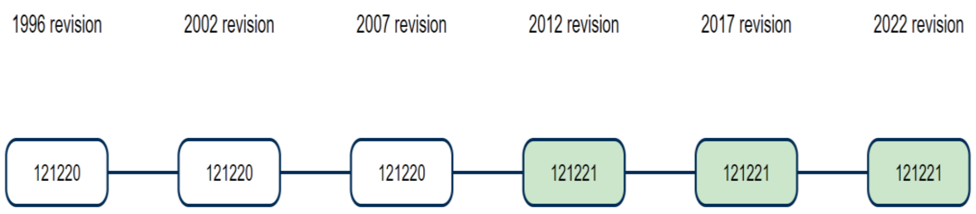


Figure 3.2: Harmonised system codes correspondences for red seaweeds under HS 121221 (**Source:** ITC map, 2022)

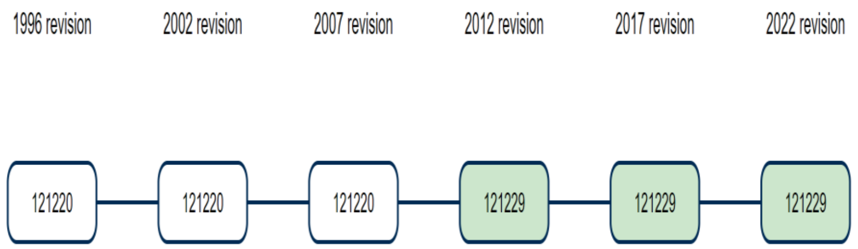


Figure 3.3: Harmonised system codes correspondences for red seaweeds under HS 121229 (**Source:** ITC map, 2022)

3.13 Data analysis procedure

Below is an explanation of the procedures followed to analyse the data collected by the researcher:

3.13.1 Primary data

i. Collected closed-ended data were first tabulated, coded and edited in Ms Excel 2021 home and student version
ii. Missing values were checked. No missing values were found.
iii. The data was transferred to SPSS software to test for normality, validity and reliability. The normality test (found in appendices 3.1 and 3.2) revealed that the collected farmers' data was not normally distributed

(Shapiro-Wilk p-value (<.000). Reliability test results (found in appendix 3.3) showed that scores were stable and consistent (Cronbach alpha value = 0.801). Validity test results (found in appendix 3.4) revealed sub-items 5 of farmers-management skills and 1 of farmers' marketing skills were found to be not valid (r > .05).

iv. Based on the results of the normality test, the appropriate inferential statistical tools were selected for further data analysis of the closed-ended questions

v. Open-ended questions were analysed through triangulation technique, and common themes from the discussions were identified and analysed accordingly.

3.13.2 Secondary data

Secondary data was analysed by application of appropriate trade indices

3.14 Analytical tools

The following is an elaboration of data analysis techniques adopted in the study:

3.14.1 Porter's five forces analysis

Porter's five analysis was conducted through focus group discussion with nine experts from institutions listed above using Porter's 2014's model guideline. Profitability potential and competitive rivalry were determined by identifying the number and intensity of buyers, the number and power of suppliers, the number of available substitutes, the number of existing producers, and the presence/absence of industry barriers and their impact on ZSI profitability potential.

3.14.2 Porter's Diamond model analysis

Similarly, Porter's Diamond model analysis was conducted with the experts using Porter's Diamond factors as guidelines, i.e. factor conditions, demand conditions, related and supporting industries, industry structure, strategy and rivalry, and role of government and chance conditions. Sources of competitive advantages and disadvantages for ZSI's were identified accordingly.

3.14.3 SWOC analysis

SWOC analysis was also conducted through a panel discussion. Sources of ZSI's strengths, weaknesses, opportunities, and challenges were identified accordingly, and the effect was examined on ZSI's performance.

3.14.4 PESTEL analysis

PESTEL analysis of the ZSI business environment was conducted through panel discussion, and political-legal, economic, socio-cultural, technological, and ecological factors affecting the industry's performance were identified, and effects were examined accordingly.

3.14.5 SPSS software

SPSS version 22 was used for testing the significance of the social demographic results of the seaweed farmers. The following tests were run in the software; descriptive statistics, inferential statistics (Mann-Whitney U tests, Kruskal Wallis, ANOVA and Independent t-tests) as well tests of normality, validity and reliability.

3.14.6 Descriptive statistics

Frequency and percentage analysis were used in the study. Frequency analysis was used to determine the number of occurrences of the research phenomenon under study, while percentage analysis determined the distribution of the occurrences among the population under investigation. Both frequency and percentage analysis were computed using SPSS version 22.

3.14.7 Mann-Whitney U test

The Mann-Whitney U test compares differences between two independent groups when the dependent variable is either continuous or ordinal but not normally distributed. The test has four assumptions:

i. The dependent variable is measured at a continuous or ordinal level.

ii. The predictor variables should consist of two or more categorical variables

iii. Independence of observations

iv. Variables are not normally distributed (**Source:**Laerd.com, 2022)

Mann Whitney U test has the following underlying hypothesis

H_0: Two populations are equal

H_1: Two populations are not equal

Mann Whitney U test is calculated as follows:

$U = n_1 n_2 + \{n_2 (n_2+1)\}/2 - \sum_{i=n1+1\ Ri}^{n2}$ Where;

U = Mann Whitney U test statistic

N_1 = sample size one

N_2= Sample size two

Ri = Sum of ranks assigned to values of the sample

The test was run in SSPS version 22.

3.14.8 Kruskal Wallis H test

The Kruskal-Wallis H test is a rank-based nonparametric test used to determine statistically significant differences between two or more groups of an independent variable measured on an ordinal or continuous dependent variable. It is an alternative to one-way ANOVA and an extension of the Mann-Whitney U test comparing more than two independent groups. The test holds the same assumptions as Mann Whitney U test. (**Source:**Laerd.com, 2022)

Test statistics value H is given as follows:

$H = \{12/N (N+1)\} \sum_{J}^{K} = 1 (R_j^2 \div nj) – 3(N+1)$

Where;

K = number of samples

Nj = number of cases in all samples combined

N = number of all cases in all samples combined

R= Sum of ranks in the j^{th} sample and, $\sum_{J}^{K} = 1$ directs to sum over k samples

The test was run in SSPS version 22.

3.14.9 ANOVA

ANOVA stands for Analysis of variance and is used to determine statistically significant differences between the means of two or more unrelated (independent) groups. The test has six underlying assumptions as follows:

i. The dependent variable is measured at a continuous or ordinal level.

ii. The predictor variables should consist of two or more categorical variables

iii. Independence of observations

iv. Variables are approximately normally distributed

v. No significant outliers

vi. Homogeneity of variances (**Source:** Laerd.com, 2022)

ANOVA test has the following underlying hypothesis

H_0: Two populations are equal

H_1: Two populations are not equal

ANOVA is calculated as follows:

F = MST/MSE

Where;

F = ANOVA coefficient

MSB = mean sum of all squares between groups

MSE = mean sum of all squares due to error

MSB = SSB/ (k-1); Where, SSB = $\sum n_j (\bar{X}_j - \bar{X})^2$ at degrees of freedom $df_1 = k - 1$

MSE = SSE / (N-k); Where, SSE =$\sum\sum (X - \bar{X}_j)^2$ at degrees of freedom $df_2 = N - k$

Total value = SST = SSB + SSE at degrees of freedom $Df_3 = N - 1$

Explanations:

SSB = sum of squares between groups

SSE = sum of squares of errors

$\bar{X}j - \bar{X}$ = mean of the jth group,

$X - \bar{X}j$ = overall mean, and nj is the sample size of the jth group.

X = each data point in the jth group (individual observation)

N = total number of observations/total sample size,

and SST = Total sum of squares = SSB + SSE

The test was run in SSPS version 22.

3.14.10 Independent T-test

The independent t-test compares the means between two unrelated groups on the same (continuous) dependent variable. Its assumptions are the same as ANOVA's. (**Source:** Laerd.com, 2022)

Independent T-test is calculated through the following formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_p\sqrt{(1/n_1 + 1/n_2)}}$$

and;

$$S_p = \sqrt{(n_1 - 1)\, s^2_1 + (n_2 - 1)\, s^2_2 / n_1 + n_2 - 2}$$

Where;

t = t-test coefficient

$\bar{x}_1$ = Mean of the first sample

$\bar{x}_2$ = Mean of the second sample

n_1 = Sample size (i.e., number of observations) of the first sample

n_2 = Sample size (i.e., number of observations) of the second sample

s_1 = Standard deviation of the first sample

s_2 = Standard deviation of the second sample

s_p = Total standard deviation

The test was run in SSPS version 22

3.14.11 Growth rate

The growth rate is calculated as the annual compound percentage change in the value of exports between two periods expressed in percentage. The value ranges between -100 per cent to +∞. A value of zero indicates that the value of trade has remained constant.

Formula:

$$\text{Growth rate} = \left\{ \left(\frac{\sum_{sw} X^1_{sw}}{\sum_{sw} X^0_{sw}} \right)^{1/n} - 1 \right\} \times 100$$

Where;

s is the set of countries in the source

w is the set of countries in the world

X^0 is the bilateral total export flow in the start period

X 1 is the bilateral total export flow in the end period, and

n is the number of periods (not including the start) (Source: Mikic and Gilbert, 2009)

3.14.12 Export share index (ESI)

The index demonstrates the importance of a particular export partner in terms of an economy's overall export profile. It is defined as the percentage of exports from the region under study (the source) to the region of interest (the destination) in the total exports of the source region. Range of values: Takes a value between 0 and 100 per cent, with higher values indicating greater importance of the selected trading partner.

Formula:

$$ESI = \frac{\sum_{sd} X_{sd}}{\sum_{sw} X_{sw}} \times 100$$

Where;

s is the set of countries in the source

d is the set of countries in the destination

w is the set of countries in the world

X is the bilateral total export flow (**Source:** Mikic and Gilbert, 2009)

3.14.13 Hirschman Herfindahl Index (HHI)

HHI is a commonly used measure of market concentration to assess market competitiveness. It is calculated by squaring market shares of businesses and totalling the squares. Values range from 0 to 10,000.

$HHI = S_1^2+S_2^2+S_3^2+S_n^2$ Where;

S=the market share percentage of firm ***n*** expressed as a whole number

(**Source:** Hayes, 2003)

3.14.14 Trade dependence index (TDI)

The trade dependence index/openness index measures the importance of international trade in the overall nation's economy. It gives the degree to which the economy is open to trade. It is calculated as the total trade value expressed as a GDP percentage. Trade dependence index ranges between 0 and +∞.

Formula:

$$TDI = \frac{\sum_s X_{ds} + \sum_s M_{ds}}{GDP_d} \times 100$$

Where;

d is the country under study

s is the set of all other countries

X is the total bilateral exports

M is total bilateral imports, and

GDP is the gross domestic product of a country d (**Source:**Mikic and Gilbert, 2009)

3.14.15 Export propensity index (EPI)

The index illustrates the overall degree of domestic producers' reliance on overseas markets. Definition: It is calculated as the ratio of exports to GDP presented as a percentage. The index ranges from zero to one hundred. A zero value indicates no exports, while 100 indicates all domestic production is exported.

Formula:

$$EPI = \frac{\sum_s X_{ds}}{GDP_d} \times 100$$

Where;

d is the country under study

s is the set of all other countries

X is the total bilateral exports

GDP is the gross domestic product of a country d. (**Source:**Mikic and Gilbert, 2009)

3.14.16 Revealed comparative advantage index (RCAI)

The RCA indicates whether a country is in the process of extending the products in which it has a trade potential. It reveals potential trade prospects with a country's new partners. The RCA index of the country **I** for product **j** is measured by the product's share in the country's exports with regards to its share in world trade:

$RCA_{ij} = (x_{ij}/X_{it}) / (x_{wj}/X_{wt})$ Where;

$\mathbf{x_{ij}}$ and $\mathbf{x_{wj}}$ are the values of the country i's exports of product j and world exports of product j,

$\mathbf{X_{it}}$ and $\mathbf{X_{wt}}$ refer to the country's total exports and the world's total exports.

A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Likewise, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product (**Source:**Mikic and Gilbert, 2009)

3.14.17 Competitive index (CI)

CI is the share of total exports of a given product from the country under study in total world exports of the same product. The index takes a value between 0 and 100 per cent, with higher values indicating greater market power of the country.

Formula:

$$CI = \frac{\sum_d X_{isd}}{\sum_{wd} X_{iwd}} \times 100$$

Where;

s is the country of interest

d and w are the set of all countries in the world

i is the sector of interest

x is the commodity export flow. (**Source:** Mikic and Gilbert, 2009)

3.14.18 Garrett's ranking technique

In this technique, seaweed farmers were asked to rank the marketing challenges presented as appropriate. Their ranks were thereby converted into score values, and final values were ranked with the help of the following formula:

$$\textbf{Per cent position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Rank given for the i^{th} variable by j^{th} respondents

N_j = Number of variables ranked by j^{th} respondents

Factors with the highest mean value are considered the most important.

3.14.19 Holt-Winters smoothing exponential method

The Holt-Winters method analyses trends and forecasts data when there are no values for seasonality. Exponential smoothing refers to using an exponentially weighted moving average (EWMA) to "smooth" a time series. The following equations are used for forecasting under the Holt-Winters smoothing exponential model:

Forecast equation ($\hat{y}_{t+h|t}$) = $\ell_t + hb_t$

Level equation (ℓ_t) = $\alpha y_t + (1-\alpha)(\ell_{t-1} + b_{t-1})$

Trend equation (b_t) = $\beta^*(\ell_t - \ell_{t-1}) + (1-\beta^*)b_{t-1}$

Where;

ℓ_t is an estimate of the level of the series at time tt,

b_t is an estimate of the trend of the series at time tt,

α is the smoothing coefficient

The independent variable for this model was time, while the dependent variable was production volume per year. The analysis was run in R-software.

3.14.20 Least square method

The least squares method is a form of mathematical regression analysis used to determine the line of best fit for a data set, providing a visual demonstration of the relationship between the data points. Each data point represents the relationship between a known independent variable and an unknown dependent variable.

The least-square method states that the curve that best fits a given set of observations is said to be a curve having a minimum sum of the squared residuals (or deviations or errors) from the given data points. The equation of the least square line is given by ($\hat{Y}$) = a + bX

Normal equation for 'a': $\sum Y = na + b\sum X$

Normal equation for 'b': $\sum XY = a\sum X + b\sum X2$

Where;

n is the number of data points

y is the dependent variable (export volume, value)

x is the dependent variable (time)

The trend line is obtained by solving the two above equations by solving these two normal equations. The analysis was run in R-software.

3.14.21 Cuddy Della Valle instability index (CDVII)

Cuddy Della Valle instability index (CDVII) measures instability in economic data series. This index was used to analyse the instability of seaweed production data (2010-2021) and exports (2010-2021).

The index is calculated as follows:

CDVI = CV$\sqrt{(1 - AdjR2}$

Where;

CDVI = Cuddy Della Valle Instability Index

CV = Coefficient of determination

$AdjR^2$ = Coefficient of determination / adjusted R^2

Ranges of CDVII:

0-15:	Low instability
15-30:	Medium instability
>30:	High instability

3.14.22 Kendall's W coefficient of concordance

Kendall's W statistic, also called the "Coefficient of Concordance", is a non-parametric statistic used to assess agreement between different raters and ranges from 0 to 1. Zero is no agreement between raters, while 1 is perfect agreement. The statistic is calculated either on an interval scale or an ordinal scale. The test statistic was used to determine the level of agreement between seaweed farmers, exporters and government representatives.

The calculation of the "W" statistic is as follows:

$$W = \frac{12S}{M^2 (n^3 - n)}$$

Where;

W = Kendall's W coefficient

S is the sum of squared deviations,

m is the number of judges (raters),

n is the total number of objects being ranked.

The test was run in SSPS version 22.

3.14.23 Perceived effectiveness index: The total scores on exporters' perceived effectiveness of export marketing strategies were calculated by summing up the respondents' scores. The scores were then expressed in percentages as follows:

Perceived effectiveness score (%) = (Total score obtained / Maximum possible score) *100

3.15 Study's ethical consideration

For purposes of data collection, the following ethical considerations were made:

i. The researcher obtained a research permit from the office of the second vice president, Zanzibar
ii. The research also obtained licenses for data collection from LGA at regional levels from Unguja and Pemba
iii. The researcher sought permission from village gatekeepers, i.e. Shekhias
iv. Permission for administering questions was also sought verbally for the farmers' and exporters' consent
v. Permissions for administering panel discussions with government representatives were sought through the submission of request letters to the institutions' director generals for the provision of key informants

Summary

This chapter outlined the methodology followed by the researcher to arrive at the study's findings. The researcher adopted a cross-sectional research approach to collect data. The study design was mixed-method survey research. The study sample consisted of seaweed farmers in Zanzibar (592), seaweed exporters (4) and government officials (9) from institutions linked to ZSI. Farmers were collected through multi-stage, quota and convenience sampling, while exporters and officials were selected through convenience and purposive sampling. The researcher used a convergent triangulation method of data collection where primary and secondary data sources were adopted and analysed in conjunction with one another to arrive at the study's findings.

Analytical methods adopted were categorised as follows; first, to analyse ZSI structure, descriptive and inferential statistics, appropriate statistical indices, Porter's five forces analysis, Porter's Diamond model analysis, SWOC analysis and PESTEL analysis were adopted. Second, to analyse the production and export performance of ZSI, Holt-Winters smoothing exponential method, least square methods, Cuddy Della Valle instability index, and other appropriate trade indices. Third, descriptive statistics were adopted to examine the industry's export marketing strategies. Lastly, to analyse challenges faced by farmers and exporters of the ZSI Garrett ranking technique.

RESULTS AND DISCUSSIONS

CHAPTER 4

RESULTS AND DISCUSSION

4.0 Introduction

The present study intended to analyse Zanzibar's seaweed industry competitiveness and suggest a suitable strategy for its improved performance by examining its structure, assessing its trade performance, evaluating its marketing strategies and identifying constraints faced by its producers and exporters. Therefore, this chapter proceeds to present the findings from the study's data analysis as outlined below:

i. **Section I:** Structural analysis of the Zanzibar seaweed industry
   This section will provide a brief background on competitiveness and its connection to structural analysis using Michael E. Porter's theory of Competitive advantage. Below are the sub-sections to be addressed under this section:
   - General profile of ZSI
   - Socio-economic profile of ZSI's producers
   - Business profile of ZSI's exporters
   - Porter's five forces analysis of ZSI
   - Porter's Diamond model analysis of ZSI
   - SWOC analysis of ZSI
   - PESTEL analysis of ZSI
   - ZSI value chain
   - Marketing channels of ZSI
   - Institutional linkages to ZSI

ii. **Section II:** Performance analysis of Zanzibar seaweed industry's exports
   Areas covered under this section include:
   - Time series analysis of ZSI's production and export trends 2010-2021
   - Forecasting production and export trends of ZSI 2022-2025

- Instability analysis of ZSI's exports
- Regional red seaweed exports trends 2000 – 2020: A comparison of leading producers
- Global red seaweed exports trend 2000 – 2020: A comparison of leading producers
- Comparative analysis of; export growth trends, compound annual growth rates, market shares performances, concentration indices, competitive indices, trade dependency indices, revealed comparative advantage indices, proximity to customers, and summary economic profiles analysis of leading red seaweeds exporters globally

iii. **Section III:** Export marketing strategies of the Zanzibar seaweed industry

This section identified the following:

- Product, price, promotion and place strategies adopted by ZSI
- Export entry and market strategies followed by ZSI's exporters
- Evaluation of the export entry and market strategies adopted by the exporters

iv. **Section IV:** Constraints faced by seaweed farmers and exporting companies of the Zanzibar seaweed industry.

This section identified the following:

- Constraints faced by seaweed farmers of ZSI
- Constraints faced by the seaweed exporters of ZSI.

SECTION I

4.1 STRUCTURAL ANALYSIS OF THE ZANZIBAR SEAWEED INDUSTRY

Industry structure strongly affects the industry profitability and determination of competitive strategies. Competitive strategies emanate from the firm's business environment. Understanding the vital forces within its environment that shape competitive rivalry in an industry is the underlying goal of structural analysis. Thus, this section intends to examine the structure of ZSI to determine its profitability potential, sources of ZSI's competitive advantages and threats and opportunities emanating from its business environment.

Therefore, this section is sub-divided as follows:

4.1.1 General administrative structure of ZSI
4.1.2 Socio-economic profile of ZSI's producers
4.1.3 Business profile of ZSI's exporters
4.1.4 Porter's five forces industry analysis of ZSI
4.1.5 Porter's diamond model analysis of ZSI
4.1.6 SWOC analysis of ZSI
4.1.7 PESTEL analysis of ZSI
4.1.8 Value Chain Map of ZSI
4.1.9 Marketing channels of ZSI
4.1.10 Institutional linkages to ZSI
4.1.8 Summary

4.1.1 Administrative Structure of ZSI

The ZSI structure at its apex consists of the RGoZ, which governs and guides its operations through its ministry of Blue Economy and Fisheries (MoBEaF). The ministry oversees all fishing and aquaculture activities under its department of fisheries development (DFD). The department is further subdivided into fisheries and aquaculture sections. The aquaculture section oversees about seven types of aquacultures, i.e., pearl, finfish, sea cucumber, crabs, coral sponge, and seaweed farming. Out of the seven, only seaweed farming is on a commercial scale. The remaining six are still in the trial stages. Seaweed farming in Zanzibar is under the jurisdiction of the seaweed section under DFD-MoBEaF. Administratively, seaweed farming is conducted at the *shehias*/ward level. Every village has its local *shehias* led by *shehas*/local leaders, which have their by-laws governing all its activities. The *shehas* are gatekeepers to the villagers.

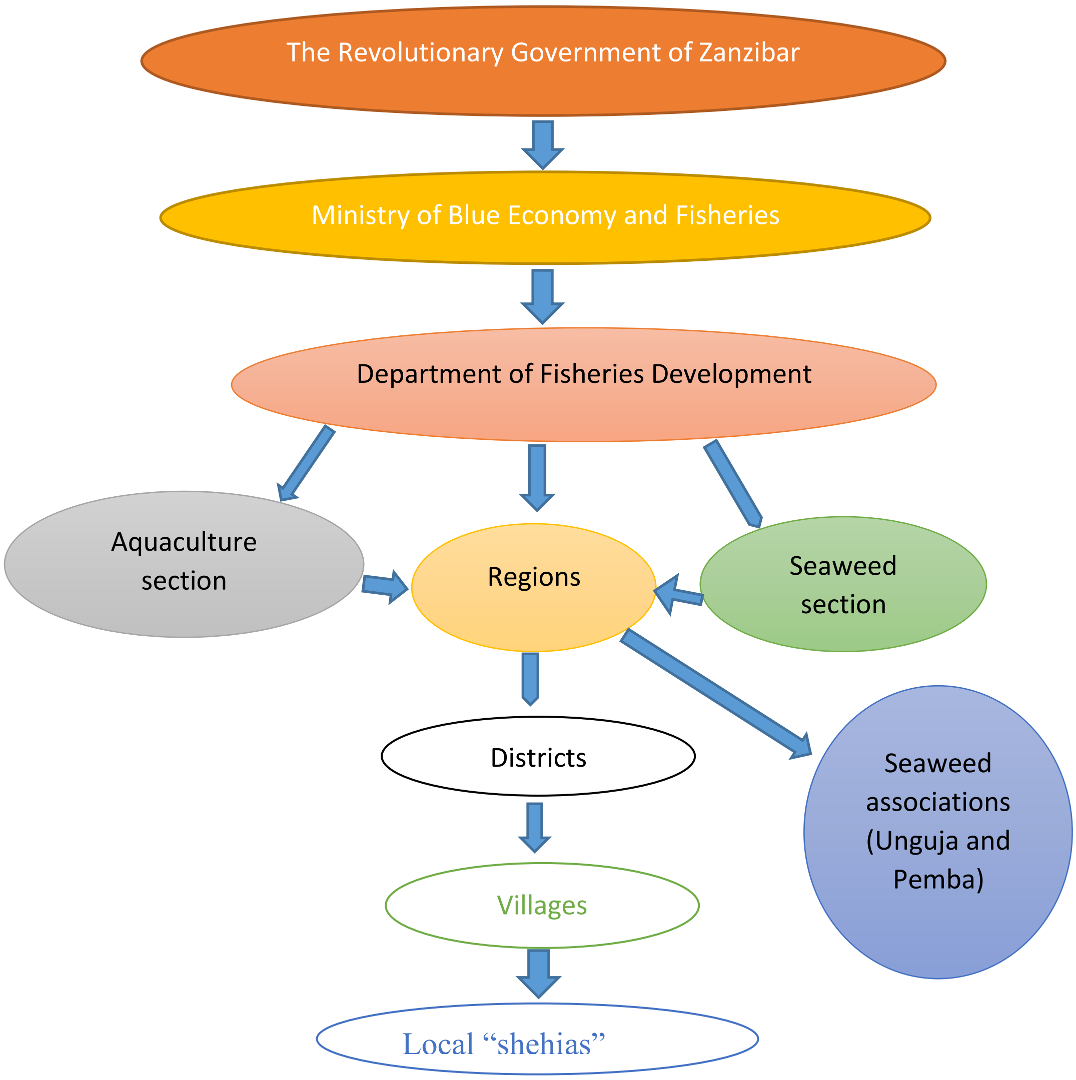


Figure 4.1: ZSI industry administrative structure

4.1.2 SOCIAL DEMOGRAPHIC PROFILE OF THE ZSI'S PRODUCERS

In this subsection, the socio-demographic profile of the seaweed farmers was analysed using descriptive (frequencies and percentages) and inferential ANOVA, Kruskal-Wallis, Mann-Whitney U test) statistics. Variables examined included gender, age, education background, marital and family background, income, number of plots owned, output per plot and production costs. The findings below summarize the socio-demographic variables of the farmer respondents from the Unguja and Pemba islands.

4.1.2.1 Gender

From the figure below, it can be observed that ZSI producers are, to a large extent, female farmers constituting 90.45% of the total respondents. Male farmers constituted only about 9.55 % of all farmers. Between the two islands, Unguja has the leading distribution of female farmers (93.5) than Pemba (87.4). Further, Pemba island was found to have a higher distribution of male farmers (12.6%) than Unguja. The results reveal that female producers than male dominate the industry. The significant dominance of female producers over males can be explained by the nature of seaweed farming, i.e. easy production method and cheap start-up capital.

Similar findings were reported by Songwe *et al*. (2016); Msuya, (2012); Hamad and Mtae, (2022). Limited male participation in farming has resulted from limited returns from seaweed farming. Hence male farmers have been opting for other viable and good economic opportunities in the islands, e.g., fishing and construction. However, notwithstanding, seaweed farming is a valuable tool for promoting gender empowerment and reducing gender-based income disparity in rural Zanzibar. Therefore, it is a useful tool for poverty alleviation and tackling high unemployment rates in rural areas for the marginalised, i.e., women.

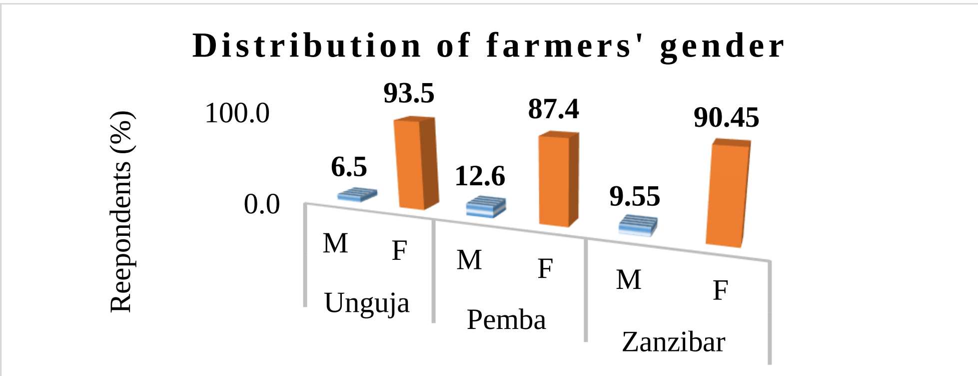


Figure 4.2: Distribution of respondents' gender (**Source:** Primary data)

4.1.2.2 Marital and Family backgrounds

The figure below reveals that 61.26% of the seaweed farmers are married, 20.23% are widows/widowers, 13.99% are divorced, and 4.18% are unmarried. Unguja was found to have a relatively higher percentage of married farmers (67.01%) than Pemba (55.5%). In comparison, Pemba has a somewhat higher number of unmarried (6.3%), widows (21.9%), and divorcee (16.3%) farmers.

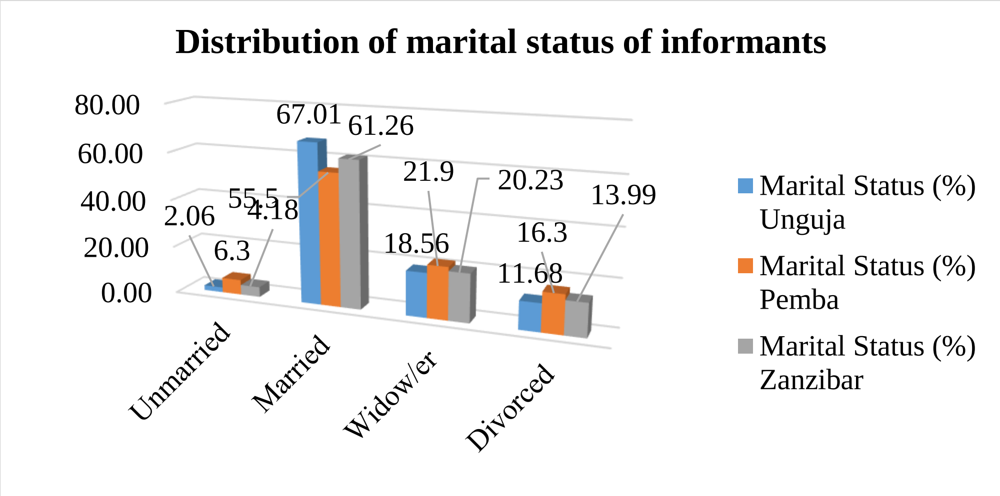


Figure 4.3: Distribution of respondents' marital status (**Source:** Primary data)

The figure below reveals that 93.73% of farmers live in extended families. Pemba island has the highest number of respondents from extended families (95.35%) compared to Unguja (92.10%). This finding has a cost implication since big households have higher expenditures. With farmers already facing price challenges, having a big household erodes their profit margins further.

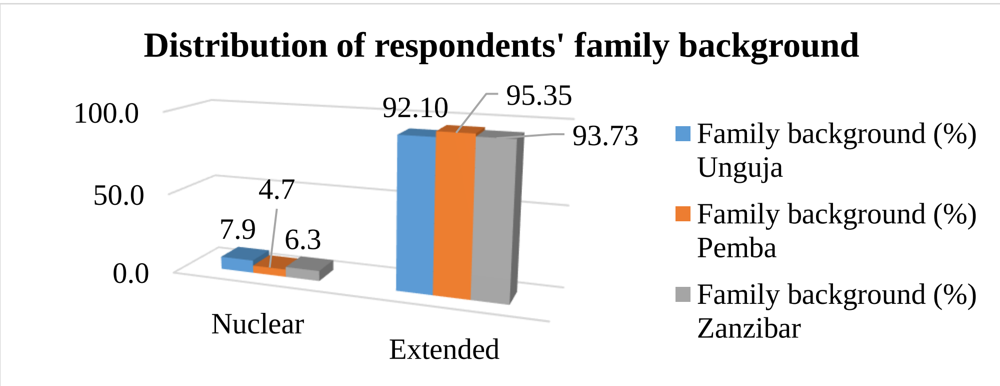


Figure 4.4: Distribution of respondents' family background (**Source**: Primary data)

4.1.2.3 Educational background

The figure below reveals that 41.96% of the farmers have attained primary education while 30.91% have attained secondary education. About 24.76% of the farmers were found to be illiterate, while 2.75% only attended short courses. Pemba Island leads in the illiterate category (38.9%), while Unguja leads in the primary (45.7%), secondary (40.6%) and short courses (3.09%) categories. The study's results contradict Songwe *et al*. (2016) research findings were the highest level of education among farmers was secondary education (33.1%), primary education (23%), illiterates (42.6%) and the remaining lot between degree, diploma and certificate. This study found that the majority of the farmers had attained primary-level education. No farmer was found to have earned a diploma or degree. However, Pemba has a higher number of illiterates (38.69%) than Unguja (10.65%), which Pemba's low infrastructural development level can explain.

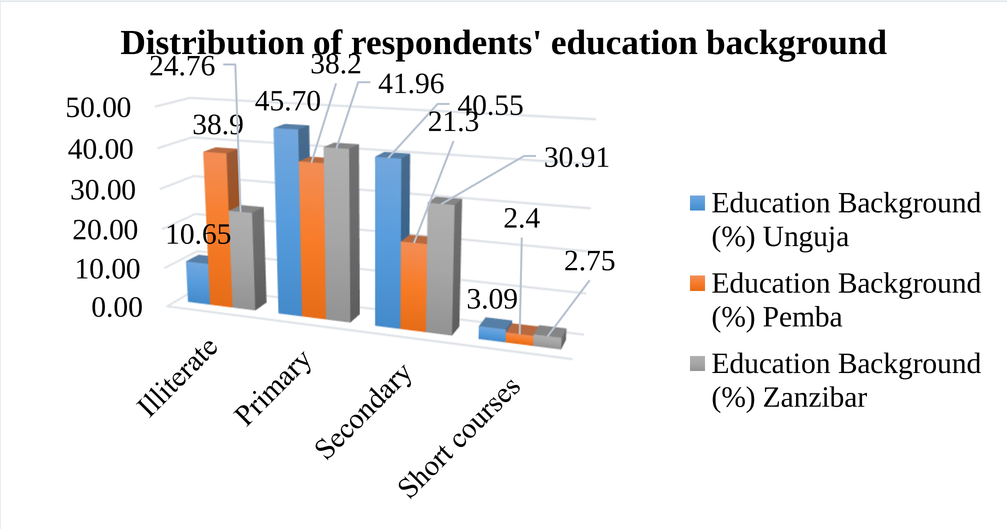


Figure 4.5: Distribution of respondents' educational background (**Source:** Primary data)

Further, literacy differences between Unguja and Pemba can be explained by the development disparities between the two islands. Unguja is more developed than Pemba and carries almost all government and non-governmental institutions because of its location (source: Primary data).

Thereby the island has more educational infrastructures, for instance, than Pemba. Another factor that can explain the disparities is that Pemba remains highly traditional than Unguja and still practice ancient cultures, e.g., early marriages; hence, for the most part, girl children tend to be taken to Islamic schools and wedded early, unlike their boys' counterparts (source: Primary data).

Appendices 4.1 and 4.2 in the appendix section of this thesis reveal the statistical significance of differences in educational background and marital status between farmers in Unguja and Pemba. Educational background was found to be statistically significant in the categories of; illiterates (U=82, p=.00 mean ranks = 33.74 Unguja, 15.9 Pemba), secondary education (U=159, p=.00 mean ranks = 19.4 Unguja, 30.9 Pemba) and in short courses (U=250, p=.04 mean ranks= 23 Unguja, 27.1 Pemba). Similarly, statistical significances were found in marital status between the Islands in the categories of unmarried (U=182, p=.00 mean ranks= 29.7 Unguja, 20.1 Pemba) and divorcees (U=214, p=.07 mean ranks= 28.4 Unguja, 21.4 Pemba).

Appendices 4.3 and 4.4 reveal statistical significance was found for mean rank differences in the primary education ($x^2(2)= 12.12$, p=.00) category of the respondents within Pemba, where Micheweni village ward has the highest mean rank score of 20.2, followed by Wete (10.8) and Mkoani (8.3). This observation implies that, on average, the Micheweni ward has more farmers with primary education than Wete and Mkoani.

4.1.2.4 Religion

This study found that all participants of the survey were Muslim. This finding can be explained by Zanzibar's historical background of being colonized by Arabs.

4.1.2.5 Age of respondents

From the figure below, it can be inferred that the maximum age of respondents was 57 years, while the minimum age was 40 years. The average age of the farmers was found to be 48 years. ZSI has an older producer base, while youth producers are almost absent. The absence of youth in the industry's production system can be explained by its low returns. Thus youth are discouraged from joining and tend to pursue other economic alternatives. Similar findings were observed by Msuya, (2012) and Songwe *et al*. (2016). Further, the observed average age of farmers from both islands can be explained by the fact that most farmers from both islands have been farming seaweed for over thirty years. Further, it can also be inferred that the industry's workforce is aged, which may affect productivity. Such observation has not been researched in the URT and may provide an area for future research.

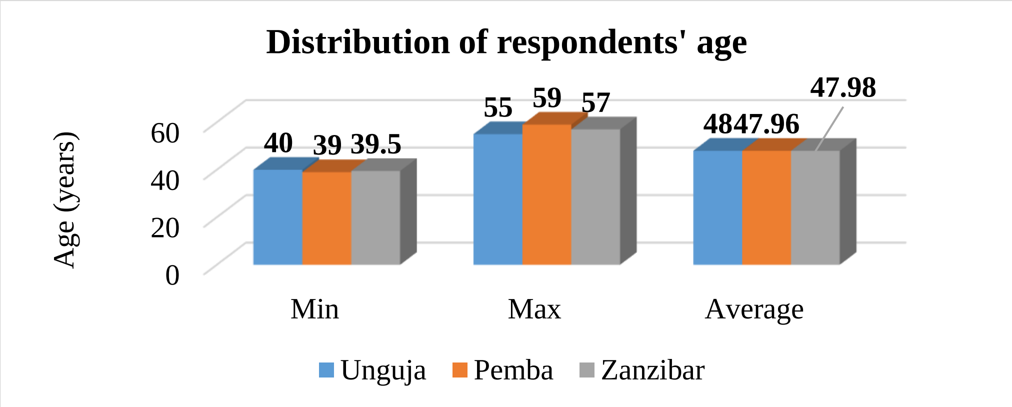


Figure 4.6: Distribution of respondents' age (**Source***:* Primary data)

4.1.2.6 Income earned from seaweed farming

From the table results below, it can be observed that there exist differences in income from seaweed farming between Unguja and Pemba islands. Most farmers (63%) in Unguja earn between INR 0–7,000 per production cycle, and only about three per cent were found to earn between INR 27,998.06 – 34,997.58 per cycle. In contrast, most farmers in Pemba (68%) earn between INR 27,998.06 – 34,997.58 per cycle. As already discussed, the income disparity is mainly because Pemba farms are twice as large as Unguja; hence, the output is twice as much (**source:** Primary data). Similarly, Pemba Island has a more favourable seaweed growing environment than Unguja due to minimal tourism (less sea pollution) and stable weather. In addition, a slight marginal difference in income (10%) earned from other sources[6] was observed between Unguja and Pemba per month.

Table 4.1: Differences in income earned from seaweed farming per production cycle

Income from seaweed farming (Rs.)[7]	Unguja		Pemba		Zanzibar (Total)	
	N	*%*	*N*	*%*	*N*	*%*
< 6,999.52	182	63	0	0	182	30.74
6,999.52 – 13, 999.03	38	13	0	0	38	6,41
13,999.03 – 20,998.55	38	13	30	10	68	11.49
20,998.55 – 27,998.06	23	8	66	22	89	15.03
27,998.06 – 34,997.58	10	3	205	68	215	36.32
Total	**291**	**100**	**301**	**100**	**592**	**100**

Source: Primary data

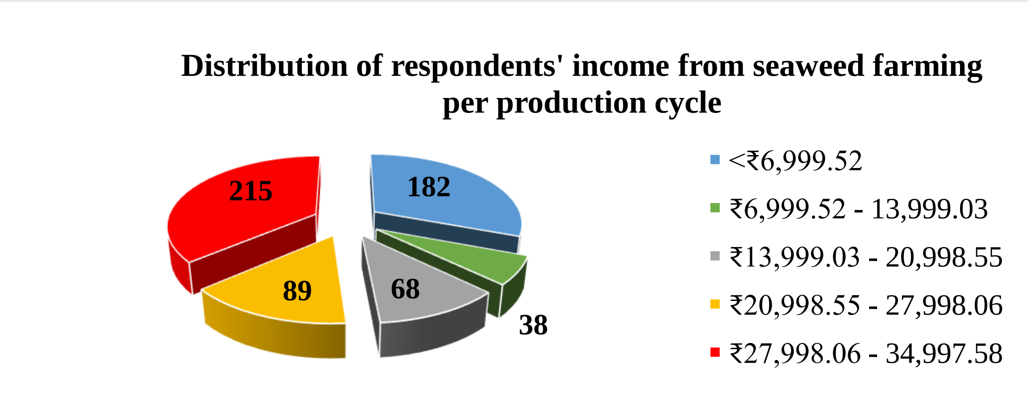


Figure 4.7: Distribution of respondents' income from seaweed farming per production cycle (**Source***:* Primary data)

From the figure above, it can be observed that the majority of the farmers (36.3%, i.e. 215) earn an income of between ₹27,998.06 - 34,997.58 from seaweed farming. Similarly, 30.74% of the farmers (182) earn up to ₹6,999.52

[6] Other sources of income include gleaning, weaving, small-scale entrepreneurial activities, tailoring etc.
[7] Conversion rates applied 1 INR = 28.57 TZS

from the same. The percentage majority is reflective heavily of Pemba's distribution than the two islands combined.

4.1.2.7 Income earned from other sources

It was found that most farmers from Unguja (48.8%) and Pemba (80%) earn between INR 1,749.88 - 3,499.76 per month from other sources besides seaweed farming. Overall, it can be inferred that most of the seaweed farmers from Zanzibar (64.36%) earn the same amount.

Table 4.2: Differences in income earned from other sources per month

Income from other sources (Rs.)	Unguja		Pemba		Zanzibar (Total)	
	N	*%*	*N*	*%*	*N*	*%*
<1,749.88	82	28	0	0	82	13.85
1,749.88 - 3,499.76	140	48	241	80	381	64.36
3,499.76 - 5,249.64	46	16	24	8	70	11.82
5,249.64 – 6,999.52	23	8	24	8	47	7.94
6,999.52 – 8,749.39	0	0	12	4	12	2.02
Total	**291**	**100**	**301**	**100**	**592**	**100**

Source: Primary data

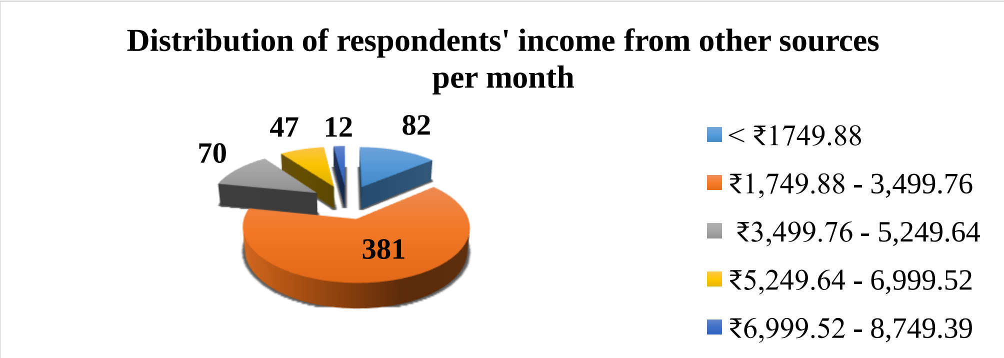


Figure 4.8.: Distribution of respondents' income from other sources per month (**Source**: Primary data)

The figure below reveals that the primary sources of extra income for the farmers include: gleaning, fishing, entrepreneurship, weaving, land-based farming and handcrafting activities. Most of the seaweed farmers in Unguja (68) are gleaners and practice land-based agriculture (64). While the respondents from Pemba practice land-based agriculture (74) to a large extent. Most farmers (138) from Zanzibar practice land-based agriculture as an alternative economic activity, followed by small-scale entrepreneurship (108).

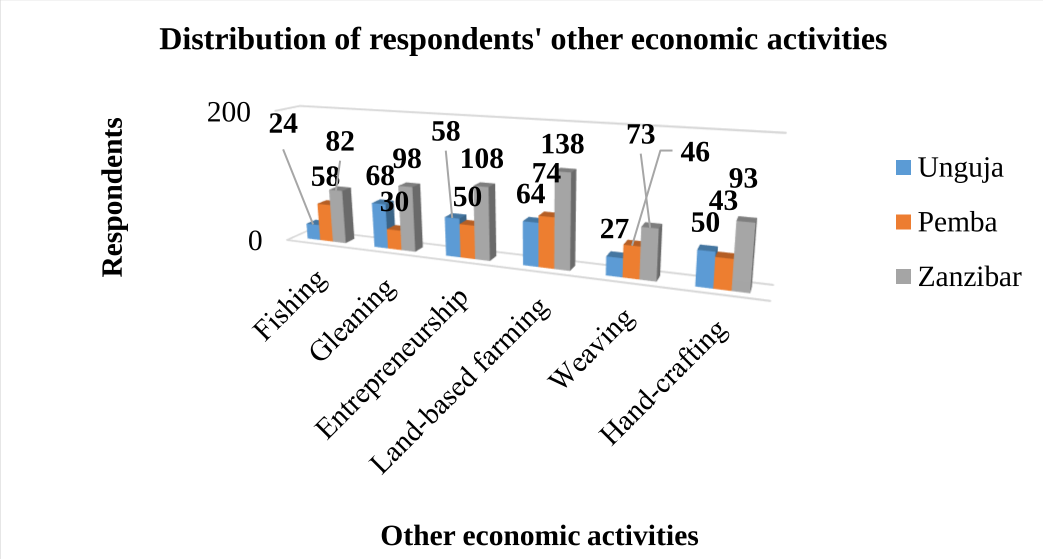


Figure 4.9: Distribution of respondents' other economic activities (**Source**: Primary data)

4.1.2.8 Far,ers' household expenditures

The table below depicts differences in household expenditures per month between farmers from Unguja and those from Pemba. Farmers from Unguja (95%) have relatively higher monthly spending (INR 20,998.55 – 27.998.06) than their counterparts in Pemba (50.17%). The differences in costs are attributed to the socio-economic differences between the two islands. Unguja has a higher standard of living and is more developed than Pemba.

Table 4.3: Differences in household expenditures per month

	Unguja		Pemba		Zanzibar	
	N	*%*	*N*	*%*	*N*	*%*
Household expenditure (Rs.)						
6,999.52 – 13,999.03	9	3	231	77	240	40.54
13,999.03 – 20,998.55	5	2	50	17	55	9.29
20,998.55 – 27.998.06	277	95	20	7	297	50.17
Total	**291**	**100**	**301**	**100**	**592**	**100**

Source: Primary data

From the figure below, it can be observed that the majority of the farmers in Unguja (277) spend on average between ₹20,998.55 - 27,998.06 per month, while in Pemba, majority of the farmers (231) spend between ₹6,999.52 - 13,999.03. The difference in spending observed between the two islands can be explained by socio-economic differences, with Unguja being more developed than Pemba, thus having a higher standard of living than Pemba.

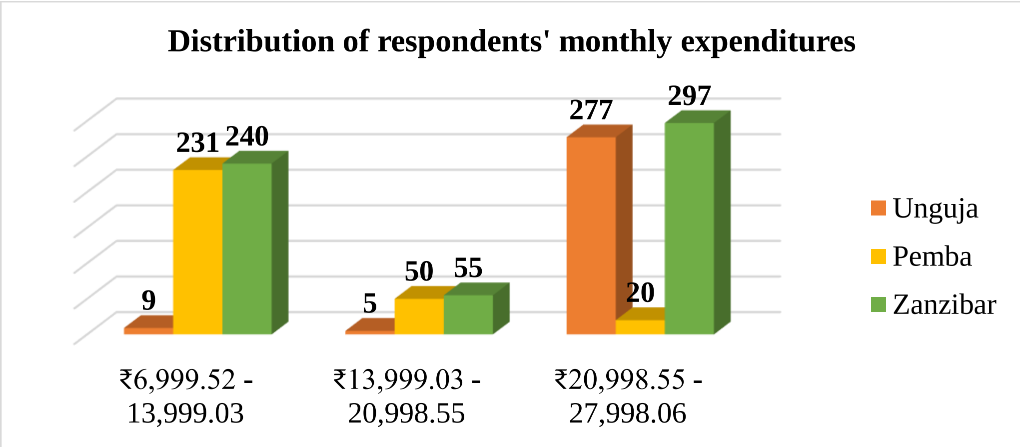


Figure 4.10: Distribution of respondents' monthly expenditures (**Source:** Primary data)

Appendix 4.5 reveals statistical differences between average household expenditures per month within Pemba by-wards (p=.003). For example, differences were observed between Mkoani and Wete (mean difference= TZS 180,417[8] p=.003) wards and Mkoani and Micheweni wards (mean difference= TZS 131,250[9] p=.035). Further, appendices 4.6 and 4.7 show statistical significance in income and household expenditure categories where Pemba earns more than Unguja from seaweed farming (t (47)=8.14, p=.00 mean= TZS 916,000[10] in Pemba & TZS 264,542[11] in Unguja). In the household expenditures category, Unguja have slightly higher expenditures than Pemba (t(47)=-5.62, p=.00 mean = TZS 125,524[12] in Unguja & TZS 121, 885[13] in Pemba). As

[8] Rs. 6,315
[9] Rs. 4,594
[10] Rs. 32,062
[11] Rs. 9,259
[12] Rs. 4,394
[13] Rs. 4,266

discussed in previous findings, observed income and expenditure differences are attributed to differences in living standards between Unguja and Pemba.

4.1.3 SEAWEED PRODUCTION DETAILS OF ZSI

4.1.3.1 Production method

The predominant production method was found to be traditional off-bottom. The production cycle is between 45 and 60 days, i.e. six times a year. Farmers can tend their farms only two weeks per month during low tides. The variety mainly produced was *spinosum* and a limited amount of *cottonii*, e.g. in Mungoni village, Unguja and several parts of Pemba. Production peaks between June and August (cooler months) and is lowest in hotter months, i.e. December-February.

4.1.3.2 Number of seaweed plots owned by farmers

The figure below shows that a seaweed farmer in Unguja owns between three to eight seaweed plots, while in Pemba, a farmer owns between one to two plots. A plot in Unguja has approximately 150 lines of seaweed plants, while a plot in Pemba has up to 3000 lines of seaweed plants (source: Study survey). Thus, even though the number of plots owned is different between the two islands, Pemba has bigger plots than Unguja. A plot of seaweed in Unguja produces up to 70 kgs of dry seaweed, while in Pemba, a single plot may produce up to 1000 kgs of dried seaweed. In contrast to Unguja, Pemba enjoys lesser environmental attacks; hence, seaweed plants thrive in growth more than Unguja.

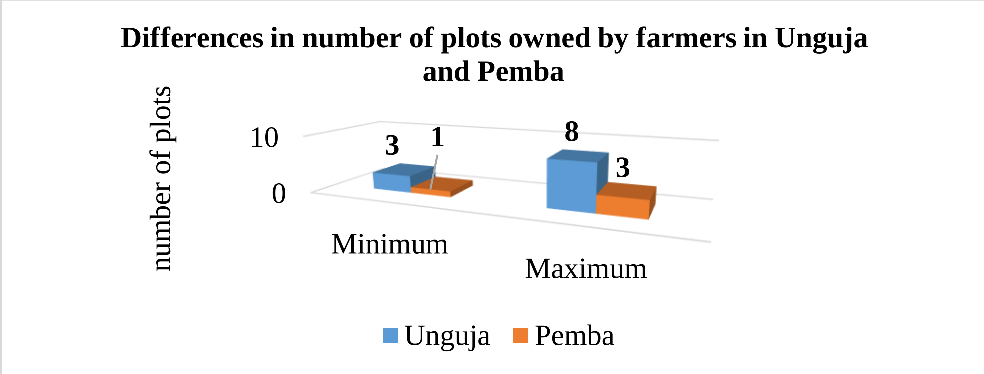


Figure 4.11: Differences in the number of plots owned by farmers (**Source:** Primary data)

4.1.3.3 Output per plot per production cycle[14]

Unguja

The figure below shows that the North Unguja region leads seaweed production in Unguja, followed by South and central Unguja. The average production for the regions is 63 kgs, 58 and 57 kgs, respectively (source: Primary data).

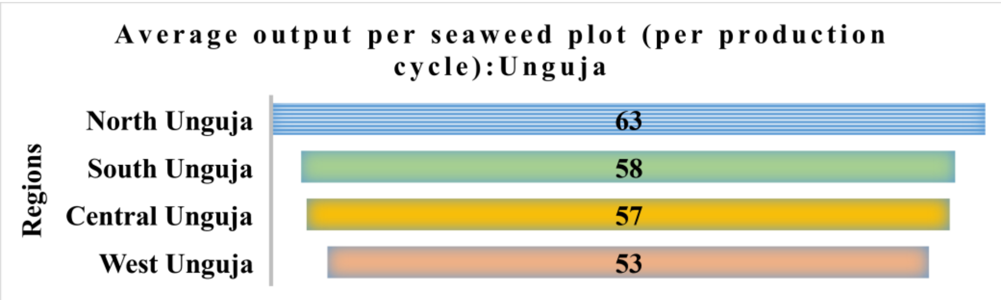


Figure 4.12: Average output per plot per cycle: Unguja (**Source**: primary data)

Pemba

The figure below shows that Wete region leads in seaweed production (48%) in Pemba, followed by Micheweni (34%). The average production per cycle is 278 kgs and 196 kgs for the North and Central Unguja regions, respectively (source: Primary data).

[14] Seaweed production cycle takes 45-60 days

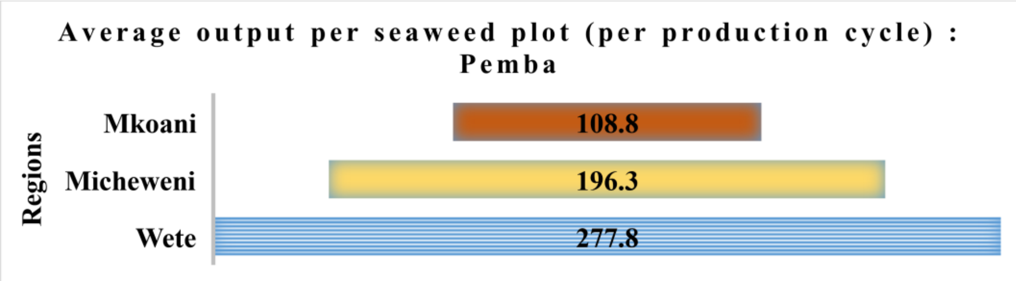


Figure 4.13: Average output per plot per cycle: Pemba (**Source**: primary data)

4.1.3.4 Production costs

Before establishing approximate values for production costs, the following is to be taken under consideration:

a. A seaweed farm in Zanzibar is measured by the number of seaweed lines
b. Most of the seeds needed are collected locally by farmers. However, seeds are bought from nearby villages where seaweed plants have failed to grow.
c. Seaweed farming does not require pesticides or fertilizers.
d. The local fiber boat's cost is not added to the fixed cost calculation since the farmers confirmed they received them as farming aid from the DPD-MoBEaF, Zanzibar. However, rental value is added in the variable cost category since some farmers cannot access such boats and rent from fishers nearby.
e. Drying racks for harvested seaweed are created by farmers locally using sticks, ropes, and nets. Hence the value of drying racks embodies these individual items at approximated values as narrated by farmers.
f. The cost of seaweed production in Zanzibar can be categorised into four, namely: input costs (cost A), labour costs (cost B), transportation costs (cost C) and other costs (cost D)

Table 4.4: Production costs per plot in Unguja (A)

Sub-items	Number	Cost/unit (Rs.)	Total cost (Rs.)
A roll of ropes (92m)	1	1047	1047

Plastic cover (12m*5m)	1	873	873
Pegs	50	175	175
Tie ties (bundle)	1	698	698
Drying rack	1	1047	1047
Sub-total (i)	**-**	**-**	**3,840**
Seeds	850 grammes	-	175
Cleaning and sorting	-	-	349
Other	-	-	1746
Sub-total (ii)	**-**	**-**	**2,270**
Total (a)			**6,110**

Source: Primary data

Table 4.5: Production costs per plot Unguja (B)

Item	**Number**	**Cost per day (Rs.)**	**Number of days per production cycle**	**Total cost (Rs.)**
Labour[15]	2	175	4	1,400
Total (b)				**1,400***

Source: Primary data

Table 4.6: Production costs per plot Unguja (C)

Item	**Cost (Rs.)**	**Number of days per production cycle**	**Total cost (Rs.)**
Transport to the farming site	175	10	1,750
Transport from shores to collection centres	349	1	349
Total (c)	**-**	**-**	**2,099**

Source: Primary data

Table 4.7: Production costs per plot Unguja (D)

Item	**Cost (Rs.)**	**Number of days per production cycle**	**Total cost (Rs.)**
Rental value for local boat	349	1	349
Total (d)	-	-	**349**

[15] Includes hired and family labour

Source: Primary data

Total production cost Unguja = Cost A + Cost B + Cost C + Cost D

= Rs. (6110+1400+2099+349)

= Rs. 9,958

Table 4.8: Production costs per plot Pemba (A)

Items	**Units**	**Cost (Rs.)**	**Total cost (Rs.)**
Roll of ropes (92m each)	2	1047	2,094
Plastic covers (12m*5m)	2	873	1,746
Pegs	300	-	1,047
Tie ties (bundle)	2	349	698
Drying racks	2	1,746	3,492
Other	-	-	1,746
Sub-total (i)	**-**	**-**	**10,823**
Seeds	I kg	-	350
Cleaning and sorting	-	-	1,047
Sub-total (ii)	**-**	**-**	**1,222**
Total (a)			**12,220**

Source: Primary data

Table 4.9: Production costs per plot Pemba (B)

Item	**Number**	**Cost per day**	**Number of days per production cycle**	**Total cost (Rs.)**
Labour[16]	3	175	4	2,100
Total (c)				**2,100***

Source: Primary data

Table 4.10: Production costs per plot Unguja (C)

Item	**Cost (Rs.)**	**Number of days per production cycle**	**Total cost (Rs.)**
Transport to the farming site	349	10	3,490

[16] Includes hired and family labour

Transport from shores to collection centres	349	2	698
Total	**-**	**-**	**4,188**

Source: Primary data

Table 4.11: Production costs per plot Pemba (D)

Item	**Cost (Rs.)**	**Number of days per production cycle**	**Total cost (Rs.)**
Rental value for local boat	349	2	698
Total (d)	-	-	**698**

Source: Primary data

Total production cost Pemba = Cost A + Cost B + Cost C + Cost D

= Rs. (12,220+2100+4188+698)

= Rs. 19,206

4.1.3.5 Sources of capital for the farmers

From the figure below, most farmers were found to obtain capital for farming from their own savings (69%) followed by small-scale loans (18%).Farmers in Pemba were found to rely heavily on personal savings (83%) than counterparts in Unguja (28%). The overreliance on personal saving by the farmers is mainy because of scarce financial resources in the rural areas but also; inegilibility of the farmers to formal loans e.g from banks and other mainstraeam financial institutions. Similary, starting a seaweed farming business in Zanzibar does not require a significant capital investment due to its relatively cheaper input requirements and Zanzibar's free water resources.

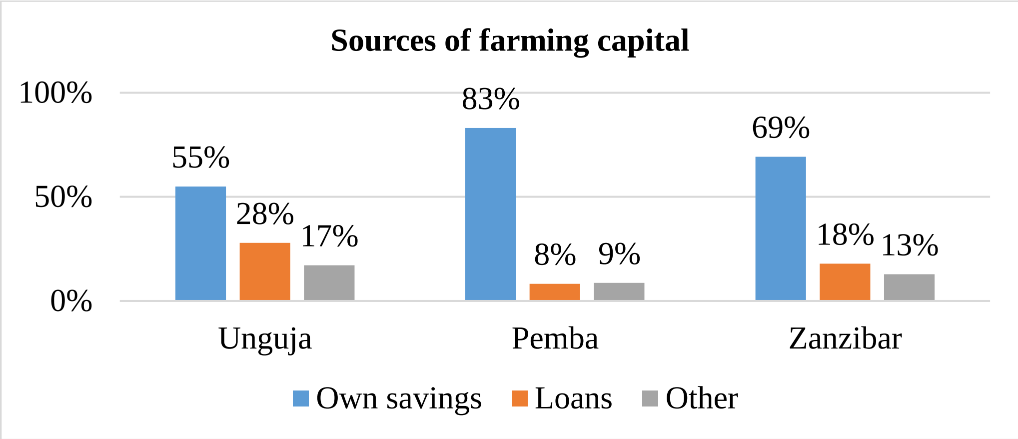


Figure 4.14: Sources of capital for the seaweed farmers (**Source:** Primary data)

4.1.3.6 Sources of input assistance for the farmers

From the figure below, it can be observed that the majority of farmers in Zanzibar obtain farming inputs assistance from government institutions, such as the seaweed section Zanzibar (49%). However, farmers expressed that the inputs given are insufficient and can not meet each farmer's farming needs. Thus, they often use personal finances to purchase the remaining inputs. Exporters were the second high rated sources (30%) offering farming assistance. However, farmers expressed that in recent times, exporters have reduced offering help, mainly due to farmers' unwillingness to be tied to indirect farming contracts.

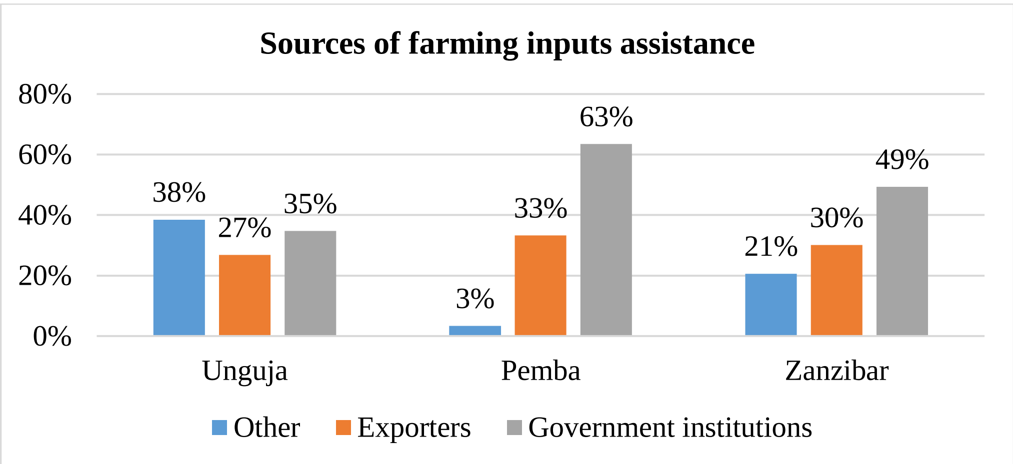


Figure 4.15: Sources of input assistance for the seaweed farmers (**Source:** Primary data)

4.1.4 FARMERS' TECHNICAL SKILLS

This subsection is intended to measure the respondents' skill levels relating to the overall successful running of a seaweed farming business. Four critical skills were identified through literature as follows:

a. Farm-management skills
b. Financial skills
c. Marketing skills
d. Record-keeping skills

The skills were further operationalised and measured on a five-point Likert scale (1-very weak, 2- weak, 3- neutral, 4- strong and 5- very strong) and analysed through frequency distribution, relative importance index (RII) analysis and Mann-Whitney U test (to find differences in the distributions). Pearson correlation validity test results for the skills (found in appendix 17) revealed sub-skill five of farmers-management skills and 1 of farmers' marketing skills were found to be not valid (r=.074 and .046 respectively)). Every other sub-skill was shown to have internal validity. For this thesis, the two sub-skills were not omitted but were included in the analysis.

4.1.4.1 Farm-management skills

Farm management skills measure a farmer's ability to locate/obtain farming land and other necessary inputs for production. They also include the ability to manage their production area to derive maximum output optimally. The following were the results of the farm-management skills analysis;

Table 4.12: Farmers' farm-management skills levels

Statements		Total scores	Index	Rank
i.	Ability to obtain farming land for seaweed production	1984	67.02	2
ii.	Ability to obtain the labour for the seaweed production	2417	81.66	1
iii.	Ability to obtain drying sites	1268	42.84	4

iv.	Ability to obtain storage space for harvested seaweed	1226	41.42	5
v.	Ability to optimally utilise farming areas to increase output	1518	51.83	3
vi.	Ability to apply appropriate techniques to counteract environmental challenges affecting seaweed production	708	23.92	6
	Composite score	**17,760**	**51.45**	**-**

Source: Primary data, 2021

From the above table, it can be inferred that the farmers' farming skills levels were found to be the highest in the ability to obtain the labour for seaweed production, ability to obtain farming land and ability to utilise farming areas to increase output optimally. In contrast, the skills levels were found to be least in the ability to apply appropriate techniques to counteract environmental challenges affecting seaweed production and utilise farming area to optimise output.

From the above results, it can be said that the seaweed farmers in Zanzibar need technical/scientific assistance concerning circumventing the already existing environmental challenges affecting seaweed production on the island. Similarly, there is a need for farm extension services to train farmers on how to increase output with current production methods optimally. Similar recommendations have been reported by Shimba *et al*., 2021; Charisiadou *et al*. 2022 and Msuya *et al*., 2022.

4.1.4.2 Financial skills

Financial skills measure the financial literacy of a farmer, ability to obtain start-up capital, ability to negotiate better loan rates, effective use of debt capital sources, effectively managing financial risks, monitoring production costs and revenue use. The following were the results:

Table 4.13: Farmers' financial skills levels

Statements		Total scores	Index	Rank
i.	Ability to apply financial skills in the farming business	841	28.42	8
ii.	Ability to obtain start-up capital	2134	72.01	1
iii.	Ability to negotiate better loan rates	1759	59.43	3
iv.	Ability to make effective use of various debt capital sources	1476	49.86	6
v.	Ability to effectively manage financial risks	1676	56.62	4
vi.	Ability to monitor production costs	1892	63.92	2
vii.	Ability to establish appropriate control procedures for cash expenditures	1074	36.28	7
viii.	Ability to monitor revenue uses	1591	53.75	5
	Composite score	**12,443**	**52.55**	**-**

Source: Primary data, 2021

From the above table, it can be inferred that farmers' financial skills levels were the highest in their ability to obtain start-up capital, monitor production costs and negotiate better loan rates. In contrast, the skills levels were found to be lowest in establishing appropriate control procedures for cash expenditures and understanding and applying financial skills in their farming business. From the above inferences, it can be said that there is a need for financial literacy training for the farmers on the island to improve their ability to apply appropriate cash control procedures and monitor revenue uses.

4.1.4.3 Marketing skills

Marketing skills measure farmers' pricing abilities, ability to negotiate price offers, and ability to acquire, process and interpret market information. The following were the results:

Table 4.14: Farmers' marketing skills levels

Statements		Total scores	Index	Rank
i.	Ability to effectively determine prices	922	31.15	4
ii.	Ability to negotiate better prices with buyers	868	29.32	7

iii.	Ability to identify potential markets	1192	40.27	3
iv.	Ability to effectively plan for new markets	1676	56.62	2
v.	Ability to acquire market information	1826	61.69	1
vi.	Ability to interpret market information	892	30.14	5
vii.	Ability to effectively apply market communication skills in the seaweed business	874	29.53	6
	Composite score	**8,250**	**39.82**	**-**

Source: Primary data, 2021

From the above table, it can be observed that farmers' marketing skills levels were realised to be highest in the ability to acquire market information, effectively plan for new markets and ability to identify potential markets. In contrast, the ability to effectively apply market communication skills in the seaweed business and negotiate better prices were found to be the lowest among the farmers. The observations imply that there is a need for immediate marketing training concerning price negotiations and marketing communication skills.

4.1.4.4 Record-keeping skills

Record-keeping skills measure farmers' ability to record and store farm information regarding production, including costs, labour, other inputs, and other specific details to manage the farm effectively. The following are the results of the analysis:

Table 4.15: Farmers' record-keeping skills levels

Statements		**Total scores**	**Index**	**Rank**
i.	Maintenance of farm inputs, labour records, and logbooks	1176	39.73	1
ii.	Maintenance of crop production and disposal records	684	23.11	3
iii.	Maintenance of cash in and out records	784	26.49	2
	Composite score	**2,644**	**29.77**	**-**

Source: Primary data, 2021

From the above table, it can be observed that farers' record-keeping levels were highest in the maintenance of farm inputs, labour records, and logbooks and least in the maintenance of crop production and disposal records. The seaweed farmers in Zanzibar require training in record-keeping regarding production, cash expenses, revenues and crop disposal. Record-keeping is vital in monitoring the farm business and improving productivity and efficiency.

4.1.4.4 Hypothesis testing

Mann-Whitney U test was conducted to determine whether there is a difference in the skills between respondents in Unguja and Pemba. In-depth results can be found in the appendices section of this study. The following is the summary of the analysis. The following were the hypothesis assumptions for the test:

H_0: No difference in scores exists between farmers in Unguja and Pemba

H_1: There exist differences in scores between farmers in Unguja and Pemba

(Significance: $\alpha = .05$)

- Farm-management skills results revealed a significant difference between the respondents in sub-skills 2 ($U = 192.5$, $p = .01$), 4 ($U = 132.5$, $p = .000$), and 6 ($U = 196.5$, $p = 0.004$).
- Other farm-management sub-skills (1, 3 and 5) revealed a non-significant difference in respondents' skill levels.
- Financial skills results revealed a significant difference between the respondents in sub-skills 1 ($U = 60$, $p = .000$), 2 ($U = 18$, $p = .000$), 6 ($U = 48$, $p = 0.000$) and 8 ($U = 71.5$, $p = .000$).
- Other financial skills sub-skills (4 and 7) revealed a non-significant difference in respondents' skill levels. Thus, the researcher fails to reject the null hypothesis and concludes the distribution is the same across the two islands.

- Marketing skills results revealed a significant difference between the respondents in sub-skills 3(U = 134, p = .000), 4 (U = 144, p = .001), 5 (U = 19.5, p= 0.000), 7 (U =76.5, p= .000) and 8 (U = 184.5, p = .011).
- Other marketing skills sub-skills (1, 2 and 6) revealed a non-significant difference in respondents' skill levels.

Thus, overall, the null hypothesis is rejected, and it concludes there exist differences in scores between the farmers from Unguja and Pemba regarding farm technical skills.

Summary

This sub-section intended to analyse the socio-demographic profile of the seaweed farmers in Zanzibar. It was found that most of the farmers were smallholder female farmers (more than 90%). The majority have attained primary education (42%) as the highest educational qualification. Most farmers are married (61.26%) and live in extended families (94%). The average age of a farmer was found to be 48 years. Production costs of seaweed production per plot were found to be ₹ 9,958 in Unguja and ₹ 19,031 in Pemba. The number of seaweed plots owned was found to be up to eight in Unguja and up to three plots in Pemba. Most farmers earn between ₹ 28,000 and 35,000 per production cycle from seaweed farming. Farmers also make, on average, between ₹ 1800 and 3500 from other sources, including land-based agriculture (23.3%) and small-scale entrepreneurial activities (18.2%). Average household expenditures for the farmers are estimated to be between ₹ 26,000 and 28,000 per month.

Analysis of farmers' technical skills revealed that seaweed farmers in Zanzibar are unable to deal with existing environmental challenges attacking their plants. Similarly, they were also found to lack skills in optimising the farming area. Further, farmers were found to lack cash control and revenue monitoring skills and could not apply financial skills in their farming business. The seaweed farmers were also found to be lacking market communication skills and price negotiation with buyers. Lastly, the farmers were found to lack the ability to maintain farm records.

4.1.5 BUSINESS PROFILE OF ZSI'S EXPORTERS

About seven[17] exporters are currently actively engaged with seaweed exports from Zanzibar. However, only three of them, i.e., Zanea seaweed co ltd, C-Weed Corp ltd, and Zanque, are significant, reliable exporters. The remaining four companies are seasonal buyers. In their study, Msuya and Neish (2013) identified fifteen exporters engaged in the value chain of the Zanzibar industry (eight major exporters and seven minor exporters). The reduction from fifteen to about seven exporters has resulted from a fall in global demand for seaweed exports and low exit barriers present in the industry. Therefore, this study obtained information from four exporters from Zanzibar, two significant exporters (ZANEA and C-WEED Co. ltd), and two minor exporters (Kisiwani enterprises and LEDO Biashara co ltd.

[17] The number given is an approximate from the ministry of Blue Economy and Fisheries, Zanzibar since most seaweed exporters are seasonal due to global demand

Table 4.16: Summary profile of Zanzibar seaweed exporters

Exporter	YOE	Business form	Business-form ownership	Operational experience (years)	Facilities available with the company	Value-addition activities	Assistance provided to farmers
ZANEA Seaweed co ltd	1989	Company	Private-Foreign	23	• Cleaning • Sorting • Weighing • Packing • Storage	None	• Farming inputs • Training • Collection
C-WEED	1993	Company	Private-foreign	29	• Cleaning • Sorting • Weighing • Packing • Storage	None	• Farming- inputs • Fibre boats • Training • Collection
Kisiwani Enterprises	2011	Sole proprietor	Domestic	11	• Cleaning • Sorting • Weighing • Packing • Storage	None	• Farming inputs • Collection

Source: primary data

The Table above shows that three of the four selected companies have more than ten years of experience in exporting seaweed (ZANEA, C-WEED, Kisiwani), and the LEDO company has only eight years of working experience. Moreover, only one company is domestically owned by a sole proprietor (Kisiwani), while the remaining companies are foreign-domestic companies with headquarters in the Philippines and USA. Apart from exporting, all four companies perform additional cleaning, sorting, weighing, packing, and storing dried seaweed. No value-addition activities were found among the four companies. ZANEA and C-WEED companies offer training and farming inputs (tie ties, seeds) apart from collection services. LEDO and KISIWANI only collect from farmers at farm points.

C-WEED company also offers fibre boats for planting and harvests in some of the villages in Pemba. The company also installed cranes in some of the farming villages in Pemba, where topographical challenges impede to and fro movements to the shore due to high cliffs and rocky beaches. ZANEA and C-WEED companies also have collection centres in almost every village surveyed. The farm inputs subsidies offered to farmers have declined substantially in recent times due to the perceived disloyalty of farmers to the exporters. After giving farm inputs, exporters indirectly tie down farmers to indirect selling contracts where farmers are expected to sell their products to their production sponsor. However, in times of boom, sponsors' harvests and prices offered by sponsors are lower than other exporters, and farmers choose to sell to the higher bidders. This move is perceived as a betrayal by the sponsors, hence, the decline in farm inputs assistance.

4.1.6 ANALYSIS OF ZSI'S PROFITABILITY POTENTIAL AND COMPETITIVE RIVALRY

4.1.6.1 Porter's five forces analysis of ZSI

The five-force analysis is also referred to as the "*industry's competitive analysis*" by Porter, 1980. The five forces remain the same across industries, but each force's strength varies from one industry to the other and evolves as industries evolve. The strength of each force is considered to be the function of the industry structure or the underlying technical and economic industry characteristics. According to Porter, the five forces determine profitability by influencing costs, prices, the investment needed, and the return.

The five forces are analysed by considering all five forces' intensity collectively instead of individually. The threat level was determined by the number and power/intensity of buyers and suppliers, the presence/absence of substitutes, and the presence/absence of industry barriers. Data for the model was collected through a panel discussion.

Table 4.17: Forces that shape profitability and competitiveness of an industry

S/N	Forces	Driving factors
1	The threat of new entrants	• Buyer switching costs • Capital entry requirements • Restrictive government policies • Branding • Economies of scale • First-mover advantages, irrespective of size • Expected retaliation from incumbency • Unequal distribution advantages
2	Bargaining powers of buyers	• Number and intensity of buyers • High buyer information • Low switching costs • Nature of offerings (differentiated vs. standardised)
3	The threat of substitute products	• Low switching costs • High buyer information • Low-priced substitutes • Higher performing substitutes
4	Bargaining power of suppliers	• Concentration level of suppliers • Suppliers group do not depend heavily on the buyer for their revenues • High switching costs for buyers • Lack of substitutes for suppliers' products • Suppliers' offerings are differentiated

5	Rivalry among existing competitors	• Nature and intensity of competitors • Branding • Product differentiation • Exit barriers

Source: Adapted from Porter, 2014

Table 4.18: Porter's five forces analysis results

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

Source: Panel discussion, 2021

Above results that ZSI faces; high threats of potential entrants, high bargaining power of buyers and suppliers, available low-priced and higher-performing substitutes and intense rivalry. Kendall's test results for agreement among raters was one indicating perfect agreement.

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 ZSI, 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[18] 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; thus, 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). ZSI 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,

[18] Estimations from study survey results

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 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 ZSI, farmers enjoy first-mover advantages from access to farming locations, raw materials, learning curve experiences, and government/non-governmental assistance, e.g. inputs.

The threat of high bargaining power of buyers:

The threat of high bargaining power of buyers in ZSI emanates from; 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[19] 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 (CP KELCO APS), Spain (CEAMSA), the USA (DuPont), China, France (CARGILL), Chile (GelyMar S.A), Belgium and to a small extent, the Philippines, Czech Republic and Korea Rep. The buyers are seasonal, buy in bulk and also purchase similar produce from Zanzibar's competitors in Asia, i.e. Indonesia, the Philippines and Malaysia. They also possess complete market information. 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 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 a potential reduction in profitability should buyers decide

[19] The companies identified[19] 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

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, the industry's potential to expand its profits is 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.

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. The lack of established domestic demand in Zanzibar and mainland Tanzania intensifies this challenge. 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 *spinosum* 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 and low switching costs exist for buyers. Both conditions apply in Zanzibar's context, and thus the ZSI 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 ZSI, 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 (tie ties, 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.

Additional factors affecting Zanzibar's seaweed industry's profitability potential

The role of the Revolutionary Government of Zanzibar

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. Governments can also aid industry trade and protect producers or consumers against exploitation. 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 still an individual affair despite its existence for more than thirty-three years.

The industry's production systems

Cultivation of Seaweed in Zanzibar is practised using a peg-line method (also known as the off-bottom method), where suspended lines derived from wooden stakes are driven onto the seafloor and are used to plant the crop (Msuya and Neish, 2013). All surveyed villages adopted the same planting technique but with minimal variations. However, off-bottom farming exposes seaweed plants to environmental attacks and destruction by other aquaculture activities, e.g., fishing boats. The result is epiphytes, diseases, and high die-offs, reducing the industry's output. Farmers specially mentioned these challenges in Unguja (n= 15/24 villages Equiv. 62%) than in Pemba (n=10/25 villages Equiv. 40%), implying that farmers in Unguja need immediate environmental intervention methods from experts.

Among the solutions to counteract rapidly rising environmental challenges in Zanzibar was the shift from off-bottom to deep-water farming/tubular-nets technology (Brugere *et al.*, 2021). Several pilot experiments on tubular-nets technology have been conducted on the island, and outcomes revealed that the technique was resilient to the environment's adverse environmental changes (Brugere *et al.*, 2021). Yahya, Mmochi and Jiddawi, 2020 found that both species' growth increased; however, Eucheuma bi-mass development was relatively higher on average than fish in deep waters. However, tubular-net technology requires swimming skills and the use of specialised boats. Thus, considering that the Zanzibar seaweed industry's producers are predominantly women and the local culture, the application of this technology is constrained. Interestingly, when asked if they would be willing to use the new farming technology, most women farmers were excited and responded positively; however, they requested training and financial assistance, especially to acquire farming boats and other necessary inputs.

Industry's innovation activities

Innovation activities in the ZSI are still scant. For instance, value-addition remains less than one per cent of total production (Msuya *et al.*, 2022).

This study found no innovation activities in the villages surveyed except for ongoing small-scale value-addition (n=5/49 villages Equiv. to 10.2%) practised by some small farmers groups. Similarly, in their study, Songwe *et al*., 2016 also found that about seventy per cent of seaweed farmers in Zanzibar did not apply value-addition techniques.

When asked why there is no innovation in the industry, most farmers casually answered, " *tutamuuzia nani*? …*mwani hauna thamani,unadharaulika*", translated to "*where/to whom can we sell?.....seaweed has no value; it is frowned upon.*" However, some factors that impede innovation and upscaling of value-addition were identified, including; are lack of seed capital, limited demand, lack of facilities to carry innovation/value-addition, and limited knowledge and training in descending order.

4.1.7 ANALYSIS OF ZSI'S SOURCES OF COMPETITIVE ADVANTAGES

4.1.7.1 Porter's diamond model analysis of Zanzibar's seaweed industry

The diamond model, as discussed in chapter II of this thesis, is used to examine the competitive advantages of a country. According to Porter (1980), four main factors drive the competitive advantages of a nation: factor conditions, demand conditions, related and supporting industries, firm structure, strategy, and rivalry. The factors' performance are moderated by the government's role in the economy and chance conditions. Below is the summary of the diamond model's factors and related sub-factors adapted from Porter:

Table 4.19: Sources of competitive advantages

Diamond Factor	Sub-factors
Firm strategy, structure, and rivalry	Industry strategy, goals, objectives
	Industry innovation and intellectual property
	Rivalry
Factor conditions	Physical resources
	Human resources

	Capital resources
	Infrastructural resources
	Knowledge resources
Demand conditions	Segment structure of demand
	Nature, demand size and number of buyers
	Rate of growth of home demand
Related and Supporting Industries	Shared activities in the value chain (marketing, distribution, procurement, production) Shared technologies Shared R&D activities
Government role	Catalyst/challenger/influencer Impedes
Chance conditions	Unexpected discoveries/invention Wars Significant shifts in exchange rates Surges in world demand Political decisions by foreign governments Major technological discontinuities

Source: Adapted from Porter (1980)

Table 4.20: Porter's Diamond model analysis results

Diamond Factor	Sub-factors	Effect	Factors impeding ZSI's competitiveness
Firm strategy, structure and rivalry	• Industry strategy, goals, objectives	Source of competitive disadvantages	• Absence of industry business strategy • Lack of industry vision goals, objectives • Lack of farmers' goals • Lack of exporters' goals

	• Industry innovation and intellectual property	Source of competitive disadvantages	• Limited industry innovative activities • Limited value-addition activities • Lack of product differentiation • Lack of industry trademarks
	Rivalry	Source of competitive disadvantages	• Numerous similar producers • Limited variety differentiation • Lack of entry and exit barriers
Factor conditions	Physical resources	Source of competitive disadvantages	• Limited physical resources • Inaccessibility of some farming sites • Location disadvantages • Ecological challenges • Availability of quality seeds (Unguja) • Availability of quality inputs
	Human resources	Source of competitive disadvantages	• Quantity of labour • Quality of labour
	Capital resources	Source of competitive disadvantages	• Limited sources of capital • High costs of capital

	Infrastructural resources	Source of competitive disadvantages	• Number Infrastructures • Quality of infrastructure • Lack of processing facilities • Lack of passages to farming sites/blocked roads • Lack of drying and storing sites
	Knowledge resources	Source of competitive disadvantages	• Limited industry scientific and technical knowledge • Limited market knowledge • Limited research and training facilities • Limited integration of technology into the industry • Limited domestic market research statistics and reports on the seaweed • Limited seaweed trade association activities
Demand conditions	Segment structure of demand Nature, demand size and number of buyers	Source of competitive disadvantages	• Small domestic segments • Small foreign segments • • Unsophisticated/less-demanding domestic buyers • Seasonal and low-volume local buyers • Lack of foreign buyers' diversification

	Rate of growth of home demand	Source of competitive disadvantages	• Slow industry growth • Limited awareness of ZSI activities • Lack of marketing efforts to promote the industry
Related and Supporting Industries		Source of competitive disadvantages	• Limited related/supplier industries • Lack of indutry intergrations
Government role	• Shared activities in the value chain (marketing, distribution, procurement, production) • Shared technologies • Shared R&D activities	Source of competitive disadvantages	• Limited government subsidies • Failure to create a seaweed industry policy • Lack of prioritisation of the industry • Failure of the government to settle farming area/land disputes

Chance conditions	• Unexpected discoveries/ invention • Wars • Significant shifts in exchange rates • Surges in world demand • Political decisions by foreign governments • Major technological discontinuities	Source of competitive advantages/disadvantages	• New substitutes • Unexpected technological discontinuity • Hike in input costs • Political decisions by foreign governments • Significant shifts in exchange rates • Wars • Fluctuations in world demand

Source: Panel discussion, 2021

Industry's strategy, structure, and rivalry

i) Industry strategy, goals, objectives

Key challenges identified regarding strategy, structure and rivalry were the absence of industry policy and strategy. The seaweed industry in Zanzibar is an individual affair/open market, and the RGoZ has left the business to self-govern. In the absence of strategy and policy, the industry's producers are a disadvantageous position and prone to external shocks without assistance. Further, it demoralizes farmers and exporters, leading to industry inefficiencies and limited profit margins. In addition, in the absence of the industry's vision, mission, and objectives both in the short and long term, the industry lacks a coordinated approach, which affects productivity, growth, and expansion.

ii) Industry innovation and intellectual property

Several key issues were identified as having a high impact on ZSI's competitiveness potential. These include; limited industry innovation and value-addition activities, limited variety differentiation and a lack of trademarks. The identified factors were said to impede ZSI's ability to compete with competitors in Asia and also limit the profitability potentials of both the industry's producers and exporters. Innovation and value-addition challenges were attributed to resource challenges (physical, capital), limited training, lack of institutional integrations, cumbersome certification procedures and overlapping costs, and the overall lack of prioritisation by the RGoZ.

iii) Rivalry

It was discussed that the industry has about 25,000 farmers producing similar products with limited value addition. Further, no value-added seaweed exports exist. Hence, both producers and exporters of ZSI face intense rivalry, which also affects the industry's profit margins. The rivalry was found to be intensified by the lack of entry barriers.

Factor conditions

As Porter (1980) elaborates, factor conditions embody the necessary inputs or production factors that enable firms to compete, including; physical and human resources, infrastructure, knowledge resources, and capital resources. Factors can be categorised into basic and advanced factors. Advanced factors such as skilled human resources, modern technology, sophisticated knowledge and disciplines are considered significant for competitive advantages.

i) Physical resources

It was discussed that Zanzibar has abundant water resources and that farming water resources are free and, to a large extent, accessible. However, due to the overpromotion of tourism activities on the island, farming land has become scarce in Unguja. Similarly, existing farms in Unguja, for instance, will likely disappear due to conflicts between hotel owners. Farming inputs were found to be not a hindering factor to farming activities. Locational advantages were recognized due to Zanzibar's strategic trade position and multiple ports.

However, in the context of the seaweed trade, the island is far from buyers in comparison to competitors in Asia.

ii) Human-resources

It was agreed that even though the ZSI producers are numerous, they do not bring innovations to the industry since they produce a similar variety. The industry labour is semi-skilled in farm operations and value-addition. Thus there is a need for knowledge transfer to farmers, especially with farming methods that circumvent ecological attacks that affect seaweed plants and overall output on seaweed plants and training on value-addition.

iii) Knowledge resources

It was recognised that there exist institutions linked to ZSI transferring skills such as the Institute of Marine Science (IMS), ZAFIRI, ZASCI, the ministry of Blue-Economy and Fisheries Zanzibar, through its department of Seaweed, some of the exporters (e.g., Zanea and C-Weed), and other industry stakeholders (public and private). However, their impact is yet small. The number of marine scientists that can help the industry farmers was also found to be insufficient. ZSI still requires more scientific expertise to overcome its production challenges. Further, the institutions' linkage with the industry was commented on as weak.

iv) Capital resources

It was discussed that ZSI does not have linkages with financial institutions. Farmers' sources of capital include bootstrapping, personal savings, small informal loans from self-help groups, and sometimes spousal support. Most farmers are considered high-risk customers due to a lack of collateral and hence do not qualify for formal financial support from mainstream financial institutions. Similarly, interest rates offered by the institutions are unattainable by farmers. In terms of their locations, rural Zanzibar does not have a broad financial reach due to the socio-economic background of the area. Most financial institutions are concentrated in Zanzibar town. However, informal self-help groups formed by farmers lend to members at affordable rates. Overall, the industry is facing financial limitations (both seed and growth capital), which has limited its growth and expansion and upscaling of value-addition and processing activities. No governmental intervention has been established so far to counteract the challenge.

v) Infrastructure

It was discussed that rural Zanzibar is still underdeveloped and has limited physical, financial, and communication infrastructures. Similarly, there exists no seaweed processing facility on the island. Further, some farming areas are hard to reach due to infrastructural challenges that require instalments of cranes to help farmers during production and harvests. Additionally, some alleyways to farming sites are blocked by hotel owners; thus, farmers struggle to reach farming sites. Overall, infrastructures in rural Zanzibar hinder the competitiveness of ZSI due to availability and quality.

Demand-conditions

It was discussed that home demand conditions impede the competitive potential of ZSI such that the size is still small and seasonal (less than 1%), rate of growth is also small. Further domestic buyers are less sophisticated and place little pressure on farmers' output. With less demand for quality and related services from home, ZSI producers lack the skills and business expertise to compete internationally.

Related and supporting industries

According to Porter, related and supporting industries benefit businesses by becoming cost-effective, e.g., linkages with supplier industries with global presence. However, no linkages were found to exist between ZSI and other domestic industries or institutions. With a lack of integrations, ZSI faces disadvantages from loss of value-chain linkages, innovations and possible industry upgrading, which are sources of competitive advantage. In addition, ZSI losses from technological and information flow and industry alliances.

Chance events

According to Porter, chance conditions may act as a source or deterrent to the competitive advantages of an economy. For instance, technological disruptions through new inventions that may require *carrageenan* as a raw material may provide opportunities for ZSI to upscale and upgrade its factors of production. However, in the event that the new invention provides new substitutes for carrageenan may act as a deterrent to ZSI's ability to sell. Similarly, an oversupply of seaweeds at the global level would act as a deterrent. At the same time, a surge in world demand would provide opportunities for upscaling and upgrading ZSI's factors of production.

Government's role

According to Porter, depending on their influence, governments may act as catalysts or deterrents to thriving economic activities through different policies. In Zanzibar's context, RGoZ efforts have been noticeably scarce throughout the operation of the industry. However, 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.

4.1.8 BUSINESS ENVIRONMENT OF ZANZIBAR SEAWEED INDUSTRY

4.1.8.1 SWOC analysis of the Zanzibar seaweed industry

SWOC is an abbreviation for strengths, weaknesses, opportunities and threats. SWOC analysis is a scanning tool used in strategic management to assess the environment of a business to identify internal (strengths and weaknesses) and external (opportunities and threats) factors affecting its performance (Jurevicius, 2021). Internal factors are considered to be within the control of a firm/business (employees, capabilities, technology, physical and financial resources), while external factors are outside business control (customers, suppliers, government, competitors).

Benzaghta et al., (2021) posit that SWOT analysis has become a fundamental tool for businesses to evaluate their market positions. Among its traced usage, the authors' highlight found the application of SWOC in the agriculture industry. The SWOC factors affecting the performance of ZSI were identified through the focus group discussion with the officials, and subsequent effects were also examined accordingly. Below is the outcome:

Table 4.21: SWOC analysis of ZSI

	Strengths		***Weaknesses***
S1	Naturally occurring red seaweed variety	W1	Lack of seaweed policy guiding the industry
S2	Farmers with farming experience of more than 30 years	W2	Limited industry innovation
S3	Available water resources	W3	Traditional production methods
S4	Available inputs	W4	Lack of brand identity
S5	Available labour	W5	Limited capital
S6	Low-cost production system	W6	Relying on limited buyers
		W7	Limited marketing channels
		W8	Limited product differentiation
		W9	Lack of seaweed cooperatives
		W10	Limited export variety
		W11	Limited male and youth participation
		W12	Ageing workforce
	Opportunities		***Challenges***
O1	Growing demand for red seaweeds and hydrocolloids	C1	Global seaweed market price fluctuations
O2	Entrepreneurial opportunities for rural coastal inhabitants to earn extra income from value-addition and innovation of seaweed	C2	Environmental/climatic changes (e.g., raised temperatures, strong winds, and high tides)
O3	Inter-industry integrations	C3	Diseases (epiphytes)
O4	Gender empowerment		
O5	Creation of seaweed cooperatives in Zanzibar		
O6	Growing demand for organic food and healthy products		

Source: Panel discussion, 2021

Strengths of ZSI

Zanzibar's seaweed industry was found to have several strengths, including having naturally occurring red seaweed variety, producers with more than thirty years of farming experience, low-cost farming investment, and available labour and input resources. However, despite the naturally occurring variety, the most demanded variety, i.e. *cottonii*, has failed to sustain itself on the island due to increased sea temperatures. Thus, the island relies mainly on the export of low-priced *spinosum*. In addition, despite the industry's producers, to a large extent having more than thirty years of farming experience, they have been unable to deal with the current ecological attacks affecting their produce.

Weaknesses of ZSI

ZSI was found to have many weaknesses, including; lacking industry policy, limited innovation, using traditional production systems, lacking brand identity, operating under limited capital, relying on limited buyers, and having limited marketing channels. Further, the industry was found to have limited produce variety, lacked farmers' cooperatives, limited export product variety, limited youth and male participation, and an ageing workforce. The weaknesses were found to have several negative bearing effects; for instance, lack of industry policy was found to have contributed to increased operational expenses for both farmers and exporters as well limiting potential export expansion for the industry. Limited innovation was found to restrict industry expansion, thus limiting buyers and industry returns. The industry is facing capital challenges that limit its expansion and mostly value-addition. ZSI also relies mainly on its exporters as a source of its market information.

Opportunities of ZSI

It was recognised that there exist several opportunities for ZSI that it can benefit from, including; growing demand for red seaweeds and *carrageenan*, increasing demand for organic lifestyles and healthy products, potential entrepreneurship from seaweed value-addition, the potential for industry integrations, gender empowerment opportunities. The opportunities highlighted demand ZSI to upscale its production to be able to tap into the trends. However, since the island has been facing production challenges due to ecological changes, the RGoZ should extend extension services to the industry producers to help the industry tap into the growing trends. Similarly, to tap into value-addition gaps existing in the industry, RGoZ and other ZSI stakeholders should collaborate to provide training, physical resources and seed capital to the farmers.

Challenges of ZSI

Key challenges identified in the discussion included increased sea temperatures of up to 40°C, increased sea winds/tidal waves, diseases (ice-ice and epiphytes), and fluctuations in global seaweed prices due to demand and supply forces. Currently, the industry has been struggling to sustain its production because of the environmental challenges which have led to high die-offs and plant destruction. The industry does not at present have the capacity to deal with the challenges as extension services are limited, and the technology required to circumvent the same (e.g., tubular net) is lacking.

4.1.8.2 PESTEL analysis of Zanzibar's seaweed industry

Similar to the SWOC matrix, PESTEL is also used to scan the business environment with a business by examining its political (P), economic (E), socio-cultural (S), technical (T), ecological (E), and legal (L) environments to identify opportunities and threats. Each environment was examined in the discussions, and key factors affecting ZSI's performance are summarised below:

Table 4.22: Summary of PESTEL analysis of ZSI

Macro--environment	***Critical issues***
Political-legal	i. Lack of seaweed industry policy ii. Conflicting investments and promotion by the government iii. Unbalanced allocation of development funds from donor countries, governments, and institutions

Economic	i. Supply and demand forces of seaweeds ii. Unemployment rate iii. Poverty rate iv. Finance and credit sources v. Interest rates vi. Taxes and levies
Social-cultural	i. Age structure of the industry producers ii. Local attitudes towards seaweeds iii. Abandonment of farms iv. Literacy level v. Limited male and youth producers
Technological	i. Level of innovation and value-addition in the industry ii. Level of integration of modern farming technology iii. ZSI technology utilisation in searching for a market
Ecological	i. Climate change ii. Seaweed-related diseases iii. Sea pollution

Source: Panel discussion, 2021

Political-Legal environment

Political-legal environment analysis revealed several threats and opportunities in the ZSI business environment. Threats are identified to emanate from; a lack of seaweed industry policy, conflicting investments and promotion by the government, and unbalanced allocation of development funds from donor countries. In contrast, the favourable political climate in Zanzibar, Zanzibar Development Vision 2050 and Zanzibar Blue Economy Policy 2020 were viewed as a source of opportunities for ZSI.

Economic environment

Economic threats affecting the industry were identified to include seaweeds' unreliable global supply and demand forces, the unemployment and poverty rate in Zanzibar, limited finance and credit sources, high-interest rates and overlapping taxes and levies. At a global level, the industry operates under oligopolistic market conditions where Asian producers dominate the market with export and higher quality varieties. Rural- Zanzibar also still face higher unemployment rates than Zanzibar-Urban (World Bank, 2015) which leaves its inhabitants more exposed to poor living standards. Due to its relatively low industry entry requirements, unemployment rates underscore the need for rural inhabitants to engage in seaweed farming.

Financial infrastructures on the island are scarcely distributed, with Zanzibar-urban (specifically Unguja) possessing a higher percentage of the infrastructures than rural Zanzibar. Thus farmers in rural Zanzibar are limited in seed and growth capital options. Additionally, interest rates charged by the institutions are deemed high to farmers, ad most do not meet the minimum requirements for securing loans. Further, financial institutions consider farmers as high-risk customers due to the inability of farmers to pay back loans.

There are overlapping taxes and levies experienced with exporters, for instance, in payment of royalty fees[20] versus local government (LGA) levies and VAT versus stamp duty payments. Exporters of ZSI also face multiple port charges, and at the local government level (district and ward), exporters are charged administrative fees for collecting and transporting seaweed. Further, as per ZRB guidelines, when an exporting business has crossed a certain threshold[21], it automatically becomes VAT registered. Exporters have been asking the government to implement this mandate throughout the years with no success. Instead, the government has repeatedly asked them to pay stamp duties[22]. The call to pay stamp duty is because the RGoZ can not earn revenue via the VAT scheme since exports are charged zero per cent tax as per the ZRB website. However, exporters view this as unfair since stamp duties do not promote exports but instead raise the cost of operations, diminish their profit margins, and offer prices paid to farmers.

Multiple government charges at Zanzibar port also affect exporters' operational costs. For instance, seaweed consignment from Pemba port is charged wharfage charges per container, and upon arriving at Zanzibar port, the

[20] charged at 2% of seaweed buying price payable to the ministry of Blue Economy and Fisheries yearly
[21] TZS 50 mil and above (Rs. 1.6 crores) as per ZRB website
[22] Stamp duty schedules are available at ZRB website.

same container, after being offloaded, is again charged wharfage. Coupled with this is the compulsory payment of skill development level levy (SDL), which should be charged to permanent employees, not casual labourers but instead is charged to casual port labourers employed by exporters.

Socio-cultural factors

Socio-cultural factors affecting ZSI operations were identified as ageing industry producers, unfavourable local attitudes towards seaweeds, abandonment of farms, low literacy levels and limited male and youth producers. Respondents categorised them as threats to the industry's competitive potential. Further, it said that locals' awareness and acceptance level (and overall belief/ideology) concerning the consumption of seaweed crops is still very low. Most locals view seaweed as of no value or nutritional benefits.

Technological environment

Technological factors identified to affect the industry operations include; low levels of innovation and value-addition in the industry, low-level integration of modern farming technology and limited communication technology utilisation in searching for markets. These factors were termed as threats to the industry's competitiveness potential and overall profitability.

Ecological environment

Ecological factors affecting the industry were said to be; climate change, where the island has been experiencing increased temperatures of up to 40^0 C, seaweed-related diseases (ice-ice, algal blooms) and sea pollution, especially in Unguja.

Strategy implications

Taking into consideration the results from Porters's frameworks and ZSI's business environment analysis, several strategies can be suggested to aiming to address the low-profit potential, lack of sources of competitive advantages, opportunities and challenges facing ZSI as follows;

For ZSI to increase its profitability potential, there has to be a market strategy innovation that aims at circumventing the challenge of the oligopsonistic nature of the global seaweed market. This can be addressed by creating the industry's market. Innovation can take the form of creating new uses for an existing product and creating new markets for the existing product. There are untapped markets such as the United Kingdom, Canada and the Netherlands that are among the leading importers of *carrageenan* in the world that can be explored through market research.

As Porter elaborates in his works (2004;2008), to survive competition, firms/governments/industries must develop unique capabilities that will provide them with advantages over competitors (cost/quality-based). Similarly, sources of competitive advantages can be created through upgrading industry producers' and production systems, establishing linkage to related and supporting industries so that ZSI can benefit from cost-effective and quality inputs, sharing production and market information and sharing in distributions.

Further, scaling up farmers' training for resilient farming techniques to enable them to counteract existing seaweed-related diseases is vital. Similarly, to tap into the growing demand for seaweeds at the global level, the RGoZ must provide necessary incentives to ZSI's producers in the form of farming inputs subsidies and deep water farming for better quality seaweed plants is crucial. In addition, further training on value-addition, branding, packaging, marketing, entrepreneurship, and provision of necessary incentives (loans, machinery, buildings) is necessary to assist with the scaling-up process of seaweed enterprise development. Value-addition is crucial for ZSI given present industry conditions of unpredictable global demand trends and will serve as a bridge to connect the industry to the domestic market which is almost non-existent.

An integrated seaweed industry policy must be created focusing on the production and marketing of seaweeds, government procurement and buying of seaweeds, subsidising seaweed exports and other related aspects of the seaweed business. Considering current declining industry trends, the RGOZ must play an active role in incentivising industry producers and exporters for the sustainability of ZSI and prosperity.

4.1.9 Value Chain Map of ZSI

ZSI's value chain map consists of four key activities: input supply, production, collection and exporting. Input supply activities chain actors include suppliers of farming inputs in Zanzibar (numerous), the seaweed section-department of fisheries development, the ministry of Blue Economy Zanzibar and some seaweed exporters (e.g. ZANEA and C-WEED). Production of seaweed in Zanzibar is done by the rural Zanzibarians (est. 25,000), who, to a large extent, are women. The seaweed collection is done by representatives of exporters from Zanzibar-urban who have collection centres in almost every seaweed farming village. Exporting of seaweed is performed by seaweed exporters in Zanzibar to *carrageenan* extractors found in Denmark (CP Kelco), the USA (FMC), Chile (Gelymar), France (Cargill), Spain (CEAMSA), the Philippines (ShemBerg biotech), Japan (Mistubishi), Korea (MSC. CO ltd) and China. Extracted gel (*iota* and *kappa carrageenan*) is then sold to industries utilising the gels for production.

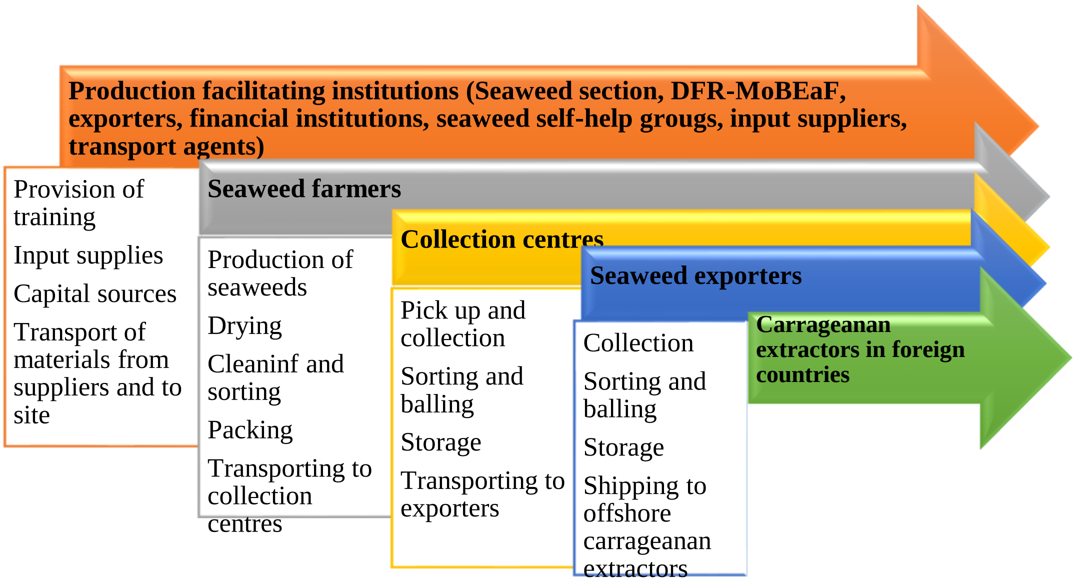


Figure 4.16: Summary value chain map of ZSI (**Source:** Primary data)

4.1.10 Marketing channels of ZSI

ZSI utilises *two* marketing channels, i.e. collectors and exporters, as observed from the value chain map above. Exporters of seaweed are the primary source of market information for ZSI.

4.1.11 Institutions linked to ZSI

There are several governmental and non-governmental institutions linked to ZSI. Below is the summarised list of institutions and roles played in the industry:

Table 4.23: Institutions linked to ZSI

s/n	***Institution***	***Type of institution***	***Role played***
1	Ministry of Blue Economy and Fisheries, Zanzibar	Governmental	Primary custodian of ZSI, policy making
2	Zanzibar Fisheries and Marine Resources Research Institute (ZAFIRI)	Governmental	Research and training
3	Institute of Marine Science Zanzibar (IMS)	Governmental	Research, training
4	Zanzibar Food and Drug Agency (ZFDA)	Governmental	Product certification
5	Zanzibar Bureau Of Standards (ZBS)	Governmental	Product certification
6	Ministry of lands and housing development	Governmental	Planning and policy making
7	Ministry of State, Office of the Second Vice President, Policy, Coordination and House of representatives	Governmental	Planning and policy making
8	Ministry of State, Presidents Office, Finance and Planning	Governmental	Planning and policy making
9	Zanzibar Revenue Authorities (ZRA)	Governmental	collection and administration of all taxes from Inland Revenue sources other than

			customs, excise and income taxes
10	Zanzibar Investment and Promotion authorities (ZIPA)	Governmental	Licensing authority
11	Tanzania Social Action Fund (TASAF)	Non-governmental	Research, training
12	REPOA	Non-governmental	Research
13	Tanzania commission for science and technology (COSTECH)	Non-governmental	Research

Source: Primary data

Summary

This section conducted a structural and business environment analysis of ZSI. Structural analysis was performed using Porter's five forces model and Diamond model analysis, while the industry's business environment was assessed using SWOC and PESTEL matrices. Several similar themes emerged as threats and opportunities were identified. Porter's five forces analysis revealed the following threats; the presence of numerous and similar producers, lack of industry barriers, availability of higher-performing substitutes, and higher buyer and supplier power. Porter's diamond model analysis revealed the following threats: lack of industry policy and strategy, limited role of RGoZ, lack of branding, crop product variety, limited infrastructures, limited financial infrastructures, which are also largely unattainable, lack of industry linkage, limited demand conditions, presence of semi-skilled industry producers, and unfavourable demand conditions

SWOC analysis revealed that ZSI faces challenges of global price fluctuations, increased sea temperatures, strong oceanic winds and tidal waves. PESTEL analysis revealed the following threats: conflicting issuing authorities, little government involvement in ZSI affairs, unbalanced development funds from donor countries, and multiple charges at the local government level and ports. Further threats emanate from unreliable global demand, high unemployment and poverty rates, ageing industry workforce, low literacy levels, limited youth and male participation, seaweed farms abandonment, climate change, limited farm technology and limited innovation and value-addition activities. Opportunities identified include; growing demand for red seaweeds and carrageenan, entrepreneurial opportunities, value-addition opportunities, inter-industry integrations and seaweed farming as a tool for gender empowerment.

SECTION II
TRADE PERFORMANCE OF THE ZANZIBAR SEAWEED INDUSTRY

4.2 Introduction

This section analyses the trade performance of Zanzibar's Seaweed Industry (ZSI). The Zanzibar seaweed industry's trade performance analysis is interpreted as the export performance analysis since Zanzibar does not import seaweeds.

Therefore, this section will cover the following sub-sections:

4.2.1 URT's Total Oceanic Trade (2013-2020)

4.2.2 Contribution performance of URT's seaweed exports on its total oceanic trade 2013- 2020

4.2.3 GDP performance of Zanzibar's primary economic sectors (2015 – 2021)

4.2.4 Contribution performance of the seaweed sub-sector to Zanzibar's GDP (2015 – 2021)

4.2.5 Production and exports trend analysis of ZSI (2010-2020)

4.2.6 Forecasting of ZSI production and export trends (2021-2025)

4.2.7 Instability analysis of ZSI's production and export trends

4.2.8 Regional comparisons of red seaweeds production shares, export volume and value (2000-2020)

4.2.9 Global comparisons of red seaweeds export volume and value (2000-2020

4.2.10 Comparative analysis of; export growth trends, market shares performances, trade indices, proximity to customers, and summary economic profiles analysis of leading *cottonii/spinosum* exporters

4.2.1 URT's Total Oceanic Trade trends 2013- 2020

The figure below shows the total oceanic trade flows between URT and the world between 2013 and 2020. From the figure below, it can be observed that URT has been operating under a trade deficit consistently during the same period. Between 2013 and 2020, the value of oceanic trade exports decreased by 47% from US$ 50.8 to 26.9 million. Similarly, imports declined by 6% from US$ 285.8 to 269.9 million during the same period. Epaphra (2016) states that the URT has faced trade deficits since the 1970s. In determining factors influencing URT's export performance, there is an agreement among authors that the trade liberalization ratio, real exchange rates, foreign direct investment, labour force and industrialisation have a positive impact on export value (Epaphra, 2016; Rwenyagila, 2023). However, factors such as the inflation rate were found to have a negative impact on exports, while the GDP growth rate was found to have no impact on exports from the URT (Uysal and Mohamoud, 2018).

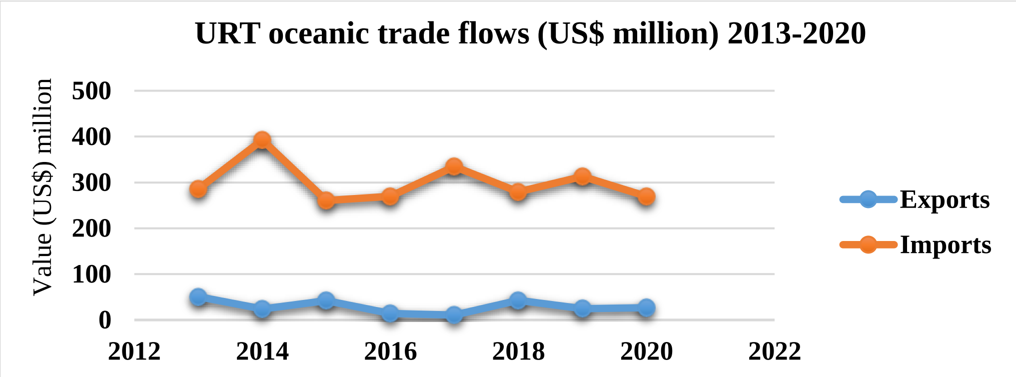


Figure 4.17: URT's oceanic trade flows 2013 - 2020 (**Source**: UNCTAD Stat, 2022)

4.2.2 Contribution performance of URT's seaweed exports on its total oceanic trade 2013- 2020

Figures below reveal URT's seaweed exports contribution to its total oceanic exports. It can be observed that between 2013 and 2014, seaweed exports contribution increased from 9% to 34%. However, between 2015 and 2016, the contribution dropped sharply to 4% before picking up between 2017 and 2020 to 54%. The observed fluctuations in contributions are mainly due to changes in URT’s seaweed exports during the same period caused by demand and supply forces at the global level, as well as the non-availability of high-priced *cottonii* on the island.

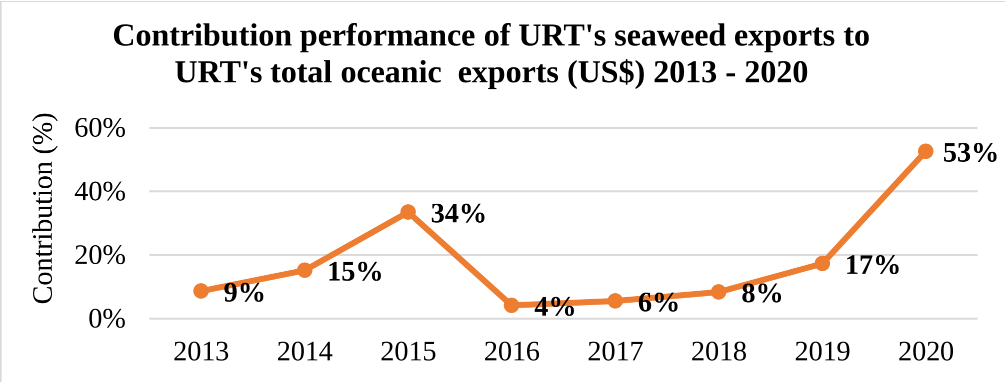


Figure 4.18: Contribution performance of URT’s seaweed exports to its total oceanic exports 2013 - 2020 (**Source:** computations using data from UNCTAD Stat, 2022)

4.2.2 GDP performance of Zanzibar's primary economic sectors 2015-2020

The figures below show that the services sector is the leading contributor to the island’s GDP, followed by the agriculture, forestry and fishing (AFF) sectors. The tax on products sector was the least-performing sector during the same period. The services and AFF sectors' contributions increased from 49.8% to 43.9% (5.9%) and from 22.1% in 2015 to 27.6% (5.5%), respectively. The industries sector’s contribution also increased from 18.3% to 19.3% (1%), while taxes on products declined from 9.8% to 9.2% (0.6%) during the same period.

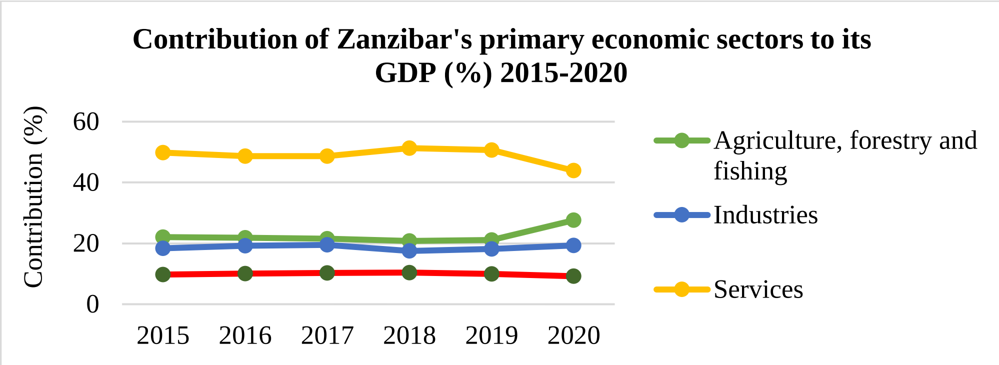


Figure 4.19: Contributions of Zanzibar's primary economic sectors to its GDP 2015- 2020 (**Source:** computations using data from OCGS, 2021)

The figure below reveals the percentage contribution of the agriculture and forestry sector to Zanzibar's GDP between 2015 and 2020. The cash crop was the least contributing sub-sector (below 5%) among the five sub-sectors. The sector's leading performers were the food crops and livestock sub-sectors (above 5%). The food crops subsector's contribution declined from 9.7% to 9.4% in the same period (0.3%). Similarly, during the same period, the contributions of forestry and fishing subsectors declined from 1.8% to 1.3% (0.5%) and 5.8% to 5.2% (0.6%), respectively. In contrast, the livestock and cash crops subsectors' contributions increased during the same period from 4.8% to 11.7% (6.9%) and 3% to 5% (2%), respectively.

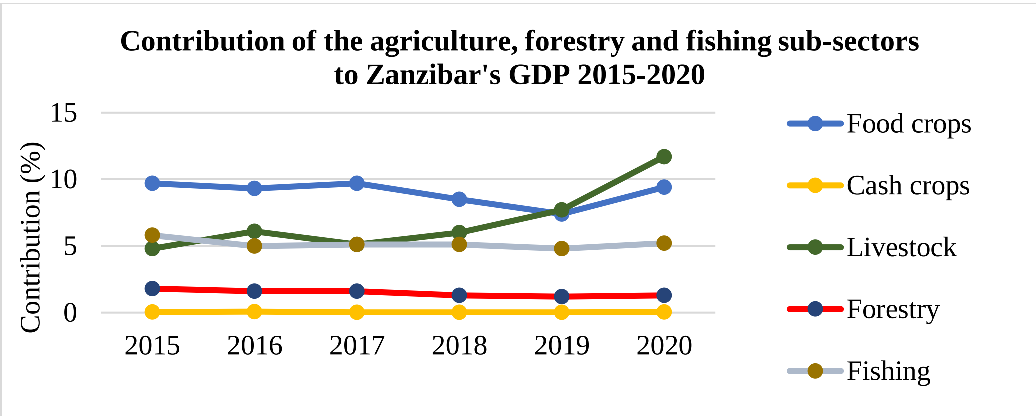


Figure 4.20: Contributions of the agriculture, forestry and fishing sectors to Zanzibar's GDP 2015-2020 (**Source:** computations using data from OCGS, 2021)

From the figure above, the contributions of each cash crop to Zanzibar's GDP show that between 2015 and 2019 where seaweed production has remained a consistent leading cash-crop subsector. The trend is an improvement from the previously held third position next to cloves and cloves stems. Clove stems were the second top cash crops contributor to the GDP, and cloves last. The increased production of high-priced *cottonii* can explain the performance of the seaweed sub-sector during the period from 58.2 tonnes in 2015 to 116.4 tonnes in 2020 tonnes (**Source:** OCGS, 2021)

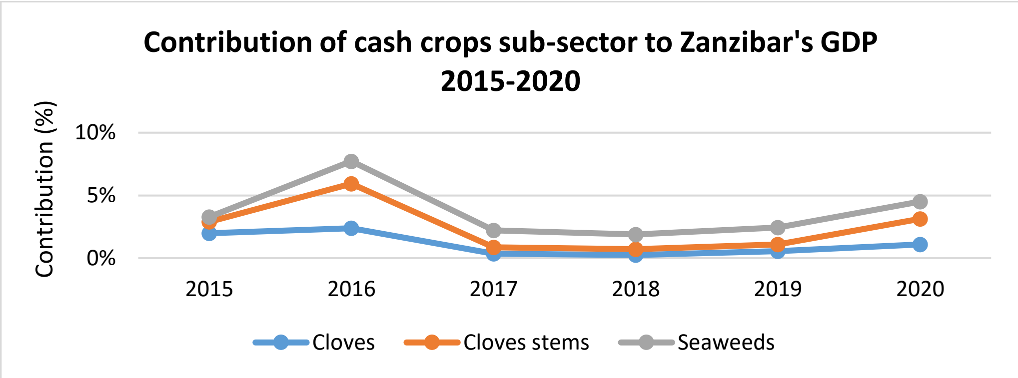


Figure 4.21: Contributions of the cash crops to Zanzibar's GDP 2015 - 2020 (**Source:** computations using data from OCGS, 2021)

4.2.3 Production and export trends analysis of Zanzibar Seaweed Industry 2010-2020

This sub-section analyses Zanzibar's seaweed production and exports between 2010 and 2020. Secondary data for this study was obtained from the ministry of Blue Economy and Fisheries URT (production) and URT Revenues Authority (export volume and value). For this study, the terms Zanzibar and URT (URT) are the same at the international trade level. URT trades in red-seaweed *Kappaphycus Alvarezii* and *Eucheuma Denticulatum* (*Spinosum* and *Cottonii*, respectively).

4.2.3.1 Time series analysis of production, export volume, and value trends of the Zanzibar seaweed industry from 2010 to 2020

As noted in sub-section (i) of this chapter, production of the *Cottonii* variety has failed in Zanzibar; however, it is still produced at low volume in some parts of Unguja, e.g., Mungoni and Pemba. Hence data collected reflects both *Spinosum* and *Cottonii* production and exports. Time series analysis was adopted to analyse the production data trends and predict values for the next five-year period. Since the production data obtained was non-seasonal, the Holt-Winters exponential smoothing method was adopted for analysis. The outer layers of the model were adjusted using the Winzorisation technique. Finally, export volume and value data were analysed using least squares (semi-log model). Below is the time series analysis of the Zanzibar seaweed industry's production and exports from 2010 to 2020:

4.2.3.2 Production

Zanzibar mainly produces two species of seaweed, i.e., *spinosum* and *cottonii*. Up to the early 2000s, both species have been growing steadily, but *cottonii* growth has failed due to environmental changes.

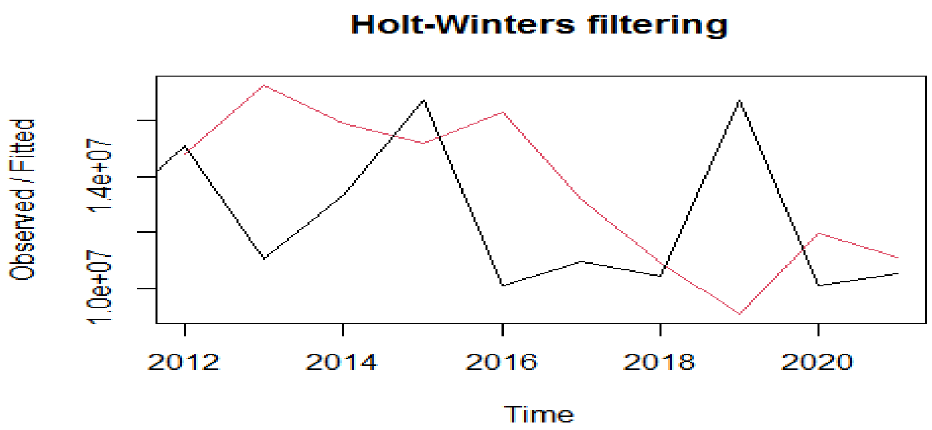


Figure 4.22: Holt-Winters Exponential smoothing filtering results for ZSI's production trends (2010-2020) **(Source:** computations done using data from the seaweed section, department of fisheries, ministry of Blue Economy and Fisheries, Zanzibar)

In the above trend series, it can be observed that seaweed production in Zanzibar has been fluctuating between 2010 and 2020. The smoothing trend line (red) reveals a declining production trend of seaweed production in Zanzibar between 2010 and 2020. It can be observed that there was a decline in production growth by fifteen per cent from kgs 10,248 tonnes in 2010 to kgs 8,668 tonnes in 2020 (source: computations based on production data from the ministry of Blue Economy and Fisheries, Zanzibar). However, between 2015 and 2018, there was an increase in the production of *cottonii* to more than a hundred per cent, from 58.2 to 116.4 tons (OCGS, 2021).

Zanzibar's production of seaweeds mainly depends upon the climate and the anticipatory price behaviour of its farmers. Seaweed production, as already explained in previous sections, has been affected primarily by severe ecological challenges on the island, including strong oceanic winds and increased sea temperatures, as documented in Msuya, (2020); Yahya et al., (2020); Makame et al., (2021); Charisiadou et al., (2022). For instance, Msuya et al., (2016) reported severe fouling of the seaweed plants in 2012 caused by the growth of blue-green algae, wild seaweed, and other epiphytes exacerbated by increased oceanic temperatures. Further, the authors attribute the decline in production to heavy rains experienced on the island, causing increased salinity levels that led to high seaweed plant die offs. Between 2014 and 2016, it was observed that production declined significantly,

Observed dwindling production has resulted from several background challenges but reduced to; economic (low returns), marketing (unfavourable demand conditions), environmental (blue-green algae fouling and related wild algae), production-related (bad local seeds option) and climatic challenges (raised sea temperatures), which have led to disease outbreaks and high die-offs (Msuya 2016**;** Songwe *et al*., 2016; Msuya, 2020; Ndawala *et al*., 2021). This chapter's sub-sections (I and IV) have discussed the challenges further.

Table 4.24: Summary of the Holt-Winter's Exponential Smothering model's coefficients

Parameters	Value	Coefficient	Value
Alpha (α)	0.3443154	a	10,921,859.9
Beta (β)	0.7179403	b	-358339.7
Gamma	False		

Source: computations using data from calculations done using data from the seaweed section, department of fisheries, ministry of Blue Economy and Fisheries, Zanzibar

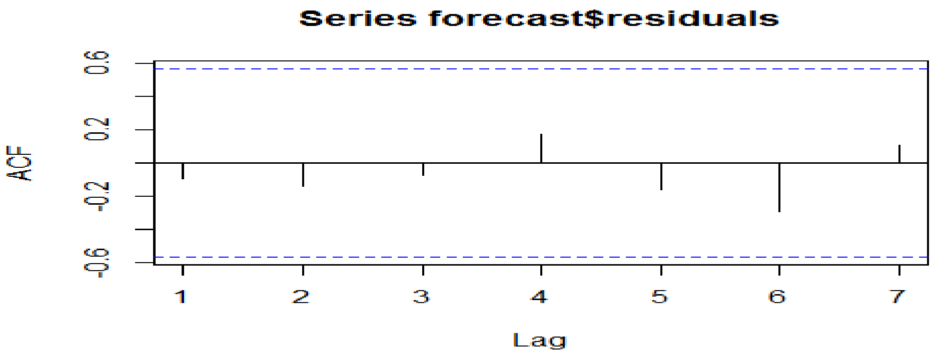


Figure 4.23: Holt-Winters Exponential smoothing autocorrelation results (**Source:** computations done using data from the seaweed section, department of fisheries, ministry of Blue Economy and Fisheries, Zanzibar)

L-Jung Box test results; x^2 = 4.7309, **d.f** = 7, **p-value** = 0.6928

The above results summarize statistical parameter outcomes of the Holt-Winters model fitting analysis that will be used to predict future production data (2021-2025). The model estimates the level and slope at the current time point. Smoothing is controlled by two parameters, i.e., alpha (0.34) and beta (0.72). The gamma value is false because the data is non-seasonal, i.e., yearly. The dependent variable for the model was production volume, and the independent variable was time (t). L Jung Box test results were used to test for autocorrelation. The test statistic values are; (x^2) = 4.7309, and the p-value of the test is 0.6928. Since the p-value is larger than 0.05, i.e., statistically insignificant, the time series data are not autocorrelated. Hence, the Holt-Winters model can suitably predict future production values for the industry.

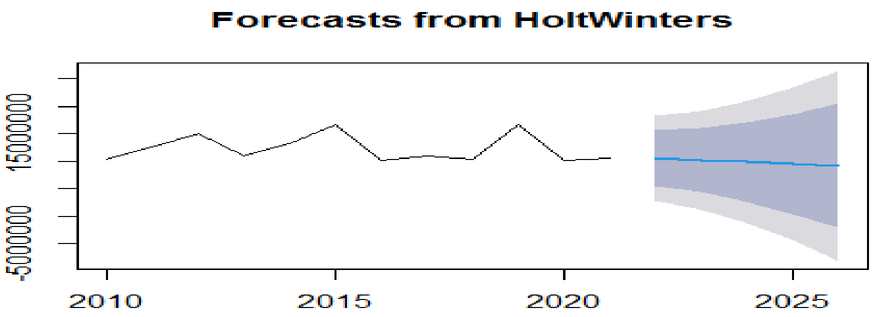


Figure 4.24: Holt-Winters Exponential Smoothing model's forecasting results (2021-2025) (**Source:** computations done using data from the seaweed section, department of fisheries, ministry of Blue Economy and Fisheries, Zanzibar)

Table 4.25: Production forecasts of ZSI 2021-2025

		Point Forecast (tonnes)			
Year	***Actual forecasted values (tonnes)***	***Lo 80***	***Hi 80***	***Lo 95***	***Hi 95***
2021	10,563	5,491	15,635	2,806	18,320
2022	10,205	4,312	16,098	1,192	19,217
2023	9,846	2,578	17,114	-1,268	20,962
2024	9,488	3,694	18,607	-4,457	23,434
2025	9,130	2,222	20,482	-8,231	26,492

Source: computations done using data from the seaweed section, department of fisheries, ministry of Blue Economy and Fisheries, Zanzibar

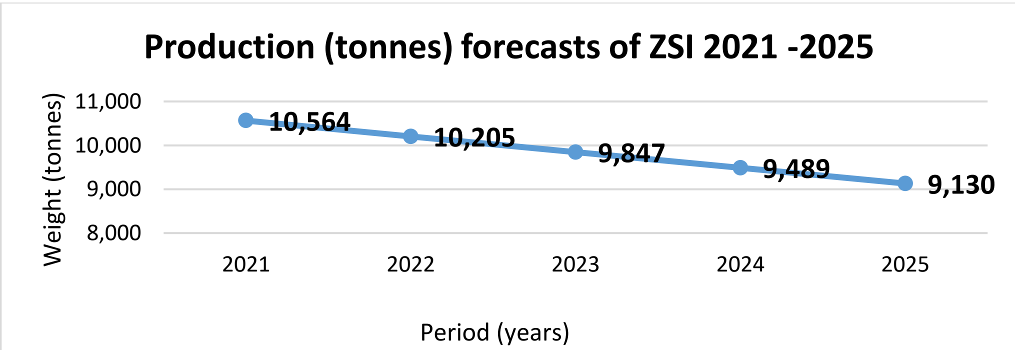


Figure 4.25: Production forecasts of ZSI 2021 – 2025

The above-forecasted results show that seaweed production will continue to drop between 10,564t in 2021 to 9,130t in 2025, equivalent to a 13.57 per cent decline. The forecasted decline can be explained by existing production challenges faced by the industry and farmers' negative attitudes regarding the seaweed business that have led to farm abandonments. This negative trend has several social, economic, and political implications. Such implications include loss of employment and, consequently, the loss of income, leading to diminished livelihoods for the farmers at the micro-level. Further, the loss of employment raises unemployment rates and poverty levels on the island at the macro-level of the economy. Therefore, this is an urgent call to the RGoZ and all of Zanzibar’s seaweed industry stakeholders to take immediate measures to tackle the industry's ongoing challenges to ensure its sustainability over time.

4.2.3.3 Export volume

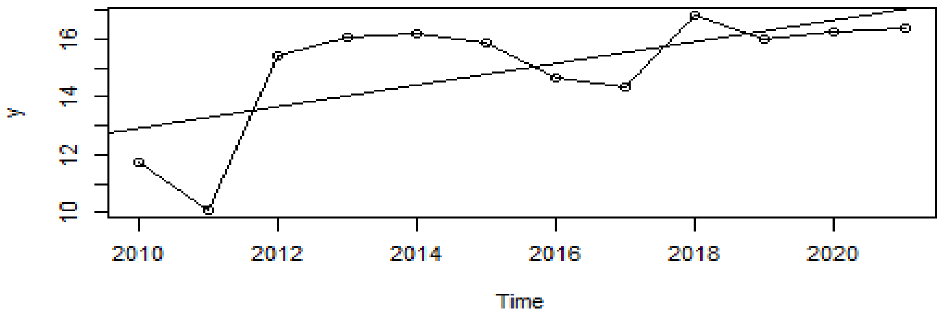


Figure 4.26: A time-series plot of ZSI’s export volume with a fitted trend line (2010-2020) **(Source:** calculations done using data from Tanzania Revenues Authority)

The above figures show that ZSI export volume fluctuated between 2010 and 2020 mainly due to demand and supply forces at the international level as well as production challenges of the high-priced *cottonii* variety. Overall, it can be observed that there is an upward trend in export volume between 2010 and 2020 despite lingering declining production. This trend can be explained by the export of unabsorbed production surplus during previous trading years. Further, it is worth noting that exports of seaweeds from Zanzibar had remained relatively lower than production volume consistently between 2010 and 2017, mainly due to the non-availability of highly demanded *cottonii* variety. Post-

2017, export quantity trends revealed an increased trend mainly due to growth in *cottonii* production during the same period.

Table 4.26: Semi-log model forecast: Export volume results (2021-2025)

	Years				
	2021	***2022***	***2023***	***2024***	***2025***
Values (tonnes)	37,245	54,309	79,190	115,471	168,375

(Source: computations done using data from Tanzania Revenues Authority)

Forecasting equation:

Log (Y_t) = -745.198 (t) + 0.377

Multiple R-squared: 0.4383, **Adjusted R-squared:** 0.3821

F-statistic: 7.802 on 1 and 10 d.f, **p-value:** 0.01901

From the above results, the p-value is less than .05, i.e., statistically significant, a non-zero correlation exists between the two variables under study, i.e., time (years, dependent variable) and export volume (independent variable). This means changes in export volume are associated with shifts in time. However, adjusted r-squared reveals that only thirty-eight per cent of the independent variable can predict the dependent variable under study.

The above forecasts table shows that the volume of Zanzibar's seaweed is expected to rise by more than one hundred per cent, from 37,245t in 2021 to 168,375t in 2025. Zanzibar is able to export more seaweed, not because of increased production but rather available production surplus that was not absorbed by the international market during past trading years. This study found that most farmers have excess bags of dried seaweed in their houses, waiting for potential buyers or the next buying cycle.

4.2.3.4 Export values

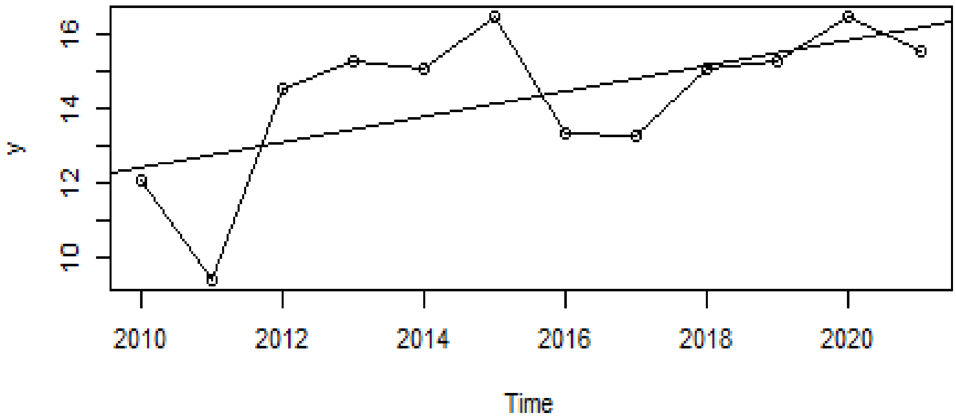


Figure 4.27: A time-series plot of ZSI's export value 2010-2020 with a fitted trend line (2010-2020) **(Source:** calculations done using data from Tanzania Revenues Authority**)**

The above figure reveals an upward trend line for export value data indicating growth between 2010 and 2020. As elaborated earlier, the increased exports result from increased demand for seaweed-based products at the international level.

Table 4.27: Semi-log model forecast: Export values results (2021-2025)

	Period (years)				
	2021	**2022**	**2023**	**2024**	**2025**
Values (US$ million)	15	21	30	42	59

Source: computations using data from Tanzania Revenues Authority

Forecasting equation:

Log (Y_t) = --673.3969 (t) + 0.3412

Multiple R-squared: 0.3668 **Adjusted R-squared:** 0.3034

F-statistic: 5.792 on 1 and 10 DF **p-value:** 0.0369

From the above results, the p-value is less than .05, i.e., statistically significant, a non-zero correlation exists between the two variables under study, i.e., time (years, dependent variable) and export value (independent variable). This means changes in export values are associated with shifts in time. However, adjusted r-squared reveals that only thirty per cent of the independent variable can predict the dependent variable under study. Further, looking at the residual signs, it can be observed that there is a negative relationship between the two variables.

From the above forecast results, it can be observed that export values are projected to increase between 2021 and 2025 from US$ 15 to 59 million, equivalent to a more than one hundred per cent increase. An increase in export values is related to the increased export volume of unabsorbed production surplus during the previous trading years.

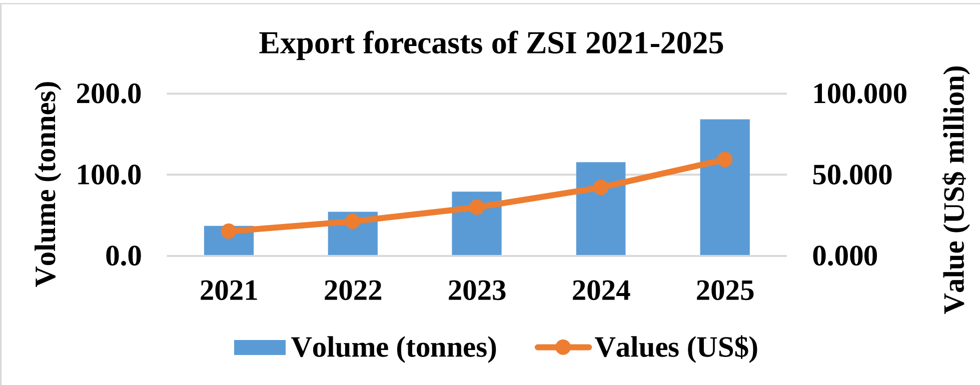


Figure 4.28: Exports forecasts of ZSI 2021 -2025

4.2.3.5 Growth rates of ZSI production and exports 2010 -2020

Annual growth rates (AGRs)

The figure below shows that between 2010 and 2011, the export volume and value of ZSI's seaweed exports declined by 81% and 93%, respectively, while production and export unit prices grew by 36% and 22%, respectively. Between 2011 and 2012, ZSI production and exports increased significantly by 21% and 100%, respectively. Export unit prices grew by 21% during the same period. Between 2012 and 2013, production declined by 27% while exports grew by 100%. Between 2013 and 2014, the export value fell by 18%, while the export volume, unit price and production increased by 10,75 and 20 per cent, respectively. AGR for export volume declined by 26%, while the unit price and export value grew by 100% in 2015. The production also increased by 20% during the same period.

In 2016, the AGR of export volume, value and production decreased significantly by 69, 96 and 40 per cent, while export unit price grew by 14%. By 2017, export volume and value declined by 27% and 2%, respectively, while the unit price and production increased by 100% and 9%, respectively. In 2018, AGR for exports and unit prices grew significantly while production declined by 5%. In 2019, export volume's AGR declined by 54% while export value, unit price and production grew significantly. Production AGR declined by 91%, while exports grew by 25% and 100% for volume and value, respectively. Export unit prices also increased by 19% during the same period.

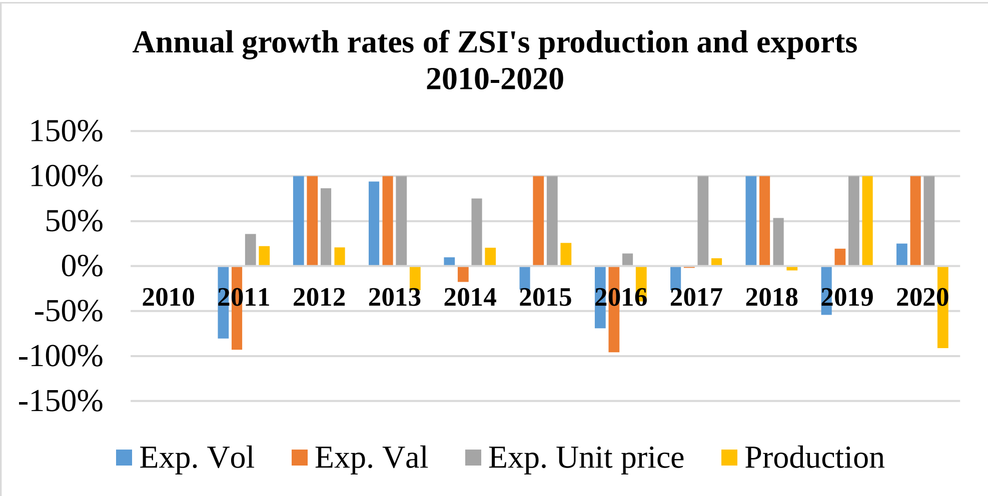


Figure 4.29: Annual growth rates of ZSI production and exports 2010-2020 (**Source:** computations using data from the seaweed section Zanzibar and Tanzania revenues Authority)

Compound Annual Growth Rates (CAGRs)

The table below shows that between 2010 and 2015, CAGR was 100% for export volume and value, while the export unit price was 78.07% and production -72.8%. Between 2016 and 2021, the CAGR for export volume declined to -9.56, 54.43, -71.54 and -82.64 per cent, respectively.

Table 4.28: CAGR growth rates of ZSI production and exports 2010-2020

Period	CAGR (%)			
	Exp. Vol	***Exp. Val***	***Exp. Unit price***	***Production***
2010-2015	100	100	78.07	-72.8
2016-2021	-9.56	54.43	-71.54	-82.64

Source: Primary data

As already elaborated at the beginning of this section, the ongoing production challenges farmers face in Zanzibar due to increased sea temperatures explain the negative growth rate value observed. The increased temperatures have led to high die-offs of the seaweed plants. However, production can only explain part of the URT's seaweed exports. The primary determinant of URT's ability to sell is mainly demand for red seaweeds and carrageenan at the global level and world production (Msafiri, 2021; Msuya et al., 2021).

4.2.3.6 Cuddy Della Valle Instability indices for seaweed production and export trends of ZSI

This index is considered an adjustment of the coefficient of variation (CV) that accommodates economic time series data trends. The method is regarded as superior to scale-based measures such as standard deviation. Calculating CDVII considers the coefficient of variation (CV) and an adjuster R^2 value (AdjR^2) expressed in percentage. Interpretation of the index is based upon the percentage of variation as follows:

- Between 0-15% CDVII value is considered as low instability
- Between 15-30% CDVII value is considered as medium instability
- Above 30% CDVII value is regarded as having high instability

The following are the results of the analysis:

Table 4.29: Cuddy Della Valle Instability indices for seaweed production and export trends of ZSI 2010 - 2021

Period	CV (%)			AdjR^2			CDVII(%)		
	P*	***E.Vol****	***E. Val****	***P***	***E.Vol***	***E. Val***	***P***	***E.Vol***	***E. Val***
2010-2020	10	79	100	0.02	0.25	0.15	18	30	47

2010-2015	19	84	100	0.31	0.68	0.64	10	13	23
2016-2020	100	72	100	0.23	0.13	0.38	70	31	32

Notes: * Production, ** Export volume, *** Export value

The table above shows that between 2010 and 2015, the CDVII value of production, export volume, and value were 10%, 13%, and 23%, respectively, indicating low instability. On the other hand, between 2016 and 2020, the production trends revealed high instability (70%), while export volume and value trends revealed low instabilities (31% and 32%, respectively). Overall, between 2010 and 2020, the CDVII values for production and export trends showed low instabilities for production (18%), while moderate and high instability was observed for export volume (30%) and value (47%) trends. The high instability values observed can be explained by production challenges in Zanzibar and global demand and supply forces.

4.2.3.7 Trading partners of Zanzibar Seaweed Industry

Since its creation, Zanzibar's seaweed industry has been exporting to six major buyers, i.e., Denmark, Spain, France, Chile, the USA, and China. However, the buyers are not countries but rather *carrageenan* processors found in such countries. Trade between Zanzibar and these processors has been maintained through historical relationships, as mentioned earlier in the document. The importers have remained consistently the same over twenty years.

This is due to the nature of the product. As discussed in section (i) of this chapter, Zanzibar's seaweed is a raw material for *carrageenan* processing industries. About eight known processors of *carrageenan* exist globally (source: exporters). Hence the potential for new markets is constrained by the nature of the exported product itself. In the case of Zanzibar's industry, such a challenge can be circumvented by establishing new uses of *Kappaphycus* and *Eucheuma* (e.g., exporting it as an item for human food consumption) or if there will be a new invention on the applicability of *carrageenan*.

Below is a summary of the processors' imports in value and volume between 2000 and 2021:

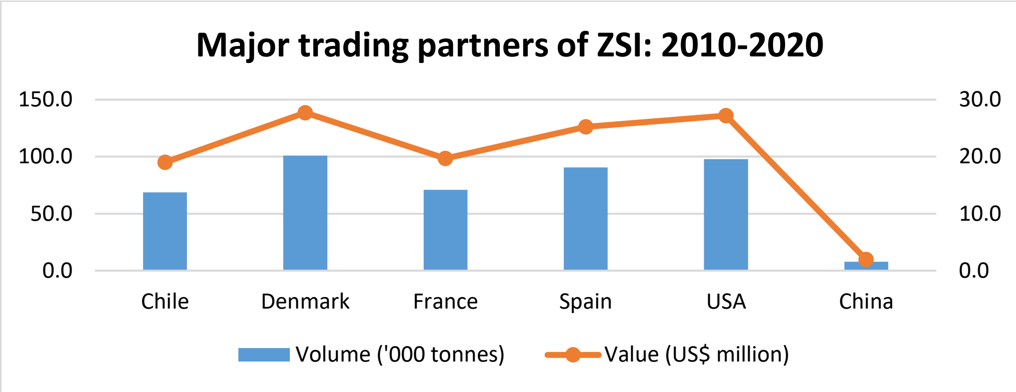


Figure 4.30: Major trading partners of ZSI 2010-2020 **(Source:** computations using data from Tanzania Revenues Authority**)**

From the figures above, it can be seen that Denmark is the leading importer of Zanzibar's seaweed (US$$ 27.7 million, 100 tonnes ('000)), followed by the USA (US$ 27.2 million, 97 tonnes ('000),) and Spain (US$ 25.2 million, 90.4 tonnes ('000)).

4.2.4 Global production of red seaweeds 2000 - 2019

The figure below further reveals the global red-seaweed production between 2000 and 2018, with the Philippines being the leading producer between 2000 and 2004. From 2005 until 2018, Indonesia scaled up production had dominated the red-seaweed market. Both Malaysia and URT (Zanzibar) can be observed to have significantly lower production (less than 2000 tons a year).

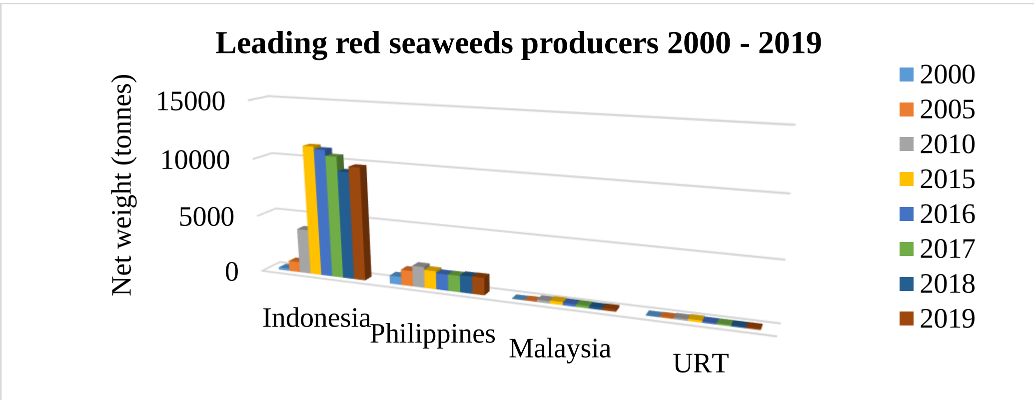


Figure 4.31: Red seaweeds production (tonnes) 2000-2019: leading producers (**Source:** computations using data from FAO, 2021)

The figure below reveals the production shares performances of leading *cottonii/spinosum* producers between 2000 and 2019, whereas, between 2000 and 2005, the Phillippines held the leading production shares before being outgrown by Indonesia from 2005 till 2019. The loss of market leadership in the Philippines can be explained by the political atmosphere that existed at the time (unrest) that led to instability within the country. URT's production shares have declined from 5% in 2000 to 1% in 2019. The fall in production shares is explained by the challenges farmers face in Zanzibar, especially in Unguja, which are caused by increased heat and lead to high die-offs and diseases.

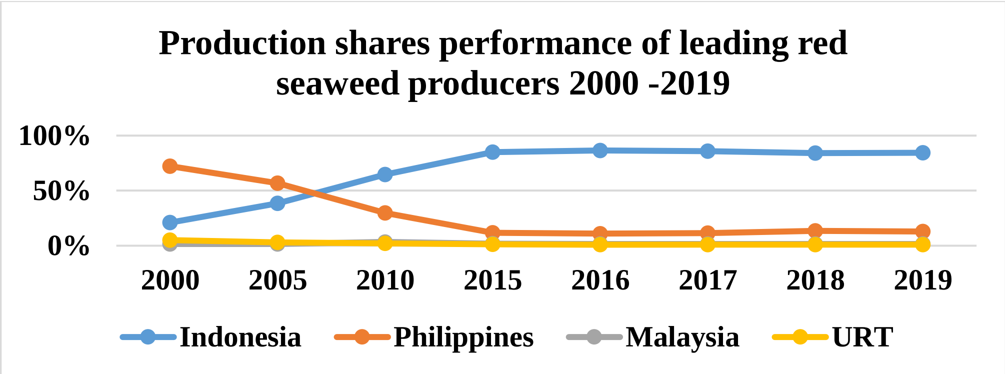


Figure 4.32: Production shares performances of leading global producers of red seaweeds 2000 – 2019 (**Source:** computations using data from FAO, 2021)

4.2.5 Global comparisons of red seaweeds exports

In 2019, algae cultivation (in net weight) contributed to about thirty per cent of world aquaculture production[23]. Among the largest produced seaweed species, the top three categories were brown, red, and green seaweeds. Red seaweeds were the second most-produced species. Its production rose from 21,000 tons in 1950 to 18.3 million tons in 2019, an equivalent of 10.3 per cent annual growth. As a result, red seaweeds accounted for 52.6 per cent of world seaweed cultivation (in tonnage) and 47.6 per cent in value (US$). *Kappaphycus* and *Eucheuma* production contributed 33.6 per cent of total seaweeds, equivalent to 11.6 million tons (Cai, 2021).

[23] World aquaculture production in 2019 stood at 120 million tonnes (Cai,2021)

Below are the global comparison of seaweed exports under HS 121221 (Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground, fit for humans) and HS 121229 ((Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground, unfit for human) between 2012 and 2021.

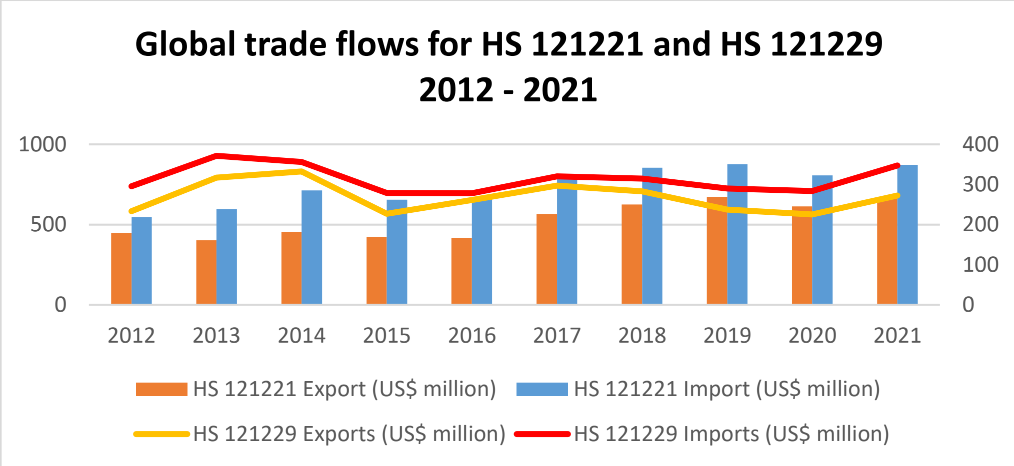


Figure 4.33: Global trade flows for HS 121221 and HS 121229 2012-2021 (**Source:** ITC map, 2022)

From the above figure, it can be observed that there exists a deficit for HS 121221 and HS 121229 commodities at the global level, indicated by the trade deficit, i.e. between 2012 and 2021. The trade deficit reveals the global industry's under-capacity, revealing opportunities for producers' upscaling production and export activities. Demand for red seaweeds is driven by the need for *carrageenan*, which is applied in several industries, including cosmetics, pharmaceuticals, pet food, dairy and milk industries.

The figures below reveal that between 2000 and 2002, the Philippines was the leading exporter in the volume of *cottonii/spinosum*, followed by Indonesia and URT (Zanzibar) at second and third positions globally, respectively. However, from 2003 to 2020, Indonesia upscaled its production and has been the leading exporter, followed by the Philippines and URT at second and third positions globally.

Similarly, between 2000 and 2004, the Philippines was the leading exporter of *cottonii/spinosum* by volume, followed by Indonesia and URT

(Zanzibar) in second and third positions globally. However, from 2005 till 2020, Indonesia has been the leading exporter of the same, followed by the Philippines and URT in second and third positions globally, except for 2012.

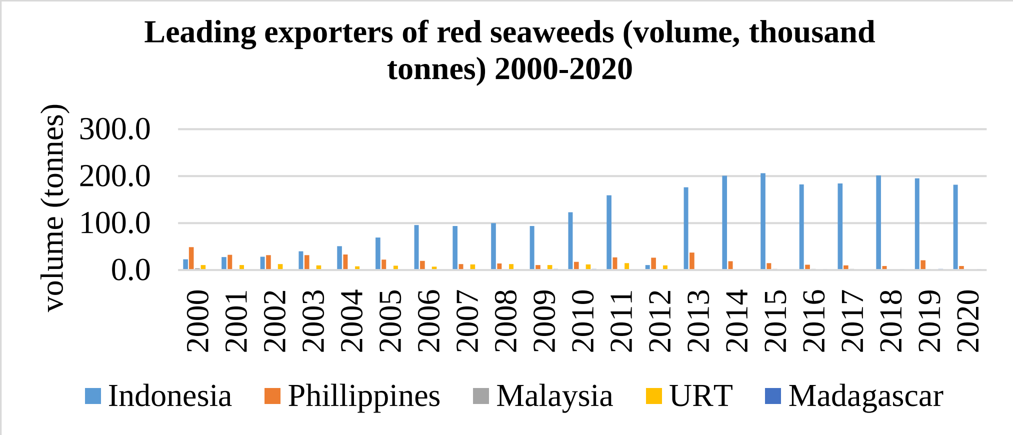


Figure 4.34: Leading exporters of red seaweeds 2000 – 2020: Volume (thousand tonnes) (**Source:** UN COMTRADE)

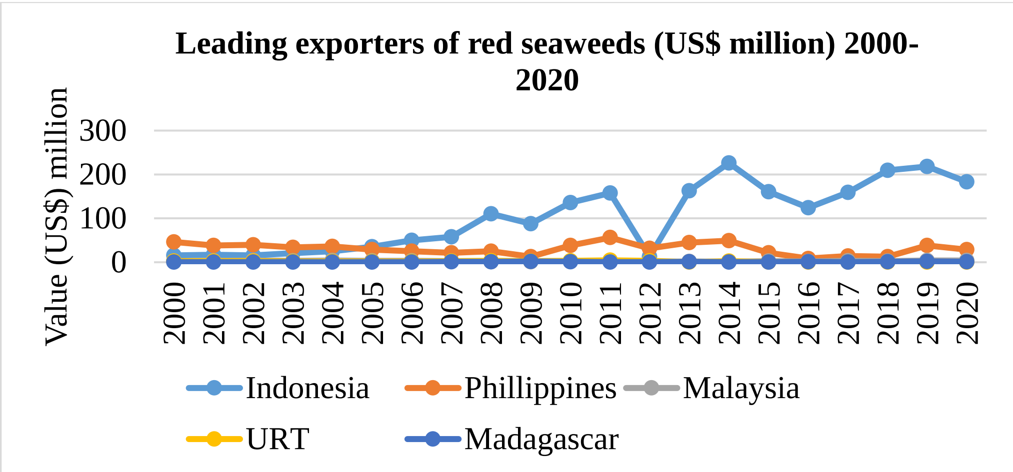


Figure 4.35: Leading exporters of red seaweeds 2000 – 2020: Value (US$ million) (**Source:** UN COMTRADE)

4.2.6 Market share performance of major red seaweeds exporters 2000 - 2020

The figure below reveals that between 2000 and 2004, the Philippines had the highest market share in the global red seaweed trade, followed by Indonesia. However, from 2005 to 2020, Indonesia surpassed the Philippines and dominated the global red seaweed trade, holding more than ninety per cent of the global red seaweed trade. URT's (Zanzibar and Mainland Tanzania) market share during the same period has remained significantly lower (less than 10%) compared to its global competitors. The concentration ratios trend consistently reveals a hundred per cent value from 2000 to 2020, indicating the global red-seaweeds market to be monopolistic.

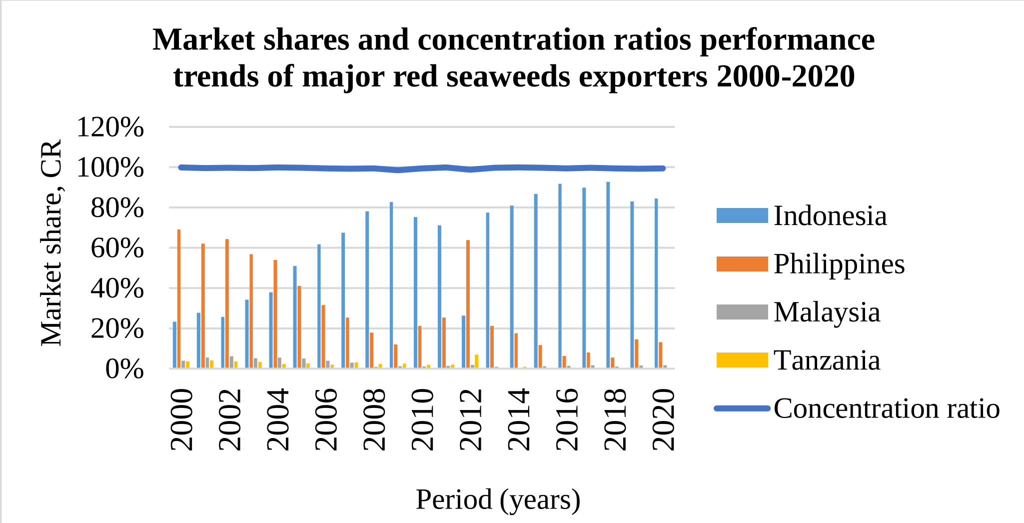


Figure 4.36: Market shares and concentration ratios performance trends of major red seaweeds exporters 2000-2020 **(Source:** computations using data from UN COMTRADE**)**

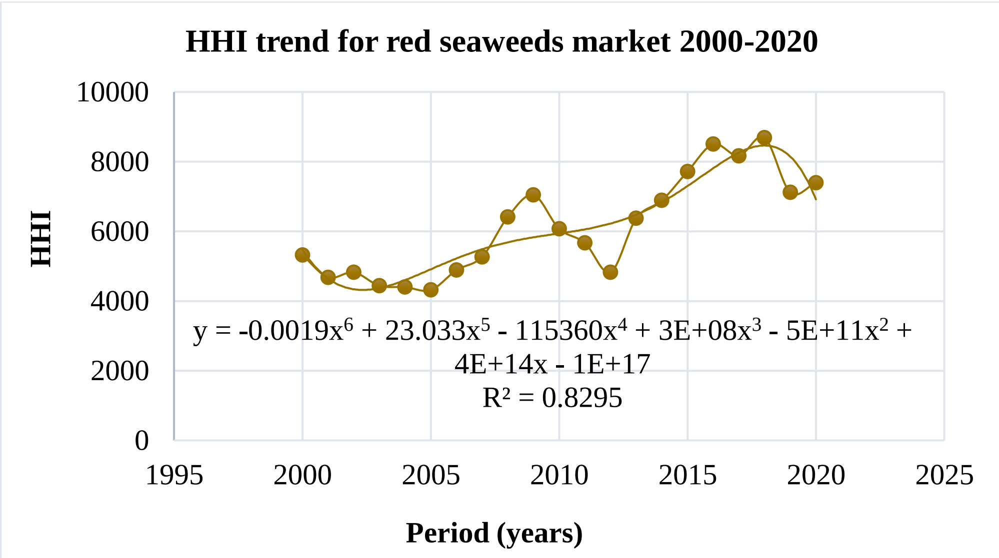


Figure 4.37: Hirschman Herfindahl index (HHI) trend of the red seaweed market 2000 – 2020 (**Source:** computations using data from UN COMTRADE)

The figure above shows that, between 2000 and 2020, the global *cottonii/spinosum* market was highly concentrated, with an HHI of above 4000. In 2020, the HHI value was above 7000, indicating a highly concentrated market. According to Hayes (2021), an HHI of 2,500 or greater indicates a highly concentrated market hence less competitive. A highly concentrated market can result from several factors, including entry barriers, e.g., high capital requirements, existing patents, etc. In the case of the red-seaweed global market, no entry barriers exist. The market has evolved naturally, mainly due to the nature of the product, producing countries, and their factor conditions. As already noted, the market is primarily dominated by Indonesia, the Philippines, Malaysia and Zanzibar.

Hence, it can be concluded that the global *cottonii/spinosum* market is an oligopoly, with the top three suppliers originating from the exact geographic location. An oligopoly is a market dominated by very few suppliers (OECD, 2022). In oligopoly markets, the number of suppliers is so small that it significantly influences the actions of others (also referred to as the *prisoner's dilemma*). In addition, factors such as high entry costs (capital expenditures), legal privileges (government licenses to use the land), and other macro-environmental forces (economic, political, socio-cultural) contribute to the formation of oligopolies (Chappelow, 2019). Government policies, for instance, can either encourage or discourage oligopolistic behaviour. Usually, this is observed in mixed economies, where businesses seek government assistance in limiting competition. However, within the oligopolistic global red-seaweed market, more than ninety per cent of its sales originate from Indonesia.

According to the OECD, some oligopolies can be competitive, and others may appear contrary to market reality. The challenge with oligopolies lies with the latter than the former, where questionable actions of top suppliers may present an appearance of market competition when they could have agreed to price-fixing or accepted price following from a market leader. Hence, relevant competition authorities at the national and international levels must investigate the possible tactics of oligopolies and their effect on fair competition. Thus, it can be concluded that with high market power, Indonesia can be viewed as an industry price maker and the remaining exporters as price followers. Therefore, surviving Indonesia's competition may be attempted by scaling up production and strategically positioning prices below Indonesia's.

Table 4.30: Market share performance of leading red seaweed producers 2010-2020, yearly (a)

Country	Export volume (net export weight, kgs)										
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Indonesia	1	1	2	1	1	1	1	1	1	1	1
Philippines	2	2	1	2	2	2	2	2	2	2	2
Malaysia	5	4	5	3	3	3	3	3	4	4	3
URT	**3**	**3**	**3**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Madagascar	4	5	4	4	4	4	4	4	3	3	4

Source: computations based on data obtained from UN COMTRADE, 2021

Table 4.31: Market share performance of leading red seaweed producers 2010-2020, yearly (b)

Country	Export value (US$)										
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Indonesia	1	1	2	1	1	1	1	1	1	1	1
Philippines	2	2	1	2	2	2	2	2	2	2	2
Malaysia	4	4	4	3	4	3	3	3	3	3	3
URT	**3**	**3**	**3**	**5**	**3**	**5**	**5**	**5**	**5**	**5**	**5**
Madagascar	5	5	5	4	5	4	4	4	4	4	4

Source: computations based on data obtained from UN COMTRADE, 2021

Table 4.32: Average market share position of leading red seaweed producers 2010-2020

Country	Export volume (thousand tonnes)		Export value (US$ million)	
	Total	**Rank**	**Total**	**Rank**
Indonesia	2,444.5	1	2,184.4	1
Philippines	456.7	2	651.8	2
Malaysia	30.4	**4**	54.9	**3**
URT	140.7	**3**	37.3	**4**
Madagascar	24.1	5	14.3	5

Source: computations, data obtained from UN COMTRADE, 2021

The results above show that Indonesia consistently led the red seaweeds market between 2010 and 2020 by holding the highest market share, followed by the Philippines. Yearly market share performance results reveal URT ranked third on the average export volume between 2010 and 2012; in 2014, the position dropped to number five before resuming to number three in 2014. However, the URT's export share dropped again to number five and remained the same between 2015 and 2020. However, overall average market share performance results during the same period put URT in the third and fourth position (volume and value, respectively) behind Indonesia and the Philippines.

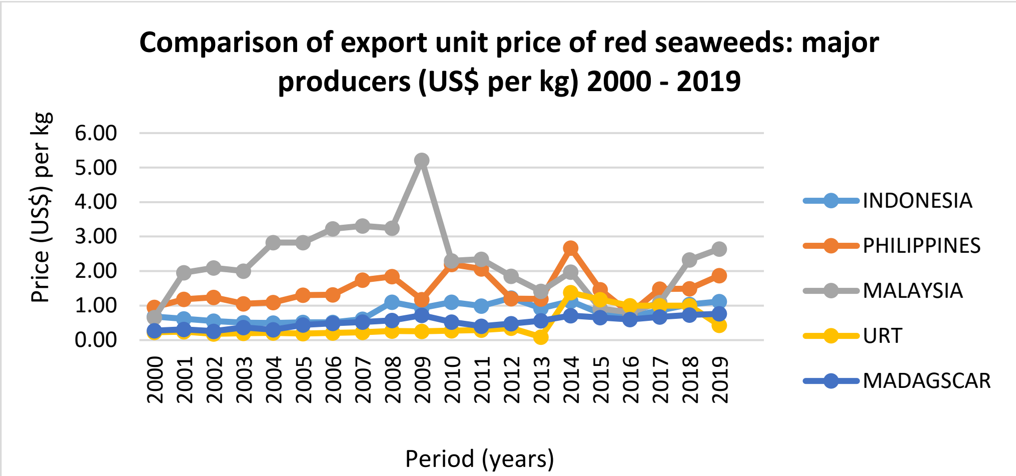


Figure 4.38: Comparisons of the export unit price of red-seaweeds: major exporters in 2000 – 2019 (Source: computations from UN COMTRADE, 2021)

From the figure above, it can be observed that between 2001 and 2013, Malaysia received relatively higher price offers per kg of seaweed exported, followed by the Philippines. However, between 2013 and 2017, the Philippines received higher price offers, followed by Malaysia. Malaysia's prices increased between 2017 and 2019 but declined behind the Philippines between 2019 and 2020.

The figure above shows that URT's prices were below competitors between 2000 and 2013 but rose significantly above Madagascar's and Indonesia's between 2014 and 2016. Between 2016 and 2017, it can be observed that the URT, the Philippines and Malaysia received similar price offers. Between 2016 and 2018, the URT's prices continued above Madagascar's and Indonesia's before declining in 2019 and experiencing a further decline in 2020. Prices of exports for the red seaweed market are governed by demand and supply forces to a large extent.

4.2.7 Summary profile of leading red seaweeds exporters

The table below reveals that Zanzibar's factor conditions (reflected in its number of islands and population size) are relatively limited. Similarly, its GDP per capita is relatively low, translating to lower living standards than competitors. As observed, the success of Indonesia's dominance in the global red-seaweed market is attributed to mainly its farming area size. Indonesia is the world's largest archipelago, with a vast fertile Water land area of about 1,919,440 sq. km with approximately 17,500 islands, about which 6000 are inhabited (Embassy of the Republic of Indonesia, 2022). In addition, the population of Indonesia was 273,523,621 inhabitants in 2020 (World Bank, 2020), which is relatively more significant than its competitors signifying abundant labour. In contrast, Zanzibar has the least farming area and population size (2654 sq. km and 1,303,569, respectively.)

Table 4.33: Summary profiles of top leading red seaweed producers

Country	Population	GDP (current, US$)	GDP per capita (current, US$)	Area (km^2)	No. of islands (approx.)	Seaweed-export-varieties
Indonesia	273,523,621	1.06 trillion	3,869.60	1,919,440	17,500	Dried seaweeds, SRC[2], RC[3]
Philippines	109,581,085	361.49 billion	3,298.80	298,170	7000	Dried seaweeds, SRC, RC
Malaysia	32,365,998	337.01 billion	10,412.30	328,550	878	Dried seaweeds, SRC, RC
Madagascar	27,691,019	13.06 billion	471.5	581,800	250	Dried seaweeds
Zanzibar	1,303,569	1.7 billion	1,033	2654	2	Dried seaweeds

Notes: 1- Semi-refined carrageenan 2- Refined carrageenan

The World Bank data website was used to obtain data on population, GDP, GDP per capita, and unemployment rates for Indonesia and the Philippines. Zanzibar's economic data was obtained from the OCGS 2021 report. In addition, the area and number of islands data for Indonesia, Philippines, Malaysia, and Madagascar were sampled from Wikipedia. Seaweed-export variety data was obtained from Ferdouse *et al*. (2018) report, except for Madagascar

Table 4.34: Average distances of leading producers from importers (km)

Country	**Seaweed Category**	
	121221	**121229**
URT	9876	8192
Indonesia	5329	4691
Malaysia	9506	8955

121221 – Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground fit for human consumption; 121229 - Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground unfit for human consumption (**Source**: ITC map, 2021)

The table above shows that the URT is relatively far from seaweed buyers than its competitors in the HS 121221 category, while Malaysia is further in the HS 121229 category. This observation reveals that URT's seaweed exports in HS 121221 may appear more expensive than competitors, influencing the price offers it receives.

Table 4.35: Importing countries' concentration ratios (%)

Country	**Seaweed Category**	
	121221	**121229**
URT	0.83	0.44
Indonesia	0.72	0.67
Malaysia	0.18	0.18

121221 – Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground fit for human consumption; 121229 - Seaweeds and other algae, fresh, chilled, frozen or dried, whether or not ground unfit for human consumption (**Source:** ITC map, 2021)

The table above reveals that the importer's concentration index for URT is high for category (i) of seaweeds (121221) while, in contrast, it is average for category (ii) of seaweeds (121229). The high importer's concentration index reveals relatively few buyers of URT's exports, while the average index indicates an average number of buyers. On the other hand, Indonesia has a high importer concentration index for both categories of seaweed.

Table 4.36: Average tariffs rates applied by selected import markets

	Common Importers' tariff rates (%)					
		Chile	China	Denmark	Spain	USA
	URT	6	0	0	0	0
	Philippines	6	0	0	0	0
	Indonesia	6	0	0	0	0
Exporters	**Malaysia**	6	0	0	0	0

(**Source:** ITC map, 2021)

4.2.8 Trade indices performances of major red seaweeds exporters 2012 – 2021

4.2.8.1 Trade dependence index (TDI)

The figure below reveals trade dependence indices for major red seaweed exporters between 2012 and 2021. Overall, Malaysia's index has consistently performed above competitors, followed by the Philippines, while the URT's and Indonesia's indices lagged during the same period. Trade dependence reveals how open an economy is to trade; hence, the higher the value, the more open an economy is. On the other hand, lower trade dependence values, e.g., in the URT, reveal the presence of trade restrictions or barriers within or towards overseas markets. In the case of the URT, no trade restrictions exist at the domestic level; seaweed exports to Chile face a six per cent tariff rate (**Source:** ITC Map, 2021).

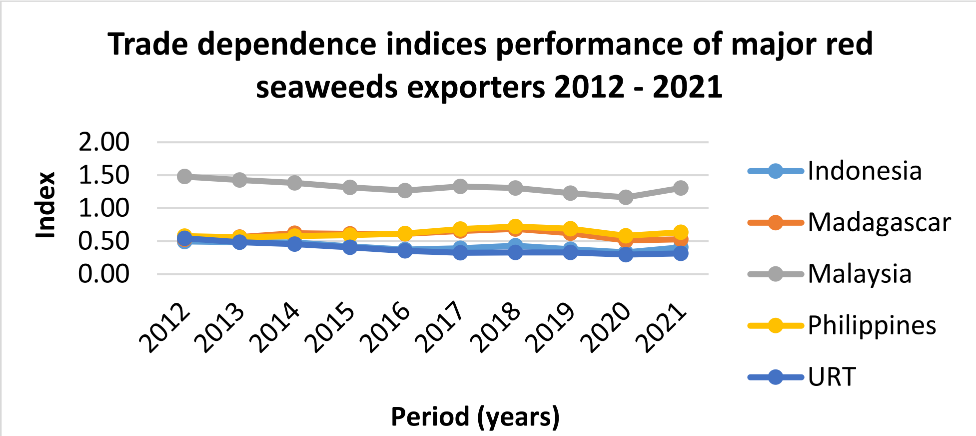


Figure 4.39: Trade dependence indices performances of major red seaweed exporters 2012 – 2021. Note: Trade dependence (range 0-∞) (**Source:** computations based on trade data from UN COMTRADE and UNCTAD STAT websites)

4.2.8.2 Export propensity ratio (EPR)

From the figure below, Malaysia had a leading export propensity index between 2012 and 2021, followed by the Philippines and Madagascar. The URT's and Indonesia's export propensity ratio performance was observed to lag behind the other leading producers during the same period. The export propensity ratio reveals how dependent an economy (domestic producers) is on trade (exports); hence, the higher the value, the higher the dependence level. The existing demand and supply forces may explain the ability of URT to export its seaweeds to the international seaweed market.

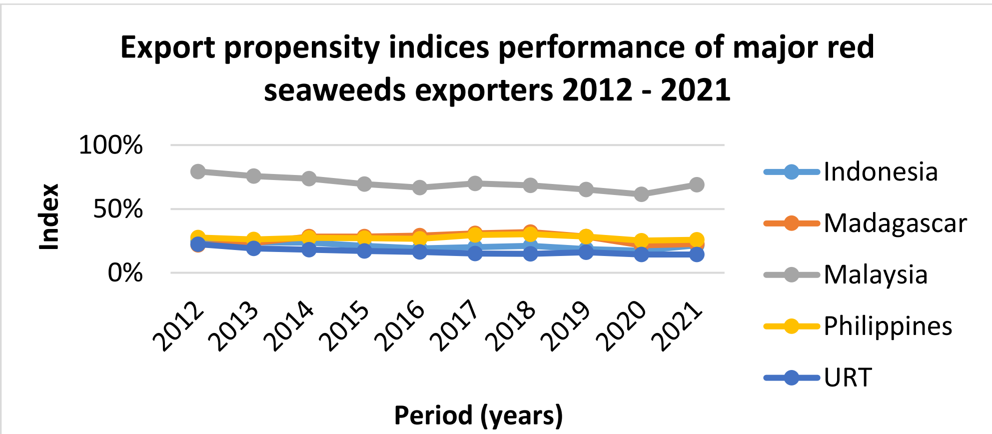


Figure 4.40: Export propensity indices performances of major red seaweeds

exporters 2012 – 2021. Note: Export propensity (range 0-100%) (**Source:** computations based on trade data from UN COMTRADE and UNCTAD STAT websites)

4.2.8.3 Revealed Comparative Advantage Index (RCAI)

The figure below reveals revealed comparative advantage indices performances of the major red seaweed exporters between 2012 and 2020. Any value of RCA greater than unity indicates a robust comparative advantage, i.e., export strength. From the figure, it can be observed that between 2012 and 2013, URT had the highest RCAI value, which significantly dropped from 2013 to 2020. Indonesia's RCAI was picked in 2013 and has remained substantially higher than competitors during the same period. The drop in URT's RCAI value may be explained by the failure of cottonii to grow in Zanzibar post-2000s due to environmental challenges. *Cottonii* is highly demanded internationally due to the better quality of *carrageenan* it produces.

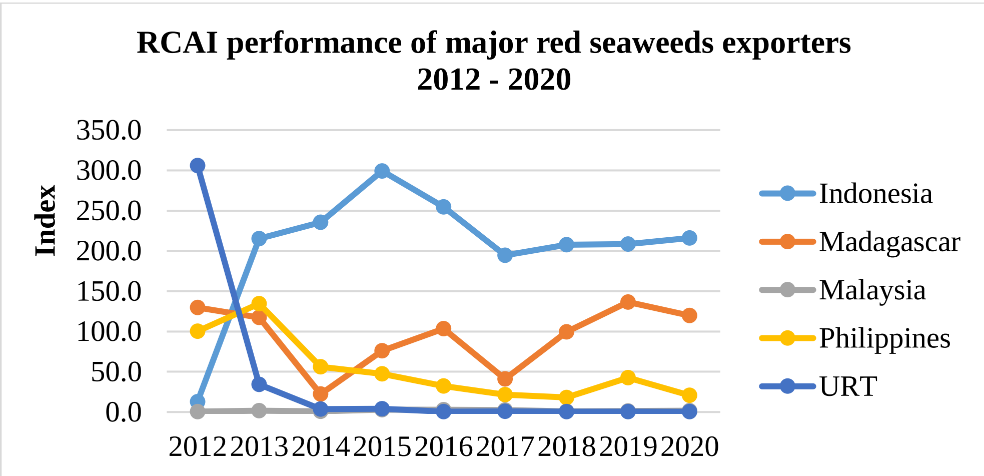


Figure 4.41: RCAI indices performances of major red seaweeds exporters 2012 – 2020. Note: Revealed Comparative Advantage (range 0-+∞) (**Source:** computations based on trade data from UN COMTRADE and UNCTAD STAT websites)

4.2.8.4 Competitive Index

From the figure below, it can be observed that Indonesia has maintained a highly competitive index red-seaweed market between 2012 and 2020. The

URT's, Malaysia and Madagascar indices have been omitted due to values being 0%, signifying a lack of competitiveness. The lack of competitiveness from the URT in red seaweed exports can be explained by the production failure of the higher variety of *cottonii* and volatile demand and supply forces existing at the global level.

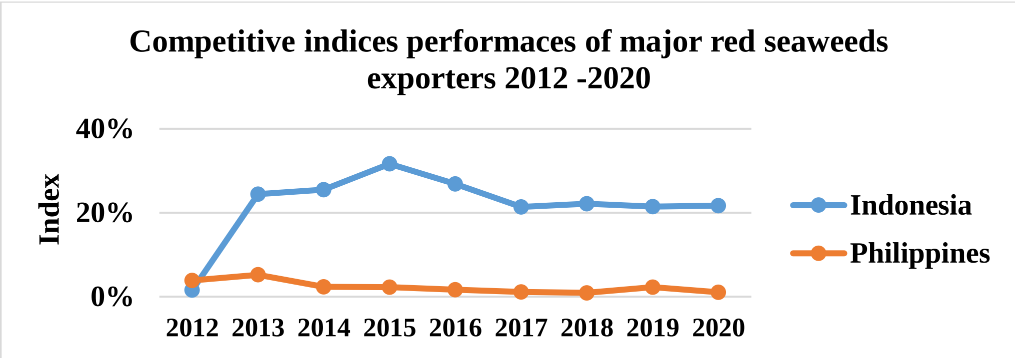


Figure 4.42: Competitive indices performances of major red seaweeds exporters 2012 – 2020. Note: Competitive Index (range: 0-100%) (**Source:** computations based on trade data from UN COMTRADE and UNCTAD STAT websites)

4.2.9 Regional comparisons of red seaweeds exports

As highlighted in the introduction part of this sub-section, Zanzibar trades in red seaweeds, specifically *Kappaphycus* and *Eucheuma (cottonii/spinosum)* species. Hence, an analysis of similar trading partners/regions will be adopted in this section. According to the FAO report (2021), Asia and Africa are the leading producers and exporters of *cottonii/spinosum* seaweeds worldwide.

In 2019, Indonesia was the largest producer, contributing to ninety-eight per cent of world *Kappaphycus* and *Eucheuma* production with 11,491,956 tons. Regarding trade, China, Indonesia, Rep. of Korea and the Philipines were the largest exporters of seaweeds and seaweed-based hydrocolloids with trade values of US$ 578, 329, 320 and 252 million, respectively. Their contribution placed them at first, second, third and fourth positions, holding 21.79, 12.39, 12.08 and 9.52 percentile shares of world seaweed exports, respectively (FAO, 2021).

In Africa, URT (Zanzibar and mainland) was the leading producer, followed by Madagascar with the production of 106, 069 and 8865 tonnes, respectively, in 2019 (FAO, 2021). The production is, to a large extent, lower than their Asian competitors due to factor conditions differences, including the size of Waterland resources, climate conditions, and human labour availability.

Below is the regional analysis of *cottonii/spinosum* regional exports by leading world regions:

4.2.9.1 ASIA

From the figure below, it can be observed that between 2000 and 2002 Philippines was the leading exporter of *cottonii/spinosum* species in the region; however, from 2003 to 2020, the volume exported dropped significantly. The decline in export volume from the Philippines was due to a reduction in production hampered by outbreaks of diseases and political unrest in farming areas. The two challenges led to the Philippines being surpassed by Indonesia as the leading producer of carrageenan seaweeds around 2008 (Valderrama *et al*., 2013). Seaweed disease outbreaks. Indonesia then can be observed to have picked up in exports and consistently led the continent between 2003 and 2020.

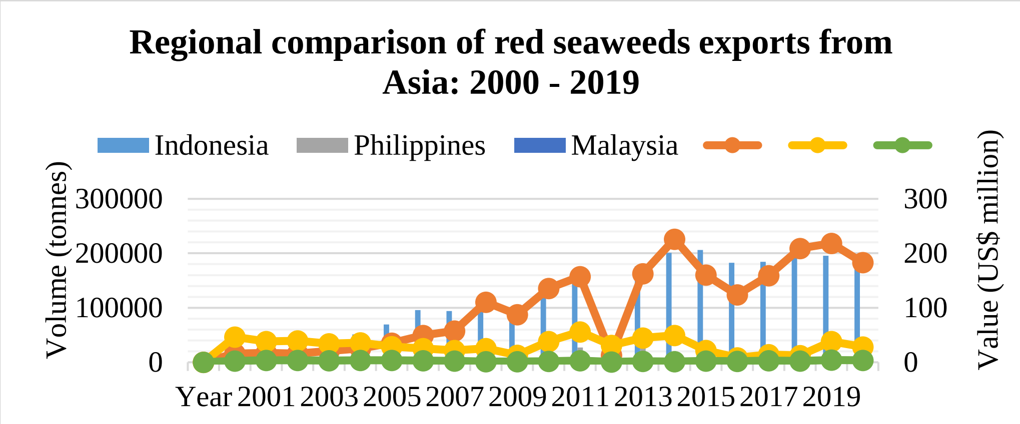


Figure 4.43: Regional comparison of red seaweeds exports from Asia: 2000 – 2019 (**Source:** UN COMTRADE, 2021)

Table 4.37: Growth rates analysis of major Asian red seaweeds exporters 2000-2020

	Indonesia		**Philippines**		**Malaysia**	
	Volume (%)	*Value (%)*	*Volume (%)*	*Value (%)*	*Volume (%)*	*Value (%)*
AGR (2000-2010)	19	28	-6	10	4	1
AGR (2011-2020)	100	100	11	17	34	20
CAGR (2000-2010)	18	24	-10	-2	-15	-3
CAGR (2011-2020)	1	2	-12	-7	2	2
GR (2000-2010)	100	100	-65	-18	-79	-27
GR (2011-2020)	14	16	-68	-49	19	17

Source: computations using data from UN COMTRADE, 2021

The above table shows that the average annual growth rates of exports volume for Indonesia and Malaysia stood at nineteen and four per cent, respectively. On the other hand, the Philippines' AAGR declined by six per cent between 2000 and 2010. Between 2011 and 2020, Indonesia had an AAGR of over a hundred per cent, while the Philippines and Malaysia's AAGR stood at eleven and thirty-four per cent, respectively.

Indonesia's compound annual growth rate (CAGR) stood at eighteen per cent between 2000 and 2010, while the Philippines and Malaysia experienced a decline in CAGR by ten and fifteen per cent, respectively. Between 2011 and 2020, Indonesia and Malaysia's CAGR were one and two per cent, respectively, while the Philippines' declined by twelve per cent.

Indonesia's growth rate between 2000 and 2010 was over one hundred per cent, while the Philippines and Malaysia's growth rates declined by sixty-five and seventy-nine per cent, respectively. Between 2011 and 2020, Indonesia and Malaysia's growth rates were fourteen and nineteen per cent, respectively, while the Philippines' growth rate declined by sixty-eight per cent.

The Philippines' export value led in the continent between 2000 and 2004 but experienced a decline from 2005 to 2020. Indonesia’s export values, on the other hand, picked up from 2005 to 2020 mainly due to scaled-up production and exports and; a decrease in exports from the Philippines.

The average annual growth rates of export values for Indonesia, the Philippines, and Malaysia stood at nineteen, ten, and four per cent, respectively. On the other hand, between 2011 and 2020, Indonesia had an AAGR of over a hundred per cent, while the Philippines and Malaysia’s AAGR stood at seventeen and twenty per cent, respectively.

Indonesia's compound annual growth rate (CAGR) stood at twenty-four per cent between 2000 and 2010, while the Philippines and Malaysia experienced a decline in CAGR by two and three per cent, respectively. Between 2011 and 2020, Indonesia's and Malaysia’s CAGR were two per cent, respectively, while the Philippines’ declined by seven per cent.

Indonesia’s growth rate between 2000 and 2010 was over one hundred per cent, while the Philippines and Malaysia’s growth rates declined by eighteen and twenty-seven per cent, respectively. Between 2011 and 2020, Indonesia and Malaysia’s growth rates were sixteen and seventeen per cent, respectively, while the Philippines' growth rate declined by forty-nine per cent.

4.2.9.2 AFRICA

In Africa, three significant countries produce and export the species above, i.e., URT, Madagascar, and Kenya (Cai *et al.,* 2021). Secondary data for comparison was obtained from the UN COMTRADE database under commodity classifications HS 121220, HS 121221 and HS 121229. Kenyan and South Africa data was insufficient to be included in the analysis. Hence it was omitted.

From the below figure, it can be observed that between 2000 and 2013, URT has consistently been the leading exporter of *Spinosum* and *Cottonii* species in volume. However, between 2013 and 2020, URT's export volume declined tremendously due to a decline in production. As explained in detail in section (i) of this chapter, home production has declined over time due to low prices and profits and the failure of cottonii to grow in Zanzibar due to environmental challenges.

Further, between 2000 and 2013, URT consistently was the leading exporter of *Spinosum* and *Cottonii* species in value. However, in 2013 it can be observed that there was a drop in export value from URT; the value picked up in 2014 sharply and dropped consistently from 2015 to 2020. On the other hand, Madagascar experienced a consistent rise in export value from 2015 to 2020 due to increased export volume.

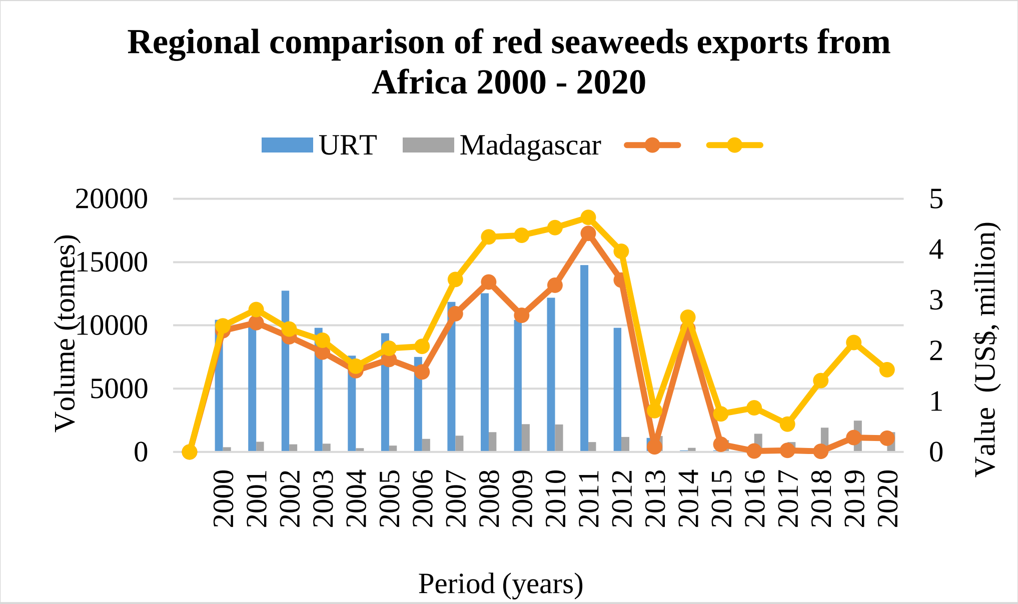


Figure 4.44: Regional comparison of red seaweeds exports from Africa 2000 – 2020 (**Source:** UN COMTRADE, 2021)

Table 4.38: Results of growth rates analysis of major red seaweeds exporters from Africa 2000-2020

	URT		**Madagascar**	
	Volume (%)	***Value (%)***	***Volume (%)***	***Value (%)***
AGR (2000-2010)	4	6	31	49
AGR (2011-2020)	-29	100	26	31

CAGR (2000-2010)	2	3	20	31
CAGR (2011-2020)	-55	-27	8	18
GR (2000-2010)	17	38	100	91
GR (2011-2020)	-94	-94	99	77

Source: computations using data from UN-COMTRADE, 2021

The table above reveals that the average annual growth rate (AAGR) of *cottonii/spinosum* export volume from URT between 2000 and 2010 stood at four per cent, while Madagascar's was thirty-one per cent. However, between 2011 and 2020, URT's AAGR declined by twenty-nine per cent, signifying a decline in export volume growth, while Madagascar had an AAGR of twenty-six per cent.

Compound annual growth rates (CAGRs) of URT and Madagascar's export volume stood at two and twenty per cent, respectively, between 2000 and 2010. On the other hand, there was a decline in the CAGR of URT's export volume between 2011 and 2020 by fifty-five per cent, while Madagascar's CAGR stood at eight per cent during the same period.

Growth rates of export volume between 2000 and 2010 stood at seventeen per cent in URT, while Madagascar's growth was over 100 per cent. On the other hand, between 2011 and 2020, URT declined export volume growth by ninety-four per cent, while Madagascar continued to experience growth of almost 100 per cent.

Similarly, the average annual rate (AAGR) of export value for URT between 2000 and 2010 stood at six per cent, while Madagascar stood at forty-nine per cent. On the other hand, between 2011 and 2020, URT's AAGR in export value grew by over 100 per cent, and Madagascar had an AAGR of thirty-one per cent.

Compound annual growth rates (CAGRs) of URT and Madagascar's exports stood at three and thirty-one per cent, respectively, between 2000 and 2010. On the other hand, there was a decline in the CAGR of URT's export value between 2011 and 2020 by twenty-seven per cent due to a reduction in export volume and production, while Madagascar's CAGR stood at eighteen per cent during the same period.

Growth rates of export volume between 2000 and 2010 stood at thirty-eight per cent in URT, while Madagascar's growth was ninety-one per cent. On the other hand, between 2011 and 2020, URT had declined export value growth rate of ninety-four per cent, while Madagascar continued to experience growth of about seventy-seven per cent.

Summary

This sub-section intended to analyse the trade performance of ZSI. Analysis of trade contributions of seaweeds to the URT's total merchandise exports revealed that in 2020 contribution stood at 53%, an increase from 17% in 2019. It was found that seaweeds were the leading cash crops between 2015 and 2020 in Zanzibar's GDP. Time series analysis of the seaweed production trends revealed a declining trend between 2010 and 2020. Similarly, forecasts showed a further decline in production between 2021 and 2025. The Holt-Winters exponential smoothing method was conducted to analyse ZSI's production trends. ZSI export data (volume and value) trends were analysed through the least square method, and results revealed an increasing trend. Forecasts for the same also showed a rising trend between 2021 and 2025. The increase in exports despite declining production is due to exports of surplus load unabsorbed in the domestic market.

Instability analysis of the production trends revealed that between 2010 and 2015, production trends had low instability, while between 2016 and 2021, there was high instability. Instability analysis of export trends revealed low instability for export volume and value between 2000 and 2010, while between 2010 and 2020, the trends revealed high instability. Leading buyers of ZSI seaweed were identified as Denmark, USA and Chile in descending order. Regional comparison of *cottonii/spinosum* exports revealed the Asian continent to be the largest producer and exporter, followed by Africa. Indonesia is the leading producer and exporter in Asia and the world of *cottonii/spinosum* (more than 80% market share), while the URT is leading in volume exported and produced but is behind Madagascar in export value performance in Africa.

Yearly analysis of market share position revealed that URT's market position shifted from 3rd to fifth between 2010 and 2013 and has remained in fifth yearly till 2020 behind Madagascar.

Export unit price performance of the major *cottonii/spinosum* exporters revealed URT's performance behind competitors between 2000 and 2013. The performance increased between 2014 and 2018, where URT prices were observed to be slightly higher than Madagascar's and Indonesia's before dropping against competitors between 2019 and 2020. World trade trends of *cottonii/spinosum* revealed an increasing demand between 2012 and 2020. Market concentration analysis for the *cottonii/spinosum* market revealed high concentration, i.e. the market is operating under oligopolistic market conditions. Analysis of trade indices revealed that URT's performance at the global level has been lagging behind competitors. URT was not found to have competitiveness in the exports of *cottonii/spinosum* (CI index = 0).

SECTION III

EXPORT MARKETING STRATEGIES OF ZANZIBAR'S SEAWEED INDUSTRY

4.3 Introduction

This section examines existing export marketing strategies of Zanzibar's seaweed industry. Export marketing strategies refer to marketing strategies adopted by companies for products that cross borders (overseas). Specifically, it is a broader term that embodies a mix of product development, pricing, promotion, distribution and entry strategies. Export marketing strategies are crucial in enhancing the export performance of companies and ensuring the companies' marketing goals and overall business objectives are met.

4.3.1 ZSI marketing strategies

Marketing strategies refer to an overall company/firm-specific plan of action to attract, reach, and retain potential customers/consumers of their products/services. Marketing strategies organically stem from a company/firm's value proposition and communicate to prospects what the business stands for and why prospects should consume such products or services (or the business' competitive advantages). They incorporate a mix of product, pricing, promotion and place/distribution strategies. Without a marketing strategy, a company can not achieve its intended goals/objectives. Marketing strategies are embedded in the overall business's marketing plan.

On the other hand, export marketing strategies refer to specific procedures adopted by companies/firms to attain their marketing goals/objectives in foreign markets. Morgan et al., 2012 define export marketing strategies as the resources and actions deployed by businesses to realize their intended export marketing strategy decisions in pursuit of desired export venture goals. This is achieved by tuning in internal company forces (physical, capital and human resources, technology, management) while factoring in the business's external environmental factors to specific objectives in a foreign target market.

No clearly outlined marketing plan or strategy was found within ZSI when this study was conducted. As elaborated in objectives (i) and (ii) of this study, the industry activities are personal affairs. However, for this study, ZSI, as already highlighted, since its output is mainly for exports, this study analyses ZSI exporters' marketing strategies rather than its farmers'.

Below findings narrate the marketing strategies of ZSI found at the time when this study took place;

4.3.2 Product Strategies

A product strategy outlines a specific business value proposition with what it aims to accomplish and how. Kotler and Keller (2015, p. 396) posit that a product strategy must address the five levels of product, i.e., core, basic, expected, augmented and potential product. Product strategies, according to the authors, include; differentiation (features/design, quality, reliability, durability, style, customisation), branding, packaging, labelling, guarantees and warranties. Both approaches are considered crucial responses to competitive rivalry in current business environments. According to the authors, product strategies increasingly occur at the augmented product level, where the offered value exceeds customers' expectations.

As already noted in the previous chapters, ZSI produces only two varieties of red seaweeds, i.e. *spinosum* and *cottonii*. Red seaweeds are a non-durable agricultural raw material used to extract *carrageenan*, a thickening gelling substance applied in a wide range of industries, including cosmetics, pet food, dairy, pharmaceuticals and fertilisers. Farmers produce the same variety across the island, and no specific product strategies were found to be applied.

On the other hand, seaweed exporters export dried raw seaweeds to *carrageenan* extractors in the US, Europe and Asia for further processing. Exporters apply *product adaptation* strategies at the global level, where consignments are customised according to the needs and requirements of foreign buyers.

4.3.3 Pricing strategies

According to Kotler and Keller (2015, p. 506), setting prices for products involves a five-step process, i.e., setting pricing objectives, estimating demand, and costs, analysing competitors' prices, costs and offers and selecting a pricing method. Several pricing strategies exist, including perceived value, geographical, value-based, target-return rate, promotional and everyday low pricing strategies (Kotler and Keller, 2015, p. 515-526).

The industry in Zanzibar is mainly a buyers' market where foreign buyers dictate buying prices and exporters negotiate around the offer prices. Hence, On the other hand, exporters were found to apply a mixture of cost-based and market-based pricing to foreign buyers. Seaweed farmers in Zanzibar do not have any pricing strategies for their produce. Instead, they rely on collection centres' price offers based on prevailing market prices at the global level as determined by exporters.

4.3.4 Promotion strategies

Farmers were found to apply no promotional strategies for their output. However, as already noted, at the individual level, exporters follow personal selling via sales representatives (e.g., collection centres and agents of exporters).

4.3.5 Distribution strategies

Kotler and Keller (2015, p. 648) define marketing channels as sets of independent organisations that ensure the availability of goods and services for consumption. A channel, in essence, moves goods/services from producers to consumers. According to the authors, channels may be merchants, brokers, manufacturers/producers' representatives, sales force, sales agents, wholesalers and retailers. Channels have a significant impact on the success of a business and its overall marketing decisions.

ZSI utilises *two-level* marketing channels, i.e., collection centres and seaweed exporters. Collection centres are the intermediaries between the farmers and seaweed exporters. Collection centres buy at farm gates, collect and store harvested dried seaweeds until set quotas are achieved. The accumulated load is then transported to seaweed exporters in Zanzibar-urban. When this study was conducted, collection centres were found in almost all villages surveyed in Unguja and Pemba. In Unguja, all collection centres surveyed belonged to ZANEA seaweed exporting company, while C-WEED exporters owned all collection centres in Pemba. Seaweed exporters in Zanzibar-urban collect and ship the harvested dry seaweed from their collection centres to *carrageenan* extractors (companies) in Europe, US and Asia.

4.3.6 Entry market strategies of ZSI's exporters

The table below reveals that exporters' selection of international markets for seaweed is based on historical relationships to a large extent. Other selection methods include personal visits, business experience, and analysis of the company's potential in a particular export market. On sources of information for which markets to pursue, most companies use past sales records, own company investigations, company personnel and export agents. Entry strategies for the majority of the exporters include direct exporting to a large extent, and only one company was found to have used indirect exporting.

Overall, given the nature of the seaweed business between URT and the world, the exporters have little control over their export marketing strategies. There are only about eight known buyers (*carrageenan* processors globally). Moreover, in the context of URT, the buying process is from company to company based on historical relationships. Therefore, even if there is fluctuation in the global seaweed markets, the buyers still buy from Zanzibar's exporters even if the prices are relatively higher than Asian producers (source: C-WEED Co. ltd CEO).

Table 4.39: Market entry strategies of the selected seaweed exporters

Exporter	Selection of markets	Source of market information	Foreign market entry strategies
ZANEA	Historical relationships Personal visits	Own company investigations Past sales records	Direct exporting to overseas processors
C-WEED	Historical relationships	Historical relationships	Direct exporting to overseas processors
Kisiwani	Historical relationships Business experience	Past sales records Company personnel Export agents	Indirect exporting through sales brokers/commissioned agents
LEDO	Historical relationships Business experience Analysis of the company's potential in prospective export markets	Past sales records Own company investigations Industry associations and stakeholders	Direct exporting to foreign processors

Source: Primary data

4.3.7 Measuring the perceived effectiveness of export marketing strategies adopted by the seaweed exporters

Measuring marketing strategies' effectiveness was done through a five-point Likert scale ranging from one to five (very ineffective to very effective). For purposes of measurement, the export marketing strategies were further categorised into the following sub-categories:

- Export marketing strategies (mix) effectiveness
- Export market screening effectiveness
- STP strategies implementation effectiveness
- Internal implementation effectiveness
- External implementation effectiveness

The sub-categorisation and operationalisation of each specific strategy were adapted from Morgan *et al.*, (2012). Analysis was done using perceived effectiveness score (PES) expressed in percentage.

4.3.7.1 Export marketing mix strategies effectiveness

In this section, export marketing mix strategies effectiveness is defined as the likelihood that the export marketing mix strategies adopted had a persuasive impact on foreign buyers. The table below summarises the exporters' effectiveness scores on their export marketing strategies. The strategies are further categorised into; product, pricing, product, channel, delivery, post-sale service, marketing communication and selling and measure their effectiveness as follows:

4.3.7.2 Product strategies effectiveness

The table below shows the results of the product strategies' effectiveness analysis. Product strategy effectiveness refers to the likelihood that product strategies adopted by exporters have a persuasive impact on foreign buyers. The effectiveness score was highest in product packaging, conforming to buyers' specifications (PES=45). On the contrary, the least effectiveness score was observed in statements three and four, i.e., Successfully launching new export products (PES=20) and Setting aside R&D investment funds to develop a new export product (PES=20).

Table 4.40: Perceived effectiveness scores for product strategies

Statements		***Total scores***	***PES (%)***	***Rank***
i.	Export product attributes conform to international standards	8	40	2
ii.	Product packaging conforming to buyers' specifications	9	45	1
iii.	Successfully launching new export products	4	20	3
iv.	Setting aside R&D investment funds to develop new export product	4	20	3
Composite score		**25**	**31.25**	-

Source: Primary data

4.3.7.3 Pricing strategies effectiveness

The table below shows the results of the pricing strategies' effectiveness analysis. Pricing strategy effectiveness refers to the likelihood that the pricing strategies adopted by exporters have a persuasive impact on foreign buyers. The effectiveness score was highest in exporters using pricing skills to respond quickly to foreign buyers' needs and changes (PES=75). However, the effectiveness score was least in bundling pricing deals (PES=60).

Table 4.41: Perceived effectiveness scores for pricing strategies

	Statements	***Total scores***	***PES (%)***	***Rank***
i.	Doing an effective job of pricing the company's products	13	65	2
ii.	Using the company's pricing skills to respond quickly to foreign buyers' needs and changes	15	75	1
iii.	Communicating pricing structures to foreign buyers	13	65	2
iv.	Being creative in "bundling" pricing deals	12	60	4
Composite score		**53**	**66.25**	**-**

Source: Primary data

4.3.7.4 Channel management strategies' effectiveness

The table below shows the effectiveness analysis of the channel management strategies. Channel management strategy effectiveness refers to the likelihood that the channel management strategies adopted by exporters have a persuasive impact on foreign buyers. The effectiveness score was highest in exporters' ability to satisfy distributors' needs (PES=100) and develop close relationships with distributors overseas (PES=95). However, effectiveness was least in exporters' ability to add value to distributors' business (PES= 75).

Table 4.42: Perceived effectiveness scores for channel management strategies

Statements	Total scores	PES (%)	Rank
i. Attracting and retaining the best distributors	18	90	3
ii. Satisfying the needs of distributors	20	100	1
iii. Closeness in working with distributors	19	95	2
iv. Adding value to distributor's businesses	15	75	4
Composite score	**72**	**90**	**-**

Source: Primary data

4.3.7.5 Delivery management effectiveness

The table below shows the effectiveness analysis of the delivery management strategies. Delivery management strategy effectiveness refers to the likelihood that the delivery management strategies adopted by exporters have a persuasive impact on foreign buyers. The effectiveness score was highest in the timely delivery of products (PES=83), and meeting delivery promises to foreign buyers (PES=80). However, the effectiveness score was low in exporters, making it easy for the company's products to be returned when foreign customers are unsatisfied (PES=70).

Table 4.43: Perceived effectiveness scores for delivery management strategies

Statements	Total scores	PES (%)	Rank
i. Timely delivery of products	33	83	1
ii. Making it easy for products to be returned	14	70	3
iii. Meeting delivery promises to foreign customers	16	80	2
Composite score	**63**	**79**	-

Source: Primary data

4.3.7.6 Post-sale services strategies effectiveness

The table below shows the results of the post-sale service strategies' effectiveness analysis. Post-sale services strategy effectiveness refers to the likelihood that the post-sale service strategies adopted by exporters have a persuasive impact on foreign buyers. The effectiveness score was highest in delivering high-quality after-sale services (PES=100) and attracting and retaining after-sales personnel (PES=95). However, the effectiveness score was least in responding quickly to service requests of customers (PES=55).

Table 4.44: Perceived effectiveness scores for post-sale service strategies

Statements	***Total scores***	***PES (%)***	***Score***
i. Delivering high-quality after-sale service overseas	20	100	1
ii. Attracting and retaining after-sale service personnel	19	95	2
iii. Training after-sale service personnel	17	85	3
iv. Responding quickly to service requests of customers	11	55	4
Composite score	**67**	**84**	**-**

Source: Primary data

4.3.7.7 Marketing communications strategies effectiveness

The table below shows the results of the marketing communication strategies' effectiveness analysis. Marketing communication strategies' effectiveness refers to the likelihood that the marketing communication strategies adopted by exporters have a persuasive impact on foreign buyers. The effectiveness score was highest in developing effective export advertising (PES=60) and promotion programs and in advertising and promotion creativity (PES=60). However, the effectiveness score was least in skilfully using marketing communications (PES=45).

Table 4.45: Perceived effectiveness scores for marketing communication strategies

Statements		*Total scores*	*PES (%)*	*Rank*
i.	Developing effective export advertising and promotion programs	12	60	1
ii.	Advertising and promotion creativity	12	60	1
iii.	Skilfully using marketing communications to attract customers	9	45	4
iv.	Effectively managing marketing communications programs overseas	10	50	3
Composite score		**43**	**53.75**	-

Source: Primary data

4.3.7.8 Selling strategies effectiveness

The table below shows the results of the selling strategies' effectiveness analysis. Selling strategies' effectiveness refers to the likelihood that the selling strategies adopted by exporters have a persuasive impact on foreign buyers. The effectiveness score was highest in the selling skills of companies' salespeople (PES=95) and in export sales management skills (PES=90). The effectiveness score was least in providing effective sales support to the sales force and distributors (PES=80).

Table 4.46: Perceived effectiveness scores for selling strategies

Statements		*Total scores*	*PES (%)*	*Rank*
i.	The selling skills of the company's salespeople	19	95	1
ii.	Retaining good export salespeople and sales managers	17	85	3
iii.	Providing effective sales support to the sales force and distributors	16	80	4
iv.	Export sales management skills	18	90	2
Composite score		**70**	**87.5**	-

Source: Primary data

Figure 4.45: Summary scores for export marketing strategies' perceived effectiveness (Source: primary data)

From the above table, it can be observed that channel management, selling and post-sale services strategies were found to have attained the highest effectiveness scores of 90, 88, and 84, respectively, whilst product strategies were found to have the least effectiveness score (PES=31). The product strategies score can be explained by the fact that the seaweed export product from Zanzibar is exported in its raw form, being an industrial raw material for *carrageenan* extraction; hence minimal manipulation is performed on the actual product. Exporters mainly monitor moisture content (35%) and ensure that product is exported with less than two per cent impurities.

Table 4.47: Kendall's W Coefficient of Concordance results for perceived effectiveness of export marketing mix strategies

N	4
Kendall's W	.708
Chi-square	65.158
df	23
Asymp. Sign.	.000

Source: Primary data

Kendall's W test results above reveal a high degree of agreement (0.71) among exporters regarding the perceived effectiveness of the export marketing mix strategies.

4.3.7.9 Export market screening capabilities' effectiveness

Market screening capabilities refer to an ability of a business to evaluate potential markets' compatibility with business vision and goals. This process involves conducting situational analysis, acquiring, screening and interpreting market information and disseminating the processed data to relevant departments within the company/business for action-taking. Below is the summary of exporters' self-evaluation on the effectiveness of their market screening strategies capabilities:

4.3.7.10 Market planning strategies capabilities' effectiveness

The table below shows the results of the market planning strategies' effectiveness analysis. The effectiveness score was highest in planning and executing export market research (PES=100) and least in formulating creative export marketing strategies (PES=60).

Table 4.48: Perceived effectiveness scores for market planning strategies

Statements	*Total scores*	*PES (%)*	*Rank*
i. Planning and executing situational analysis of internal and external market conditions	18	90	3
ii. Planning and executing export marketing research	20	100	1
iii. Strategic planning, implementation, and control	18	90	3
iv. Setting clear export marketing goals	19	95	2
v. Formulating creative export marketing strategies	12	60	5
Composite score	**87**	**87**	-

Source: Primary data

4.3.7.11 Market information acquisition

The table below shows the results of the market information acquisition strategies' effectiveness analysis. The effectiveness score was highest in exporters quickly learning about changes in export customer preferences (PES=75) and least recognised in discovering competitor strategies and tactics (PES=40).

Table 4.49: Perceived effectiveness scores for market information acquisition strategies

Statements		***Total scores***	***PES (%)***	***Rank***
i.	Being able to locate information about potential customers from primary, secondary, internal, and external data sources	11	55	2
ii.	Quickly learning about changes in export customer preferences	15	75	1
iii.	Discovering competitor strategies and tactics	8	40	4
iv.	Gaining insights about the marketing from distributors and the channel	10	50	3
v.	Using multiple information sources to learn about competitors	10	50	3
Composite score		**54**	**54**	-

Source: Primary data

4.3.7.12 Market information interpretation

The table below shows the results of the market information interpretation strategies' effectiveness analysis. The effectiveness score was highest in identifying emerging trends in the export marketplace (PES=100) and least in integrating all available information to gain insights into the export market (PES=65).

Table 4.50: Perceived effectiveness scores for market information interpretation strategies

	Statements	*Total scores*	*PES (%)*	*Rank*
i.	Integrating all available information to gain insights into the export market	13	65	4
ii.	Combining new information with past research to build a richer market view	18	90	2
iii.	Analysing market information to understand the export market effectively	17	85	3
iv.	Identifying emerging trends in the export marketplace	20	100	1
	Composite score	**68**	**75**	-

Source: Primary data

4.3.7.13 Market information dissemination

The table below shows the results of the market information dissemination strategies' effectiveness analysis. The effectiveness score was highest in sharing available market information widely within the company (EI=100) and ensuring export market information reaches all interested parties (EI=100). However, the effectiveness was least in giving other units in the firm easy access to the company's export market information (EI=50).

Table 4.51: Perceived effectiveness scores for market information dissemination strategies

	Statements	*Total scores*	*PES (%)*	*Rank*
i.	Making relevant export market information available to decision-makers	20	100	1
ii.	Sharing available market information widely within the company	20	100	1
iii.	Ensuring export market information reaches all interested parties	17	85	3
iv.	Giving other units in the firm easy access to our export market information	10	50	4
	Composite score	**67**	**84**	-

Source: Primary data

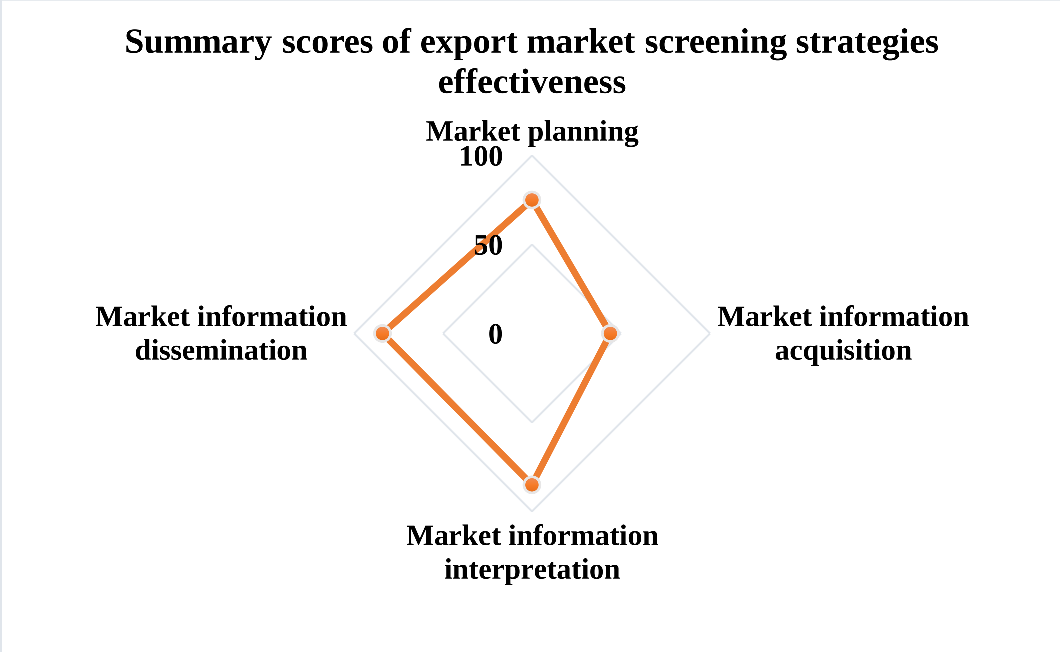


Figure 4.46: Summary scores of export market screening strategies' perceived effectiveness (Source: primary data)

The above figure shows that market planning strategies have the highest effectiveness score (85) among seaweed exporters. In contrast, market information acquisition strategies had the lowest effectiveness score (44). The result reveals that exporters are facing challenges with acquiring market information. Therefore, the result is a direct call to academia in Zanzibar and the URT, in general, to assist with researching and disseminating the global seaweed market trends to the exporters.

Table 4.52: Kendall's W Coefficient of Concordance results for perceived effectiveness of export market screening strategies

N	4
Kendall's W	.761
Chi-Square	51.778
df	17
Asymp. Sig	.000

Source: Primary data

Kendall's W test results revealed a high degree of agreement among exports (0.76) concerning the perceived effectiveness of export market screening strategies.

4.3.7.12 Segmentation, Targeting and Positioning (STPs) strategies implementation effectiveness

STPs strategies are adaptative strategies where markets are partitioned based on several factors (e.g., benefits sought by consumers, the behaviour of the consumers) to identify suitable segments which the company can target/serve by creating a specific mix of product, price, place and promotion to meet their particular needs/wants. Another way of defining it is the process by which companies partition markets to identify suitable segments of which they can have competitive advantages in serving over rivals. In the context of ZSI, foreign markets are selected based on the availability of *carrageenan* extractors. For most companies surveyed except LEDO, foreign buyers have remained the same since the establishment of the industry.

STPs implementation strategies measure the effectiveness of the STPs implemented by the exporters in terms of their ability to have a persuasive impact on foreign buyers. The table below shows that the highest effectiveness score reached the potential market segments identified by the exporter (PES=80). The effectiveness score was least in exporters' ability to conceptually distinguish markets abroad using set criteria that are distinct and actionable (PES=30). The above results reveal the need for marketing academia in the URT to assist the exporters with research and dissemination of market information with regard to the global seaweed industry trends and overall unexplored markets for URT’s seaweed exports.

Table 4.53: Perceived effectiveness scores for STP implementation strategies

S/N	*Statements*	*Total scores*	*PES (%)*	*Rank*
1	The company can effectively identify potential country-based or individual consumer groups	15	75	2
2	The company can effectively measure and estimate the size and purchasing power of the potential foreign consumers	9	45	4
3	The company can conceptually distinguish markets abroad using set criteria that are distinct and actionable	6	30	5
4	Potential market segments identified by the company can effectively be reached and served	16	80	1
5	The company has developed an effective marketing mix elements programs/value proposition for attracting and serving identified potential segments	10	50	3
	Total Composite score	**56**	**56**	**-**

Source: Primary data

Table 4.54: Kendall's W Coefficient of Concordance results for perceived effectiveness of STP strategies

N	4
Kendall's W	.536
Chi-Square	8.571
Df	4
Asymp. Sig.	.073

Source: Primary data

From the above results, it can be observed that there is a moderate level of agreement (0.51) among exporters concerning STPs implementation strategies' effectiveness.

4.3.7.15 Internal and external implementation capabilities' effectiveness

According to Morgan et al., (2012), internal implementation capabilities refer to a business's ability to use its available resources to translate its intended export marketing strategy decisions into realized export marketing actions. The capabilities measure alignment between a business' marketing decisions and deployed resources to realise the same. In contrast, the authors define external marketing strategy implementation as the extent to which the company's recognised export marketing actions and resource deployments are received in the marketplace.

Table 4.55: Kendall's W test statistic results for internal and external marketing strategy implementation (a)

Strategy	***Statements***	***Mean rank***	***Rank***
Internal Marketing Strategy Implementation	a. We have effectively executed the actions detailed in the exporters' export marketing plan	2.13	4
	b. We have deployed the resources needed to make exporters' export marketing strategy work	4.00	3
	c. Rewards in our company are linked to the requirements of exporters' export marketing plan	4.75	2
	d. Our monitoring/control system is well aligned with the needs of exporters' export marketing plan	5.63	1
External Marketing Strategy Implementation	a. The export market channel has been less enthusiastic in supporting exporters' current export strategy than we anticipated	2.38	2
	b. The current export strategy is being received in ways consistent with delivering on its planned objectives	2.25	3
	c. The marketplace has not responded to exporters' current export marketing strategy in the way we intended	6.88	1

Source: Primary data

From the table above, it can be inferred that in the internal implementation capabilities effectiveness category, the exporters' monitoring/control system is well aligned with the needs of their export marketing plan and scored the highest mean rank of 5.63. On the contrary, exporters' effective execution of the actions detailed in their export marketing plan scored the least (MR=2.13). The results reveal that exporters have failed to use their internal resources to meet their export marketing decisions. The reasons behind this can be a shortage of funds or a lack of willingness to commit to the export marketing plan by the top management.

On the other hand, in the external implementation capabilities effectiveness category, the highest mean rank was realised in the marketplace not responding to exporters' current export marketing strategy in the way intended (6.88) and least in the export market channel been less enthusiastic in supporting exporters' current export strategy than anticipated (2.38). The foreign buyers not responding as predicted by the exporters reveal that perhaps there is a need for more creative promotion of URT's seaweed exports which requires a financial commitment and willingness of top management. Separate budgets for advertising and promotion should be drafted and set aside to enable the company's salespeople/marketing team to implement the company's export marketing plan.

Table 4.56: Kendall's W test statistic results for internal and external marketing strategy implementation (b)

N	4
Kendall's W	.807
Chi-Square	19.376
df	6
Asymp. Sig.	.004

Source: Primary data

From the table results above, it can be observed that there is a high degree of agreement among exporters (W=.807) concerning internal and external marketing strategies implementation capabilities' effectiveness.

Summary

This sub-section evaluated the export marketing strategies of ZSI. Seaweed farmers were found to apply no specific product strategies; however, exporters were found to apply product adaptation strategies at the global level, where consignments are customised according to the needs and requirements of foreign buyers. Seaweed farmers in Zanzibar do not have any pricing strategies for their produce. On the other hand, exporters were found to apply a mixture of cost-based and market-based pricing to foreign buyers. Personal selling was the promotional strategy for communicating ZSI's value proposition to foreign buyers.

ZSI utilises two-level marketing channels, i.e. collection centres and seaweed exporters. Collection centres are the intermediaries between the farmers and seaweed exporters. Entry strategies applied by the seaweed exporters' were found to be direct and indirect exporting based on historical relationships to a large extent. Other selection methods include personal visits, business experience, and analysis of the company's potential in a particular export market. On sources of information for which markets to pursue, most companies use past sales records, own company investigations, company personnel and export agents.

Effectiveness analysis of the industry's existing export marketing strategies revealed that channel management strategies had the highest score while product strategies had the least score. Among the market screening strategies, market planning strategies had the highest effectiveness score, while market information acquisition had the lowest score. STPs strategies implementation results revealed that the effectiveness score was highest in exporters being able to identify potential country-based or individual consumer groups effectively and reach the same while being able to conceptually distinguish the markets based on a set of distinct and actionable criteria scored least. Internal implementation capabilities effectiveness results revealed that the exporters' monitoring/control system is well aligned with the needs of their export marketing plan and scored the highest mean rank. In contrast, exporters' effective execution of the actions detailed in their export marketing plan scored the least. On the other hand, in the external implementation capabilities effectiveness category, the highest mean rank was realised in the marketplace not responding to exporters' current export marketing strategy in the way intended and least in the export market channel been less enthusiastic in supporting exporters' current export strategy than anticipated.

SECTION IV

CONSTRAINTS FACED BY SEAWEED FARMERS AND EXPORTERS IN ZANZIBAR

This sub-section intends to identify and expound on the challenges facing seaweed farmers and exporters in Zanzibar. It is subdivided into two: constraints faced by the farmers and constraints faced by seaweed exporters. Data was collected through pre-tested schedules and analysed through the Garrett ranking technique.

4.4 Constraints faced by seaweed farmers

Constraints faced by farmers were categorised into the following eight sub-groups:

i. C1: Government policy-related constraints
ii. C2: Production-related constraints
iii. C3: Post-harvest constraints
iv. C4: Financial constraints
v. C5: Physical infrastructure constraints
vi. C6: Marketing constraints
vii. C7: Value-addition constraints
viii. C8: Environment-related constraints

Data collected from farmers were analysed through the Garret ranking technique, and the outcome was as follows:

4.4.1 Government policy-related constraints

The role of government constraints examines the role played by the RGoZ in either promoting or hindering the smooth running of ZSI activities. The following were the results:

Table 4.57: Garrett scores results for government policy-related constraints

Constraints		Unguja		Pemba		Zanzibar	
		GS	*R*	*GS*	*R*	*GS*	*R*
i.	Limited provision of training on cultivation techniques, processing and marketing of seaweed	31.12	7	20.86	7	25.99	7
ii.	Limited provision of credit to farmers	74.12	1	40.25	5	57.19	4
iii.	Limited provision of farming implements	66.64	2	68.62	2	67.63	1
iv.	Limited government procurement and trading of seaweed	44.24	5	84.2	1	64.22	2
v.	Under-development of seaweed marketing infrastructure, grading, and standardization protocols	34.52	6	33.24	6	33.88	6
vi.	Absence of established efforts and measures geared towards preventing the exploitation of farmers	59.4	3	66.4	3	62.9	3
vii.	Absence of special schemes to support the farming practice	44.56	4	62.8	4	53.68	5

Source: Primary data **Notes:** GS: Garrett score; R: Rank

The table above reveals that limited provision of credit to farmers was ranked highest among farmers in Unguja (Garrett score 74.12). In contrast, limited government procurement and trading of seaweed ranked first in Pemba (Garrett score 84.2). Overall, the limited provision of farming implements was the uppermost challenge for the seaweed farmers in Zanzibar (Garrett score 67.63).

In the case of farmers in Unguja, their utmost cry is for the need for credit and farming implements to help improve seaweed farming productivity. Most farmers are interested in expanding their farms; however, they are constrained by capital requirements to buy tie ties, ropes, tents, and other relevant inputs for farming activity. Most seed and growth capital for farmers in Unguja originates from personal savings or spouses.

There are limited self-help groups in most that can provide credit to seaweed farmers. The RGoZ, through its ministry of Blue Economy and Fisheries, assists with farming inputs only (tie ties, ropes) but not capital. There are other non-governmental institutions such as ZASCI, TASAF, seaweed exporters, and other industry stakeholders who, from time to time, assist with farming inputs as well, but not capital. Hence the need for government intervention in capital provision is vital in Unguja.

On the other hand, farmers in Pemba, apart from expressing their need for additional farm inputs, face the challenge of overproducing seaweed due to running relatively larger farms than Unguja. Moreover, as discussed earlier in this chapter, the trading of seaweed by exporters is conducted based on quotas. Once such limits are achieved, farmers can not sell but instead wait for the next circle or individual private buyers (rare and seasonal). Hence, most farmers end up with a large volume of untraded seaweed in their homes, which ties up their seed and growth capital and constrain their ability to repay farming loans. Therefore, the main outcry of farmers in Pemba is for the government to develop a mechanism to absorb the large volume of untraded seaweed sitting idle in their homes to have liquid cash for other farming and be able to repay farming loans.

Further, the lack of government efforts and measures geared towards preventing the exploitation of farmers was ranked as the third constraint faced by farmers from both islands. The challenge has been the main outcry throughout the existence of the farming practice. Farmers complain about receiving low prices from exporters. The average price paid per kilogram of dry seaweed in Unguja is Rs. 42.51, while in Pemba is Rs. 16.83. Two significant factors can explain the differences; the exporters on each island and the volume produced. ZANEA Co. Ltd is the leading buyer in Unguja, while C-WEED is the top buyer in Pemba. Farmers also get paid, on average, Rs. 32.9 per kg of *cottonii* due to its scarce availability.

The low price paid in Pemba results from an oversupply of seaweed. Despite several Pemba farmers' complaints, C-WEED company has consistently paid low prices to Pemba farmers. Therefore, there is a need for a quick intervention from the RGoZ to establish policies that will outline the minimum buying price of seaweed from farmers to protect them from the exploitative nature of some exporters and shelter them against world price fluctuations of seaweed. Another significant constraint farmers from both islands face regarding the limited role of the RGoZ is the absence of the industry's special schemes to support the growth and productivity of the farming practice. For example, it has been noted that despite the seaweed industry being the third revenue generator in Zanzibar, it does not have any special schemes to support its growth, development, and transformation, unlike the cloves industry, which has set policies in place to protect it.

As a result, the seaweed industry in Zanzibar has mainly remained traditional compared to competitors in Asia. This challenge has resulted in the inability of ZSI to increase its profit margins and command better price offers at the international level.

4.4.2 Production constraints

Production constraints examine production-related challenges faced by the farmers, and the following were the results:

Table 4.58: Garrett scores results for production-related constraints

Constraints		Unguja		Pemba		Zanzibar	
		GS	***R***	***GS***	***R***	***GS***	***R***
i.	Farming inputs costs	55.84	4	57.9	2	56.87	3
ii.	Labour costs	41.72	5	48.62	4	45.17	4
iii.	Labour availability	37.24	6	47.86	5	42.55	6
iv.	Lack of knowledge about the latest farming methods	65.08	2	78.8	1	71.94	1
v.	Product quality challenges	65.56	1	54.84	3	60.2	2
vi.	Stealing planted seaweed	33.2	7	35.4	6	34.3	7
vii.	Conflicts with hoteliers	61.44	3	23.64	7	42.54	5

Source: Primary data **Notes:** GS: Garrett score; R: Rank

The table above reveals that the product-quality challenge is the most high-ranked production-related constraint in Unguja. In contrast, farmers in Pemba ranked a lack of knowledge about the latest farming methods as their first constraint. Lack of knowledge about the latest farming methods was ranked second by farmers in Unguja, while farming inputs costs were the second most high-ranked production-related challenge in Pemba. Finally, conflicts between hotel owners and farmers were ranked third by farmers in Unguja. In contrast, farmers from Pemba ranked product-quality challenges as the third production-related constraint.

It has been noted throughout the existing seaweed literature in the URT that, Unguja has been experiencing growth challenges due to climate change (raised temperatures, high tides), epiphytes, and other seaweed-related diseases. In addition, this trend has affected the quality and volume of seaweed produced in Unguja, which is predominantly *spinosum*, due to the failure of the growth of *cottonii* post the late 2000s. One can also argue that, given that Unguja is predominantly tourist-oriented and much of its land has been allocated to hotels, the hotel waste released directly into the sea causes seaweed growth intolerance.

This study identified areas where seaweed has failed to grow, such as Bweleo (West Unguja), Unguja-Mkuu, and Pongwe in Central Unguja. The failure of seaweed to thrive was observed in shallow waters; however, seaweed experts from IMS Zanzibar elaborated that seaweed might grow in deeper waters but require specific boats and appropriate farming clothing items for the farmers, which need enough capital to invest. In addition, deep waters farming requires farmers to know swimming which becomes a challenge since women of older age groups run the activity to a large extent. Nevertheless, Pemba island faces fewer environmental attacks than Unguja since the area can still produce large quantities of seaweed per season (twice as much as Unguja) and is more fertile than Unguja. Areas facing seaweed growth challenges include Kichungwani, Kwa Mjibwa, and Kidutani in South Pemba.

Further, almost all villages visited in both Unguja and Pemba expressed their need for training on new methods of farming seaweed that will tackle environmental attacks and maximize outputs. However, as noted previously, production methods remain predominantly traditional. Farmers in Unguja, specifically in Kikungwi, Kajengwa, Pwani-Mchangani, Kiongoni, and, Nganani, have expressed their complaints about local hotel owners who deal with contempt for them. Local hotel owners, predominantly of foreign origin, disregard the farming practice and have consistently asked farmers to relocate to other areas. When farmers have disputed this, the hotel owners will destroy the seaweed plants at night because they consider seaweed aesthetically displeasing scenery to tourists/hotel guests. This issue of farmers versus hotel owners is complicated since the government has been silent on helping farmers find new farming areas or fine hotel owners. Interestingly, the RGoZ has been putting more effort into promoting tourism in Unguja. It is noteworthy that tourism is the number one source of revenue in Zanzibar.

Further, given how one engages in this farming practice by simply locating a free open coastland nearby, most of the natural or traditional roads leading to the beaches have been fenced by hotel owners. Hence, current and potential seaweed farmers must travel on longer routes to circumvent the fenced roads to reach their farms. Farmers especially feel this challenge during harvests when they must carry harvested produce back to their houses or collection centres. This has been a nuisance for the local farmers and a continuous cry towards local government authorities. However, the rules have remained silent on the matter. Hence, government intervention is required to assist the local farmers in these areas and prevent further conflicts.

Farming input costs have been a cry for farmers from both islands. Given the limited returns seaweed farmers from each island earn, the attention to maximising their returns has been by cutting down expenses on farming inputs. Unfortunately, this initiative has rendered farmers to create locally made tieties, sheds, and ropes due to their high costs in the market. However, the locally-made inputs have been proving unsustainable over time as they have diminished quality. They also affect output at the end of the production period. Even though this study found that some government and non-governmental institutions and exporters provide farming inputs from time to time, the number of inputs provided still does not meet the farmers' needs. Therefore, a need for more assistance with farming inputs or capital to procure them still exists.

Further, farmers in Unguja are faced with the problem of stealing planted seaweed. Since most farmers live far from the coast and the beach farms are left without guards at night, they find many of their plants stolen in the mornings. This trend affects output volume and destroys remaining plants when thieves uproot without care. Therefore, there is a need to establish local farmers' groups to include beach farm security as a priority. Overall, the leading production-related challenge was a lack of knowledge about the latest farming methods, which was ranked first, followed by product quality challenges and farming input costs at second and third positions, respectively.

4.4.3 Post-harvest constraints

Post-harvest constraints examine challenges faced by the farmers after harvesting their crops, and the following were the results:

Table 4.59: Garrett scores results for post-harvest constraints

Constraints	Unguja		Pemba		Zanzibar	
	GS	***R***	***GS***	***R***	***GS***	***R***
i. Lack of storage facilities	60.92	3	71.6	3	66.26	3
ii. Lack of drying areas	67.84	2	72.84	2	70.34	2
iii. Lack of processing facilities	72.36	1	82.6	1	77.48	1

Source: Primary data **Notes:** GS: Garrett score; R: Rank

The table above reveals lack of processing facilities was ranked first by farmers from Unguja and Pemba. Further, the lack of drying areas was ranked second by Unguja farmers, while the lack of storage facilities was a second-ranked post-harvest constraint for farmers in Pemba. Finally, the lack of storage facilities was ranked last by farmers in Unguja, and the lack of drying facilities was ranked last by farmers in Pemba.

Processing of seaweed in Zanzibar is small-scale in the form of value-addition, done mainly by ZASCI and a few seaweed groups at the village level.

Efforts to establish a seaweed processing facility in Pemba by the collaboration of RGoZ and UNIDO commenced with feasibility studies in 2013, but unfortunately, the project was unable to pick up. Considering the nature of the seaweed business at the international level, most farmers usually remain with large bags of dried seaweed at home due to limited demand. Therefore, scaled-up processing activities would absorb idle produce and alleviate farmers' tied-up capital problems. However, seaweed processing activities on the island are constrained by minimal government involvement and financial limitations.

As noted earlier, seaweed exporters buy seaweed in quotas determined by the global seaweed market forces. Every village is then allocated quotas based on their production at that season and the personal judgment of exporters. Once quotas are fulfilled, the remaining seaweed is stored by farmers in their houses for the following buying cycle. The challenge arising from this buying mechanism is that there is no guarantee that this farmer will be able to sell their load in the following process. In addition, the buying mechanism is based on a first-come, first-served. Hence, the farmer with the most load to the collection centre can sell all their load, leaving no chance for other farmers with medium to small-sized loads to sell. Exporters are not liable in this matter. This study found that farmers had several bags of seaweed in their houses waiting for potential buyers in almost all villages.

Overall, it can be observed that the lack of processing facilities was ranked highest, followed by the lack of drying areas and storage facilities by the farmers.

4.4.4 Financial constraints

Financial constraints examine the overall understanding of the farmers on financial services and challenges faced when accessing seed and growth capital. The following were the outcome of the analysis:

Table 4.60: Garrett scores results for financial constraints

Constraints	Unguja		Pemba		Zanzibar	
	GS	***R***	***GS***	***R***	***GS***	***R***
i. Lack of subsidies from the government	44.96	5	32.24	5	38.6	5
ii. Credit ineligibility	74.32	1	85.24	1	79.78	1
iii. Lack of information on available credit options	57.36	3	82.74	2	70.05	2
iv. Limited financial literacy	70.32	2	69.24	4	69.78	3
v. Limited credit options on the island	48.04	4	44.62	3	46.33	4

Source: Primary data **Notes:** GS: Garrett score; R: Rank

The table reveals that farmers from both islands ranked ineligibility for credit as their first financial constraint. Limited financial literacy was ranked second by farmers from Unguja and fourth in Pemba. Farmers' lack of information on available credit options was ranked second in Pemba and third in Unguja. The seaweed industry faces seed and growth capital difficulties, among other challenges. To a large extent, seed and growth capital sources come from bootstrapping, personal savings, spousal support, and small loans from self-help groups (for a limited time). Moreover, most farmers from both islands do not qualify for loans from formally established financial institutions since they are considered high-risk customers. In addition, even if there were to be a small minority of the farmers qualifying for such loans, financial institutions in rural Zanzibar are scant.

Instead, informal money lenders can offer short-term cash solutions at higher rates than financial institutions unserviceable by farmers. However, informal money lenders are generally considered risky. Hence, farmers face such financial dilemmas and become crippled from pursuing farm expansion goals in the short and long term. In addition, they face liquid cash challenges to run the farm daily. Therefore, the farmers need financial interventions to drive and catalyse their productivity, growth, and transformation.

4.4.5 Physical infrastructure constraints

Physical infrastructure constraints examine infrastructural challenges faced by the farmers. The following were the results of the analysis:

Table 4.61: Garrett scores results for physical infrastructure constraints

Constraints		Unguja		Pemba		Zanzibar	
		GS	***R***	***GS***	***R***	***GS***	***R***
i.	Lack of nearby collection centers	49.76	5	62.6	2	49.76	5
ii.	Accessibility of farming sites	51.4	4	55.4	3	51.4	4
iii.	Blocked roads to the farming sites	64.48	2	40.56	5	64.48	2
iv.	Lack of farming area	74.32	1	45.74	4	74.32	1
v.	Lack of nearby financial facilities	54.4	3	82.66	1	54.4	3

Source: Primary data Notes**:** GS: Garrett score; R: Rank

The table above reveals that the lack of farming area received the first rank among farmers in Unguja. In contrast, farmers in Pemba ranked the lack of financial facilities nearby as the first physical infrastructure constraint. Blocked roads to farming sites received the second rank among farmers in Unguja, while the absence of nearby collection centres received the second rank in Pemba. Finally, the lack of financial facilities nearby received the third rank in Unguja, while the accessibility of farming sites was ranked third by farmers in Pemba.

The main outcry among most farmers in Unguja surveyed by this study was limited farming areas due to conflicting coastal site uses between the tourism sector and the seaweed industry. In addition, most hotel owners have forced seaweed farmers to abandon their farming lands directly facing hotel fronts due to aesthetic issues. As a result, the farmers are forced to seek farming and drying sites elsewhere, far from their residences. Secondly, most hotel owners have fenced their properties and nearby surroundings, including traditional local pathways for the residents. As a result, most farmers have to circumvent the surroundings to find alternative routes to reach their farm sites within the hotels' surroundings. This challenge has resulted in raised production costs for some caused by the need to hire transport to reach farming sites and, for others, total abandonment of the farming sites and the practice on the island.

Further, conflicting uses of coastal land strips bring environmental concerns to seaweed plants. It poses seaweed crops to pollution from hotel wastes usually directed into the ocean. This ecological aspect might contribute to high seaweed die-offs in Unguja than in Pemba island since tourism activities are more concentrated in Unguja than in Pemba. Hence, this is a call for the RGoZ to urgently consider land use reallocation to accommodate the government's and seaweed industry's tourism interests. Furthermore, an urgent strategic plan has to be geared at establishing and zoning coastal areas based on economic activities to eliminate conflicts and grievances, especially on Unguja island.

Recurring land conflicts with hotel owners without serious government interventions will lead to further demotivation among farmers and may promote total abandonment of farms. As a result, rural women will face the challenges of finding alternative economic opportunities. However, given the underdeveloped nature of rural Zanzibar, these chances are limited. In turn, the women farmers may lose their livelihoods and a sense of self-dependency, raising both unemployment rates and poverty levels on the island.

Further, farmers from Unguja and Pemba expressed their need for accessible financial institutions nearby. Moreover, they expressed that they must travel long distances to access financial services since most financial institutions are based in town areas. The area's limited socio-economic levels may explain the limited financial services in rural Zanzibar. Hence, providers of such services are demotivated from investing much in the area. In addition, on Pemba island, there is a call for more collection centres to be established as it was found that not every village has a collection centre. In addition, Pemba's topography is hillier than Unguja, making it difficult for farmers to access farming sites. Also, carrying loads from the sea to the shore becomes cumbersome, during harvest, especially for the women farmers. Therefore, farmers lacking collection centres must travel to nearby villages to sell their crops.

A similar challenge was observed in Unguja in some villages but not to a large extent. Exporting companies such as C-WEED have taken measures to support farmers from areas with topographical challenges by fitting cranes by the seashore in Pemba to ease movement during production. However, the efforts are still minimal and require further investments by the RGoZ. Overall, lack of farming area scored the first rank, followed by blocked roads to farming sites and lack of nearby financial facilities by the farmers.

4.4.6 Marketing constraints

Marketing constraints examine marketing challenges farmers face when attempting to sell their produce. The following were the results of the analysis:

Table 4.62: Garrett scores results for marketing constraints

Constraints		Unguja		Pemba		Zanzibar	
		GS	***R***	***GS***	***R***	***GS***	***R***
i.	Low-price offers	79	1	82.7	1	80.85	1
ii.	Limited domestic consumption	15.16	7	17.2	7	16.18	9
iii.	Limited sources of information concerning potential buyers	30.86	3	29.72	4	30.29	3
iv.	Limited demand	33.44	2	35.58	2	34.51	2
v.	Lack of market planning skills	13.36	8	12.15	9	25.51	6
vi.	Limited marketing channels	10.2	10	11.24	10	10.72	10
vii.	Lack of market information acquisition skills	29.28	4	30.14	3	29.71	4
viii.	Lack of market information screening skills	27.8	5	27.8	5	27.8	5
ix.	Lack of market information interpretation skills	25.36	6	23.38	6	24.37	7
x.	Lack of market communication and selling skills	12.26	9	11.68	8	23.94	8

Source: Primary data **Notes:** GS: Garrett score; R: Rank

The table above reveals that low-price offers, limited demand, and limited information sources regarding potential buyers were ranked first, second, and third by farmers in Unguja concerning marketing constraints. On the other hand, farmers from Pemba similarly ranked limited price offers and demand as the first and second highest marketing constraints, respectively, but lacked market acquisition skills as their third constraint.

As addressed in section (I) of this document, low-price offers result from primarily two reasons. First, demand and supply forces in the global seaweed market so that prices will drop when there is an oversupply. Secondly, low prices are also a result of limited markets/buyers. As discussed earlier, there are few *carrageenan* processors globally, and these companies have the high-buyer bargaining power to influence prices. In addition, Zanzibar's seaweed industry has been facing stiff competition from Asian producers. With 99% of production and exports of *spinosum* and *cottonii* being concentrated in Asia, Zanzibar is in a disadvantageous position to bargain better prices and act as a market price-follower. Therefore, the industry will continue to face price challenges unless there is an upscale production and value-addition in seaweed exports.

Further, given the distance between Zanzibar and its overseas buyers compared to competitors' distance to buyers, exports from Zanzibar become expensive. Therefore, overseas buyers opt for nearby suppliers, e.g., Indonesia. As a result, the small margins of profits received by exporters in Zanzibar have to be shared by over 25,000 farmers on the Island, which constrains them from offering better prices. In addition, as observed by this study in section (II) of this document, overseas buyers of Zanzibar's seaweed have remained consistently the same over the years. Hence, there is a challenge to buyers' bargaining power and profit margins.

For farmers, the challenge of limited buyers signifies Zanzibar's limited number of exporters. With limited exporters, farmers cannot accept whatever price per kilo of seaweed is offered. In addition, as elaborated earlier, exporters buy from farmers based on set quotas; hence once reached, the farmers have no other place to sell their produce except to store and wait on the next season.

Therefore, as recommended earlier, it is high time that RGoZ takes the initiative to develop an appropriate marketing strategy to create new markets and market segments, among other agendas.

This study also found that farmers from Unguja and Pemba lack marketing information acquisition, screening, and interpretation skills. Most farmers rely on historical relationships with exporters to sell their seaweed. Farmers have taken limited initiatives to search for and establish new buyers for their produce. The lack of initiatives is not due to complacency but rather underscored by their little educational background and lack of training to search and recruit new markets. In addition, there exist limited distribution channels for the industry. For instance, at the time of this survey, it was found that the only distribution channel present on the island is collection centres at shehias (villages), limiting farmers' exposure to new and broader markets.

Tackling the ever-present price challenges for farmers can be approached from three prospects. First, the RGoZ has to put its hand in the industry and engineer awareness campaigns to establish seaweed awareness and, consequently, domestic consumption in Zanzibar and URT mainland. Secondly, the government should develop industry integrations at various stages, linking farmers to manufacturers and distributors. For instance, the industry can be linked to manufacturers in industries that could use seaweed as its alternative healthy and organic raw material, e.g., toothpaste, dairy, animal feeds, fertilizers, soap-making, and food industries. Third, in a broader context, since the crop is primarily export-oriented, it needs to be re-branded and re-marketed as a healthy food option apart from its existing known industrial applicability. This strategy creates new crop export use and establishes new market segments. There are two strategic options to this approach, i.e., further market use of an existing product to existing buyers or market new use of the product to newly established markets.

Hence, there is a pressing need for all Zanzibar seaweed industry stakeholders led by the RGoZ to create initiatives geared towards revamping and transforming the industry. Further, capacity building is required for seaweed farmers on the island, especially in marketing and value-addition. In addition, as discussed earlier, creating awareness of seaweed and its uses and applications and promoting it domestically will significantly improve the farmers' profit margins. Similarly, increasing value-addition activities will contribute to a large extent towards solving the ongoing plague of low prices and limited profit margins among farmers on the island as value-added seaweed is priced higher than its raw form. Furthermore, creating industry integrations will promote the further sale of seaweed in its raw form, raising income for the farmers.

Overall, low-price offers scored the highest rank, followed by limited demand and limited sources of information regarding potential buyers.

4.4.7 Value-addition constraints

Value-addition constraints examine challenges faced by farmers when trying to undertake value-addition activities for their produce. The following were the results of the analysis:

Table 4.63: Garrett scores results for value addition constraints

Constraints	Unguja		Pemba		Zanzibar	
	GS	***R***	***GS***	***R***	***GS***	***R***
i. Limited training on value-addition	73.68	1	58.96	3	66.32	3
ii. Lack of processing facilities	56.76	3	74.89	1	65.83	2
iii. Lack of capital	64.92	2	66.82	2	65.87	1
iv. Lack of domestic demand for seaweed products	56.64	4	53.56	4	55.1	4

Source: Primary data **Notes:** GS: Garrett score; R: Rank

The table above reveals that limited training on value-addition received the first rank from farmers in Unguja, while the lack of processing facilities received the first rank in Pemba. Lack of capital for value-addition was ranked second by farmers from both islands. Lack of processing facilities and limited training on value-addition was ranked third by farmers in Unguja and Pemba, respectively. Overall, lack of capital was the highest-scored constraint among farmers, followed by lack of processing facilities and limited training on value-addition.

Value-addition from seaweed crops in Zanzibar exists but at a minimal scale. Value-added seaweed products fetch higher price margins than raw seaweed (Songwe *et al.,* 2016). Institutions such as ZASCI have been instrumental in pioneering the value-addition of the crop on the island. Even though ZASCI provides training on the production methods and marketing of seaweed, this study found that a wide gap in knowledge and skills exists among farmers still exists. For instance, the study found that only ten villages (n=10/49, 20%) from both islands possessed value-addition skills. Individual farmers with entrepreneurial backgrounds also practice value addition at a minimal scale. Products created (e.g., soaps, hair oils, seaweed powders, lotions) are sold locally and have no wider distribution channels.

Factors impeding the upscaling of the value-addition activities among farmers include; limited educational background, financial limitations, limited awareness of the crop's applicability, narrow distribution channels, and limited government participation and support (source: primary data). However, farmers expressed enormous willingness to learn more about seaweed value-addition. This willingness was observed in almost all villages surveyed in Unguja and Pemba.

4.4.8 Environmental constraints

Environmental constraints examine challenges faced by farmers during production processes concerning changes in the environment, and the following are the results of the analysis:

Table 4.64: Garrett scores results for environmental constraints

Constraints		Unguja		Pemba		Zanzibar	
		GS	***R***	***GS***	***R***	***GS***	***R***
i.	Increase of harmful weeds	69.76	2	62.72	3	66.24	2
ii.	Seaweed-related diseases	71.32	1	72.47	1	71.9	1
iii.	Destruction of seaweed due to strong oceanic tides and winds	60.92	3	67.24	2	64.8	3

Source: Primary data **Notes:** GS: Garrett score; R: Rank

The table above reveals that farmers from Unguja and Pemba islands faced environmental challenges and were ranked equally for both island farmers. Seaweed-related diseases (ice-ice) received the first rank, an increase in harmful weeds (epiphytes) received the second rank, and the destruction of seaweed plants due to damaging winds was ranked last. Overall, it can be seen that seaweed-related diseases were ranked first in environmental constraints, followed by increased harmful weeds and destruction to strong seaweed plants due to oceanic tides and winds.

These challenges were specially mentioned by farmers in Unguja (n= 15/24 villages, 62%) than in Pemba (n=10/25 villages, 40%), implying that farmers in Unguja need immediate environmental intervention methods from experts. The ice-ice disease and growth of epiphytes on the seaweed plant have resulted from ecological changes, primarily raised oceanic-water temperatures and salinity due to rains (Charisiadou *et al*., 2021, Msafiri, 2021, Brugere *et al*., 2019). Such occurrences have been observed in the islands since 2012 and have been plaguing the island, resulting in weak growth of seaweed crops and high die-offs (Msuya *et al*., 2016).

Similarly, one can speculate that conflicting coastal area uses (tourism versus mariculture) observed in Unguja than Pemba may have contributed to such demise. This observation is worth investigating by RGoZ through its relevant bodies, e.g., the Zanzibar Environment Management Authority

(ZEMA) and the ministry of Blue Economy and Fisheries. As this chapter observes in section (ii), seaweed production in Zanzibar declined between 2010 and 2020. Among the factors contributing to such demise are ice-ice disease and epiphytes. Thus, providing expert training on managing and circumventing the ongoing environmental changes management to farmers is vital to the industry to ensure its sustainability in the long term.

Among the solutions to counteract rapidly rising environmental challenges in Zanzibar was the shift from shallow-water farming (off-bottom method) to deep-water farming (tubular-nets technology). Several pilot experiments on tubular-nets technology were conducted on the island, and outcomes revealed that the technique was resilient to the environment's adverse environmental changes (Brugere *et al*., 2021). In their study comparing the growth of *Eucheuma* species, fish abundance, and diversity in deep waters, Yahya *et al*., 2020 found that both species' growth increased; however, the development of *Eucheuma* bi-mass was found to be relatively higher on average compared to that of fish. Hence, it can be concluded that the technology can be used to counteract the *cottonii*'s growth failure on the island, which fetches a higher price margin than *spinosum* due to the high quality of *kappa*-carrageenan as well as to increase fish-catching activities.

However, tubular-net technology requires swimming skills and the use of specialized boats. Thus, considering that the Zanzibar seaweed industry's producers are predominantly women and the local culture, the application of this technology is constrained. Hence, effective adoption of the technology for the sustainability of the farming practice would require an understanding of and adaption to the socio-economic background of the island as well as feasibility studies to be conducted (Brugere *et al*., 2021).

4.4.9 Summary of seaweed farmers' constraints

Overall, as observed in the results below, it can be concluded that post-harvest, environmental and value-addition constraints are the leading challenges farmers face in Zanzibar, requiring immediate intervention from scientific institutions and the RGoZ.

Table 4.65: Summary Garrett scores results for farmers' constraints

Constraints	Garret scores	Ranks
Post-harvest	71.36	1
Environmental	67.41	2
Value-addition	63.28	3
Financial	60.9	4
Limited role of government	52.21	5
Production	50.51	6
Marketing	30.39	7

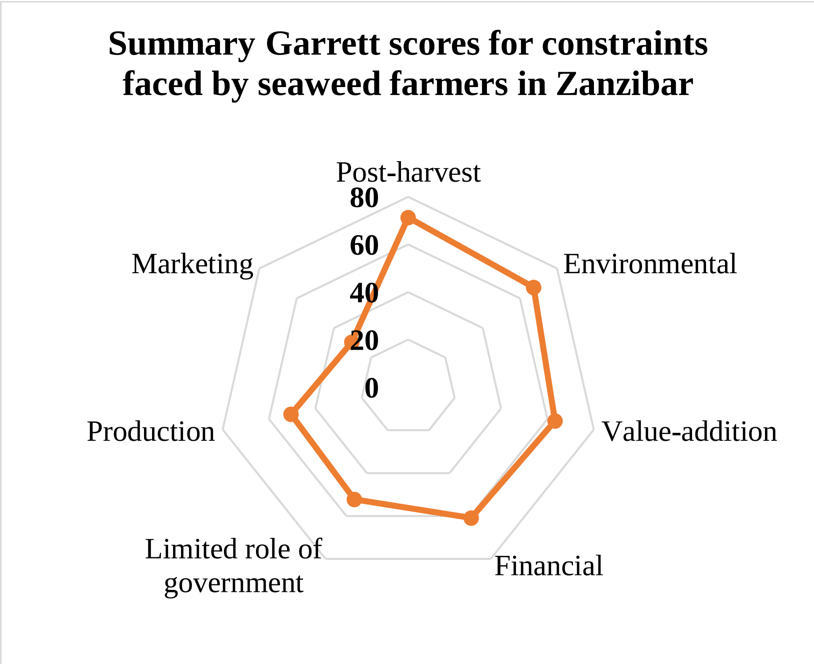


Figure 4.47: Summary of Garrett scores results for constraints faced by seaweed farmers in Zanzibar

4.4.10 Constraints faced by seaweed exporters

Constraints faced by seaweed exporters are categorized into three sub-groups, namely;

a) C1: Government role

b) C2: Financial control and related aspects
c) C3: Marketing constraints

4.4.11 Administrative-related constraints

The below results show that the lack of seaweed industry policy was ranked first by exporters in Zanzibar. The second constraint was the government's conflicting investment priorities, mainly between tourism and seaweed farming. Finally, the lack of an established seaweed industry market and delays in export permit processing time tied ranks as third constraints.

Seaweed exporters expressed that with the lack of prioritisation of ZSI activities, they have been facing increased operational costs, cumbersome export procedures and documentation, multiple conflicting government charges, excessive port charges and double taxation. Similarly, conflicted investments exist between ZSI and leading revenue-earning sectors, i.e., tourism and clove production affecting its operations. In addition, as observed earlier in this chapter, no market strategy exists in the industry. Instead, seaweed exports have been based on historical relationships with overseas processors. The lack of market strategy has led to limited profitability and dwindling production. Given the unstable nature of the global seaweed market, relying on limited buyers poses a significant threat to the industry. In addition, the lack of diversity in buyers limits industry innovations and product differentiation; hence production and exports remain primitive. As a result, URT's ability to gain higher market shares in the global seaweed market is inhibited.

Similar findings were reported in the REPOA 2018's brief, where the report highlighted that while development strategies exist in Zanzibar's Fisheries Development policy, mechanisms and resources for its implementation are absent. Also, the report revealed that weak macroeconomic support and regulatory institutions exist to enforce quality standards in ZSI. The report also revealed that multiple levies and taxes exist due to industry regulatory framework gaps, weak trade institutions, and complicated export logistics. Seaweed exporters also expressed their grievances regarding the time taken to process export permits by the relevant authorities, which takes over one month. The delays are due to permits being passed through several officers for verification. The delays have led to increased port charges, rising operations costs and consignment delivery delays.

Table 4.66: Garrett scores results for administrative-related constraints

	Constraints	*Garret scores*	*Ranks*
i.	Lack of established seaweed industry market strategy	70.25	3
ii.	Conflicting investments priorities	72.5	2
iii.	Government perception of the seaweed business	45.25	5
iv.	Limited seaweed export promotion measures	29.75	7
v.	Lack of seaweed industry policy	79	1
vi.	Conflicting issuing authorities for export permits	33.25	6
vii.	Delays in the export permit processing time	70	4

Source: Primary data

4.4.12 Financial control and related aspects

The below results reveal that the first ranked financial constraint was conflicting government taxes, specifically VAT versus stamp duty. Exporters expressed that as per ZRB guidelines, when a business has crossed a certain threshold[24], it automatically becomes VAT registered. Exporters have been asking the government to implement this mandate throughout the years with no success. Instead, the government has repeatedly asked them to pay stamp duties[25]. The call to pay stamp duty is because the RGoZ can not earn revenue via the VAT scheme since exports are charged zero per cent tax as per the ZRB website. However, exporters view this as unfair since stamp duties do not promote exports but instead raise the cost of operations, diminish their profit margins, and offer prices paid to farmers.

[24] TZS 50 mil and above (INR 1.6 crores) as per ZRB website

[25] Stamp duty schedules are available at ZRB website.

The second-ranked financial constraint was multiple charges by the government, i.e., payment of royalty fees[26] and LGA levies. The ministry of Blue Economy and Fisheries charges exporters royalty fees of two per cent of buying price annually. Also, at the local government level (district and ward), they are charged administrative fees for collecting and transporting seaweed. Therefore, the exporters recommended that the RGoZ choose a single charge at the central government or LGA levels.

In addition, they expressed that no uniform scale of measurement in payments exists at the district level. For instance, TZS 250 (Rs. 8.77) per bag of dried seaweed (e.g., in South Unguja) versus TZS 2,000 (Rs. 70.17) per bag (Central Unguja) vs TZS 5,000 (Rs. 173.6) per tonne in other villages in Unguja. In Pemba, the LGA charges are TZS 2,500 (Rs. 87.72) per tonne vs TZS 5,000 (Rs. 173.6) per tonne vs TZS 30,000 (Rs. 1052.63) flat rate. The contradiction in payments and units of measurement makes trading seaweed a hassle for exporters and affects operational costs. Therefore, it was recommended that the government review the charges and arrive at clear and appropriate charges and units for measurement (per tonne of flat rate).

The third-ranked constraint was port charges. Exporters expressed their grievances on multiple government charges at Zanzibar port, affecting operational costs. For instance, seaweed consignment from Pemba port is charged wharfage charges per container, and upon arriving at Zanzibar port, the same container, after being offloaded, is again charged wharfage. Exporters implore the RGoZ to revisit and review port charges to promote seaweed exports. In addition, during the calculation of government charges, input expenses (subsidies given to farmers, e.g., tieties, ropes, fibre boats) are not counted as part of the costs of operations. As a result, the value of charges is estimated at raised values which becomes unfair to exporters increasing operational costs. Another raised cost concern was the payment of SDL to casual

[26] charged at 2% of seaweed buying price payable to ministry of Blue Economy and Fisheries yearly

labourers at the port. Exporters expressed that SDL should be charged to permanent employees, not casual labourers.

Table 4.67: Garrett scores results for financial control and related aspects

	Constraints	*Garret scores*	*Ranks*
i.	Exchange rates	20	8
ii.	Inflation	48.25	5
iii.	Conflicting compulsory taxes	80	1
iv.	Lack of uniform measurement for administrative charges	53	4
v.	Skill development levies on casual labourers	47	6
vi.	Omission of input expenses in government tax calculations	40	7
vii.	Multiple conflicting charges	67	2
viii.	Port charges	60	3

Source: Primary data

4.4.13 Marketing constraints

The below results reveal that limited demand for seaweed globally was ranked as the first marketing constraint, followed by limited applications of URT's seaweeds. Non-availability of seaweed was ranked third, and the non-availability of desirable variety was ranked last. As noted earlier in this chapter, the global seaweed market is highly volatile and is governed by demand and supply forces. Apart from demand and supply, prices of seaweed at an international level are determined by the crop moisture content (35% on average) and contaminants (2% or less) (Neish and Msuya, 2013).

In addition, there are only a few processors of seaweed in the world; therefore, market competition is intense. Seaweed from URT is exported with no value-addition in its raw nature as raw material for *carrageenan* extraction industries. As pointed out in this chapter, profits are limited with limited applicability and marketing. Further, Zanzibar is logistically far from its buyers, making its seaweed exports expensive compared to competitors such as Indonesia and the Philippines (Neish and Msuya, 2013). Thus exporters' margins are constrained by the challenge of limited buyers.

Furthermore, exporters have expressed challenges with sufficient seaweed products in the local market. As observed earlier in this chapter, globally, there has been an oversupply of seaweeds; hence prices have fallen. As a result, both exporters and farmers of seaweed have been affected. In Zanzibar, farmers have reduced production and abandoned their farms due to low returns. Similarly, the *cottonii* variety, which fetches a higher price than *spinosum*, has failed to grow in Zanzibar since 2012 (Msuya, 2010:2020; Msuya *et al*., 2022) due to environmental changes. Hence, further compounding the unavailability of sufficient volume and desired variety of challenges.

Table 4.68: Garrett scores results for marketing constraints

Constraints		*Garret Scores*	*Ranks*
i.	Limited demand	73	1
ii.	Limited applications of URT's seaweeds	56	2
iii.	Non-availability of the product in sufficient quantity	26	4
iv.	Non-availability of a desirable variety	43	3

Source: Primary data

4.4.14 Summary of constraints faced by seaweed exporters if ZSI

In conclusion, seaweed exporters ranked the limited role of RGoZ as the first constraint, followed by financial control and related aspects and marketing constraints, as seen in the results below:

Table 4.69: Summary Garrett scores results for constraints faced by seaweed exporters in Zanzibar

Constraints		*Garret scores*	*Ranks*
i.	Limited role of government	57.14	1
ii.	Financial control and related aspects	51.91	2
iii.	Marketing	49.5	3

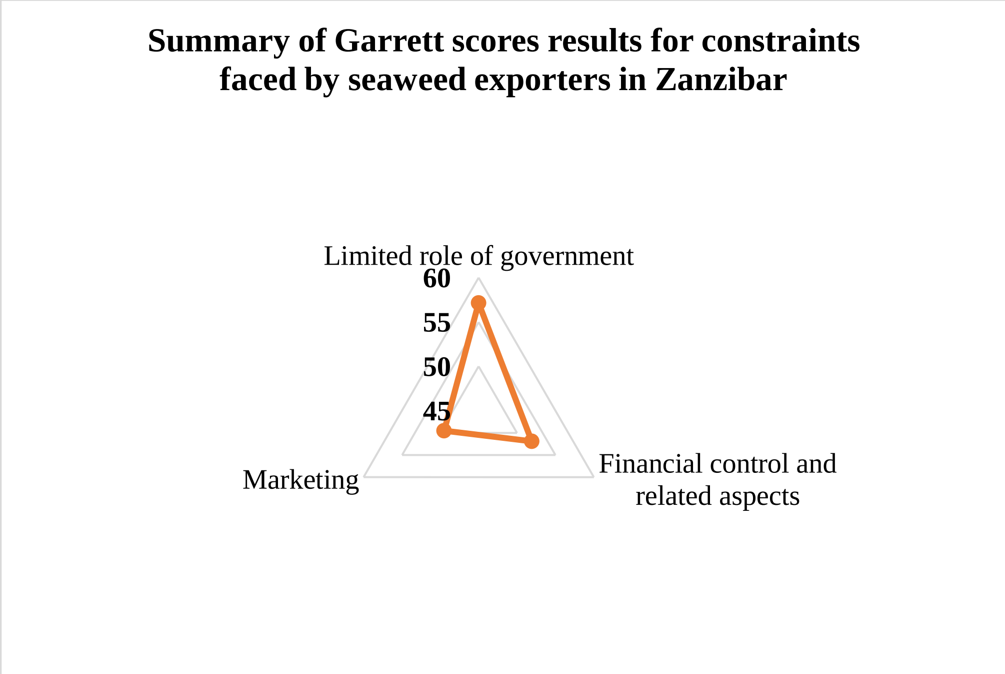


Figure 4.48: Summary of constraints faced by seaweed exporters

Hypothesis testing

Significance of differences in constraints scores between farmers in Unguja and Pemba was examined through the Mann-Whitney U test, and the following were the hypotheses assumed:

H_0: No significant differences exist in ranking constraints by farmers in Unguja and Pemba

H_1: There exist significant differences in ranking constraints by farmers in Unguja and Pemba

Significance ($\alpha = .05$)

Significance was realised in the following:

- Government policy related constraints' statements 1 (U=192.5, p = .03); 3 (U=172.00, p=.011); 4 (U=19.500, p=.000); 5 (U=65.500, p=.000) and 7(U=186.500, p=.018)
- Financial constraints' statements 2 (U=214.000, p=.072) and 3 (U=96.000, p=.000)

- Marketing constraints' statements 2 (U=52.500, p=.000); 4 (U=68.000, p=.000); 6 (U=116.500, p=.000); 9 (U=64.00, p=.000) and 10 (U=55.500, p=.000)
- Physical infrastructure constraints' statements 2 (U=86.500, p=.000) and 5 (U=123.00, p=.000)
- Value addition constraints' statement 2 (U=86.500, p=.000)

Therefore, H_o is rejected, and H_1 adapted, i.e. there exist significant differences in ranks' scores of the constraints between farmers in Unguja and Pemba.

Summary

This section analysed existing challenges faced by seaweed farmers and exporters in Zanzibar. Farmers' challenges were grouped into the role of government, production, financial, marketing, post-harvest, physical infrastructure, value-addition and environmental constraints. Exporters' challenges were categorised into three; the role of government, financial and marketing challenges. Farmers' leading government role-related challenges include; lack of credit provision, absence of government procurement and trading, limited provision of farming implements and absence of efforts/measures geared towards preventing farmers' exploitation. Production-related challenges showed the lack of knowledge of the latest farming methods, product quality challenges and high input costs.

Post-harvest challenges faced by farmers are a lack of processing facilities, limited sites for drying and a lack of storage facilities. Further, physical infrastructure challenges revealed a lack of farming area (in Unguja), blocked roads to sites and a lack of nearby financial facilities to be the leading constraints. Leading farmers' financial challenges include ineligibility to credit facilities, limited information concerning available credit options and limited financial literacy. Farmers' leading marketing challenges include; low prices, limited demand and limited sources of marketing information. Leading value-addition challenges were a lack of capital, processing facilities, and limited training. Due to strong winds, farmers face environmental challenges: ice-ice seaweed diseases, harmful weeds, and thallus breakage.

Exporters' leading government-related challenges were a lack of seaweed industrial policy and strategy, conflicting investment priorities by the RGoZ and delays in export permit processing time. Leading financial challenges for the exporters are conflicting compulsory taxes, multiple conflicting charges and port charges. Marketing challenges revealed limited demand, limited utilisation of URT's seaweeds and non-availability of production in sufficient quantity to be the leading challenges. Overall, post-harvest, environmental and value-addition constraints were leading for seaweed farmers, while the limited role of government, financial control and related aspects and; marketing constraints were leading for the exporters.

SUMMARY OF FINDINGS AND CONCLUSION

CHAPTER 5

SUMMARY AND CONCLUSION

This study attempted to analyse the competitiveness of Zanzibar's seaweed industry by examining its structure, trade (export) performance, industry marketing strategies, and constraints farmers and exporters face within the industry. Significant findings from the analysis have been discussed in depth in the previous chapter; therefore, the following is the summary of the results:

5.1 Structural analysis of ZSI revealed the following:

5.1.1 Socio-demographic profile of Zanzibar's seaweed industry's producers:

- The majority of the farmers are female (90%)
- All farmers were found to be Muslims (100%)
- The majority had attained primary education (42%) as the highest educational qualification.
- Most farmers are married (62%) and live in extended families (94%).
- The majority of the farmers (42%) were found to be aged between 48-50 years.

5.1.2 Seaweed production details of the farmers

- The Production system in Zanzibar was found to be off-bottom/peg and line. Production costs of seaweed per plot in Zanzibar are estimated to be Rs. 10,251 for a plot of 100 m^2.
- The number of seaweed plots owned differs between Unguja and Pemba, where a farmer in Unguja can have up to eight plots in contrast to a maximum of three in Pemba.
- Most farmers (32%) were found to earn between Rs. 26,240 – 32, 819 per production cycle from seaweed farming.
- Most farmers (65%) earn between Rs. 1,607 and 3,290 from other sources, including land-based agriculture and small-scale entrepreneurial activities.

- The average household expenditure for the farmers was found to be between Rs. 19,661 and 26,240 per month.
- The average price per kg of dry seaweed differs between Unguja and Pemba. In Unguja, farmers receive between Rs. 21.42 per kg of dry *spinosum*, while those in Pemba receive Rs. 16.83.
- Farmers get paid Rs. 32.90 for *cottonii* as it is a highly desired variety by foreign buyers and attracts higher export per unit price than *spinosum*.
- It was found that a seaweed farmer's price margin is 40% in *spinosum* export unit value and 34% in *cottonii* export unit value.

5.1.3 Farmers' technical skills

- Analysis of farmers' technical skills revealed that seaweed farmers in Zanzibar are unable to deal with existing environmental challenges attacking their plants.
- Similarly, they were also found to lack skills in optimising the farming area.
- Further, farmers were found to lack cash control and revenue monitoring skills and could not apply financial skills in their farming business.
- The seaweed farmers were also found to be lacking market communication skills and price negotiation with buyers.
- Lastly, the farmers were found to lack the ability to maintain farm records.
-

5.1.2 Business profile analysis of the seaweed exporters

- Business profile analysis of exporters established that three of the four selected companies have more than ten years of experience in exporting seaweed (ZANEA, C-WEED, Kisiwani), and the LEDO company has only eight years of working experience.
- Moreover, only one company is domestically owned by a sole proprietor (Kisiwani), while the remaining companies are foreign-domestic companies with headquarters in the Philippines and USA.

- Apart from exporting, all four companies perform additional cleaning, sorting, weighing, packing, and storing dried seaweed.
- No value-addition activities were found among the four companies. ZANEA and C-WEED companies offer training and farming inputs (tie ties, seeds) apart from collection services. LEDO and KISIWANI only collect from farmers at farm points.
- C-WEED company also offer fibre boats for planting and harvests in some of the villages in Pemba. The company also installed cranes in some of the farming villages in Pemba, where topographical challenges impede and from movements to the shore due to high cliffs and rocky beaches.
- ZANEA and C-WEED companies also have collection centres in almost every village surveyed.
- The farm inputs subsidies offered to farmers by exporters have declined substantially recently due to the perceived disloyalty of farmers to the exporters.
- Value chain assessment of ZSI revealed that there are three core activities of the industry, i.e. input supply (by suppliers), production (farmers), collection (collection centres) and exporting (exporters)
- Exporters were found to be the only reliable source of market information for the farmers

5.1.2 Porter’s five forces analysis of ZSI structure revealed the following:

- Porter’s five forces analysis revealed ZSI has low-profit potential due to; the high bargaining power of buyers and suppliers, available cheap and higher-performing substitutes, intense rivalry and lack of entry barriers
- Porter's diamond model analysis revealed that ZSI’s source of competitiveness only comes from its abundant factor endowments. However, lack of industry strategy, structure and rivalry; lack of industry integrations role of the RGoZ and chance conditions were found to impede its competitiveness potential.

5.1.3 Porter's diamond model analysis revealed the following:

- ZSI was found to have no sources of competitive advantages
- The industry's competitive disadvantages from unfavourable factor conditions, demand conditions, lack of industry linkages, lack of industry's vision, strategy, individual visions of producers, objectives, an almost absent role of the RGoZ in its activities and chance conditions

5.1.4 Business environment scanning revealed the following:

- SWOC analysis revealed that ZSI draws its strength from its factor endowments, available cheap inputs and low production costs. Weaknesses for the industry were found in traditional farming methods, lack of industry innovation and limited domestic consumption. Opportunities for the industry were found to originate from untapped domestic demand, entrepreneurial opportunities and value-addition gaps. The threats to the industry were found from the unpredictable global demand conditions.
- PESTEL analysis revealed several threats and opportunities in the ZSI business environment. Threats are said to emanate from;
    - ❖ Lack of seaweed industry policy
    - ❖ Conflicting investments and promotion by the government,
    - ❖ Unbalanced allocation of development funds from donor countries and governments
    - ❖ High-Interest rates
    - ❖ Overlapping taxes and levies
    - ❖ Ageing industry producers
    - ❖ Unfavourable local attitudes towards seaweeds
    - ❖ Low literacy levels
    - ❖ Limited male and youth producers
    - ❖ Low levels of innovation and value-addition in the industry

- ❖ Low-level integration of modern farming technology
- ❖ Limited communication technology utilisation in searching for markets
- ❖ Increased temperatures, high oceanic tidal waves and strong oceanic winds
- ❖ Seaweed-related diseases (ice-ice, algal blooms)
- ❖ Sea pollution, especially in Unguja
- ❖ **In contrast,** the favourable political climate in Zanzibar, Zanzibar Development Vision 2050 and Zanzibar Blue Economy Policy 2020 were viewed as a source of opportunities for ZSI

5.2 Trade performance analysis revealed the following:

- Analysis of trade contributions of seaweeds to the URT's total merchandise exports revealed that in 2020 contribution stood at 53%, an increase from 17% in 2019
- It was found that seaweeds were the leading cash crops between 2015 and 2020 in Zanzibar's GDP
- Time series analysis of the seaweed production trends revealed a declining trend between 2010 and 2020
- Similarly, forecasts showed a further decline in production between 2021 and 2025
- ZSI export data (volume and value) trends were analysed through the least square method, and results revealed an increasing trend
- Forecasts for export volume and value also showed a rising trend between 2021 and 2025.
- Instability analysis of the production trends revealed that between 2010 and 2015, production trends had low instability, while between 2016 and 2021, there was high instability
- Instability analysis of export trends revealed low instability for export volume and value between 2000 and 2010, while between 2010 and 2020, the trends revealed high instability

- Leading buyers of ZSI seaweed were identified as Denmark, USA and Chile in descending order
- Regional comparison of red seaweed exports confirmed the Asian continent to be the largest producer and exporter, followed by Africa
- Indonesia was confirmed as the leading producer and exporter in Asia and the world of red seaweed (more than 80% market share), while the URT is leading in volume exported and produced but is behind Madagascar in export value performance in Africa
- Yearly analysis of market share position revealed that URT's market position shifted from 3rd to fifth between 2010 and 2013 and has remained in fifth yearly till 2020 behind Madagascar
- Export unit price performance of the major red seaweed exporters revealed URT's performance behind competitors between 2000 and 2013
- The performance increased between 2014 and 2018, where URT prices were observed to be slightly higher than Madagascar's and Indonesia's before dropping against competitors between 2019 and 2020
- World trade trends in the red seaweed market revealed an increasing demand between 2012 and 2020
- Market concentration analysis for the red seaweed market revealed high concentration, i.e. the market is operating under oligopolistic market conditions
- Analysis of trade indices revealed that URT's performance at the global level has been lagging behind competitors
- URT was not found to have competitiveness in the exports of Kappaphycus/Eucheuma (CI index = 0).

5.3 Export marketing strategies analysis of the industry revealed the following:

- Seaweed farmers were found to apply no specific product strategies; however, exporters were found to apply product adaptation strategies at the global level, where consignments are customised according to the needs and requirements of foreign buyers.
- Seaweed farmers in Zanzibar do not have any pricing strategies for their produce. On the other hand, exporters were found to apply a mixture of cost-based and market-based pricing to foreign buyers.
- Personal selling was the promotional strategy for communicating ZSI's value proposition to foreign buyers.
- ZSI utilises two-level marketing channels, i.e. collection centres and seaweed exporters.
- Collection centres are the intermediaries between the farmers and seaweed exporters.
- Entry strategies applied by the seaweed exporters' were found to be direct and indirect exporting based on historical relationships to a large extent.
- Other selection methods include personal visits, business experience, and analysis of the company's potential in a particular export market.
- On sources of information for which markets to pursue, most companies use past sales records, own company investigations, company personnel and export agents.
- Effectiveness analysis of the industry's existing export marketing strategies effectiveness revealed that channel management strategies had the highest score while product strategies had the least score.
- Market screening strategies' effectiveness' results revealed that market planning strategies had the highest effectiveness score, while market information acquisition had the lowest score.
- STPs strategies implementation effectiveness results revealed that the effectiveness score was highest in exporters being able to identify

potential country-based or individual consumer groups effectively and reach the same while being able to conceptually distinguish the markets based on a set of distinct and actionable criteria scored least.

- Internal implementation capabilities effectiveness results revealed that the exporters' monitoring/control system is well aligned with the needs of their export marketing plan and scored the highest mean rank.
- In contrast, exporters' effective execution of the actions detailed in their export marketing plan scored the least.
- On the other hand, in the external implementation capabilities effectiveness category, the highest mean rank was realised in the marketplace not responding to exporters' current export marketing strategy in the way intended and least in the export market channel been less enthusiastic in supporting exporters' current export strategy than anticipated.

5.4 Constraints faced by the industry's producers revealed the following:

- Leading constraints for the seaweed farmers overall were post-harvest, environmental and value-addition constraints at the first, second and third positions, respectively
- Farmers' leading government role-related challenges for the farmers included; lack of credit provision, absence of government procurement and trading, limited provision of farming implements and absence of efforts/measures geared towards preventing farmers' exploitation
- Production-related constraints showed that the lack of knowledge of the latest farming methods, product quality challenges, and high input costs were leading constraints
- Post-harvest challenges faced by farmers are a lack of processing facilities, limited sites for drying and a lack of storage facilities.
- Physical infrastructure challenges revealed a lack of farming area (in Unguja), blocked roads to sites and a lack of nearby financial facilities were the leading constraints

- Leading farmers' financial challenges include ineligibility to credit facilities, limited information concerning available credit options and limited financial literacy
- Farmers' leading marketing challenges include; low prices, limited demand and limited sources of marketing information
- Leading value-addition challenges were a lack of capital, processing facilities, and limited training.
- Lastly, farmers' leading environmental constraints were; seaweed-related diseases, harmful weeds and the breakage of seaweed plants due to strong winds

5.5 Constraints faced by exporters revealed the following:

- Government-related constraints: lack of seaweed industry policy, the government's conflicting investment priorities, mainly between tourism and seaweed farming and the lack of an established seaweed industry market and delays in export permit processing time tied ranks as third constraints were ranked highest in descending order
- Financial control and related aspects constraints: conflicting charges by the RGoZ, i.e., VAT versus stamp duty, double charges by the government, i.e., payment of royalty fees[27] and LGA levies and port charges were ranked highest in descending order
- Marketing constraints: limited demand, limited applications of URT's seaweeds and non-availability of sufficient quantity.

5.6 Conclusion

The present study attempted to analyse the competitiveness of Zanzibar's seaweed industry by examining its structure, profitability potential, competitive advantages, business environment, product and export trends, export marketing strategies, and constraints farmers and exporters face within the industry. Based on the findings of this study, Zanzibar's seaweed industry is currently not competitive, mainly due to the lack of sources of competitive

[27] charged at 2% of seaweed buying price payable to ministry of Blue Economy and Fisheries yearly

advantages. The dwindling performance of ZSI, among other factors (e.g., production challenges and global demand and supply fluctuations of the seaweed industry), can also be explained by the failure of exporters to allocate internal resources to realise their export marketing strategies. Further, it was also established that current export marketing strategies of the industry have failed to bring the desired/anticipated response from the foreign buyers as expected by the exporters.

Therefore, this study contradicts existing ZSI studies that recommend upscaling production to enhance its competitiveness. Upscaling won't solve existing price challenges *ceteris paribus* since the industry's overall performance is determined solely by its global demand conditions. Further, current industry conditions revealed a consistent surplus between 2011 and 2020. With present competitive disadvantages, ZSI’s producers and exporters are at a loss of operational and expansion capital, which dispose them to debts, business failures, loss of employment and overall livelihood deterioration. The impact is felt more by the industry’s producers, whose socio-economic background and overall economic profile of Zanzibar predisposes them to limited employment opportunities, thus the likelihood of facing higher levels of abject poverty.

Thus, its high time that ZSI and its stakeholders, with the assistance of the RGoZ, and the URT government, prioritise and strategize on immediate interventions required to revive and sustain ZSI for the overall welfare of its workforce and prosperity of Zanzibar and URT in general at the global seaweed market.

5.7 Strategy Implications

Porter (1980) suggests three strategies to enhance the competitiveness of any industry, i.e. low-cost production, differentiation and focus. Based on the findings of this study, all three strategies were found to be unsuitable for ZSI due to the unique nature of the its challenges. Therefore, the following are suggested for the improvement of the industry’s performance:

- The creation of a seaweed-integrated industry policy for the sustenance of ZSI. The policy, among other things, should focus on efficiently utilising the water resources in Zanzibar, establishing special zones for seaweed farming, establishing government-based procurement and trading, and expanding of marketing channels of ZSI. The policy interventions should also include introducing mechanisms for seaweed disease control and improving extension services to seaweed farmers. In addition, policy measures to increase the pool of marine scientists in Zanzibar through the promotion and funding of marine education are crucial.

- At the government level, the interventions should create an enabling environment for foreign direct investment flows into the ZSI to improve industry productivity and value-addition. Value addition will create opportunities for ZSI to be linked to its domestic and regional markets. Further, researching ways to improve the quality of exported seaweed variety to enable differentiation in quality at the global level.
- Farmers' skills should also be upgraded through appropriate training to cope with the industry's environmental challenges. Similarly, further training on seaweed value-addition and provision of seed capital in the form of interest-free loans and physical resources to run a seaweed value-addition business.

- Development of a marketing plan to tap into new markets for red seaweeds at the global level, for example, the United Kingdom, Germany, Canada and the Netherlands. Similarly, re-marketing URT seaweeds in the human food category apart from industrial raw material to circumvent the oligopsonistic nature of global seaweed trade.

- Revival of seaweed farmers' associations through capacity building (leadership training; revising the existing structure, financial assistance) and establishment of seaweed-related cooperative societies to aid production and marketing of industry's output.

- Lastly, there is a need for active participation and collaboration of marketing and aquaculture academia with exporters in research and disseminating findings concerning the global seaweed industry trends and market conditions.

5.8 Contribution of the researcher

The researcher attempted to analyse the competitiveness of ZSI by examining its structure, profitability potential, competitive advantages, business environment, product and export trends, export marketing strategies, and constraints farmers and exporters face within the industry. The study was guided by Porter's theory of competitive advantages. Researchers contributed to the existing ZSI's theoretical and empirical literature by extending Porter's Five Forces and Diamond Model frameworks to the aquaculture industry.

Secondly, the study found that traditional Porter's frameworks were insufficient to explain the current conditions of ZSI and that other factors had to be considered to give a more balanced approach to addressing ZSI's key challenges. Thus, the researcher used SWOC and PESTEL frameworks as complementary frameworks. Lastly, this study also addressed the trade and marketing aspects of ZSI, which industry scholars have hardly addressed as most of the studies have been centred around the production challenges of the industry and its impact on livelihoods.

5.9 Thrust for future research

The present study was limited to the competitive analysis of ZSI. It examined its structure, trade (export) performance, industry marketing strategies, and constraints faced by farmers and exporters within the industry. Areas that future researchers can explore include; ZSI's market strategy, production systems and value chain innovation. Further research can be conducted on ways to improve the quality of exported seaweed variety to enable differentiation in quality at the global level, the female entrepreneurial potential of ZSI, gender and seaweed trade, as well as the evaluation of the impact of tourism activities on seaweed growth and overall seaweed industry productivity.

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APPENDICES

APPENDICES

Appendix 3.1: Normality test results (i)

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
Farm-management skills	0.197	49	0.000	0.910	49	0.001
Financial skills	0.248	49	0.000	0.845	49	0.000
Marketing skills	0.150	49	0.007	0.952	49	0.046
Record-keeping skills	0.344	49	0.000	0.637	49	0.000
a. Lilliefors Significance Correction						

Source: Primary data

Appendix 3.2: Normality test results (ii)

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
Log_Farmmanagement	0.214	49	0.000	0.863	49	0.000
Log_Financialskills	0.211	49	0.000	0.853	49	0.000
Log_Rekkeeping	0.344	49	0.000	0.637	49	0.000
Log_Marketingskills	0.157	49	0.004	0.943	49	0.019
a. Lilliefors Significance Correction						

Source: Primary data

Appendix 3.3: Reliability test results – farmers' schedule scale questions

Reliability Statistics		
Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
0.801	0.536	24

Source: Primary data

Appendix 3.4: Pearson correlation validity test results- farmers' schedule

Pearson Correlations criterion validity test results		
Farmmgtskills1	Pearson Correlation	.278**
	Sig. (2-tailed)	0.000
	N	592
Farmmgtskills2	Pearson Correlation	.261**
	Sig. (2-tailed)	0.000
	N	592
Farmmgtskills3	Pearson Correlation	.319**
	Sig. (2-tailed)	0.000
	N	592
Farmmgtskills4	Pearson Correlation	-.146**
	Sig. (2-tailed)	0.000
	N	592
Farmmgtskills5	Pearson Correlation	0.074
	Sig. (2-tailed)	0.074
	N	592
Farmmgtskills6	Pearson Correlation	.122**
	Sig. (2-tailed)	0.003
	N	592
Finskills1	Pearson Correlation	.304**
	Sig. (2-tailed)	0.000
	N	592
Finskills2	Pearson Correlation	.602**
	Sig. (2-tailed)	0.000
	N	592
Finskills3	Pearson Correlation	.491**
	Sig. (2-tailed)	0.000
	N	592
Finskills4	Pearson Correlation	.180**
	Sig. (2-tailed)	0.000
	N	592
Finskills5	Pearson Correlation	.436**
	Sig. (2-tailed)	0.000
	N	592
Finskills6	Pearson Correlation	.378**
	Sig. (2-tailed)	0.000
	N	592
Finskills7	Pearson Correlation	.174**
	Sig. (2-tailed)	0.000
	N	592
Finskills8	Pearson Correlation	.318**
	Sig. (2-tailed)	0.000
	N	592
Records1	Pearson Correlation	.146**

	Sig. (2-tailed)	0.000
	N	592
Records2	Pearson Correlation	.376**
	Sig. (2-tailed)	0.000
	N	592
Record3	Pearson Correlation	.488**
	Sig. (2-tailed)	0.000
	N	592
Mktgskill1	Pearson Correlation	.082*
	Sig. (2-tailed)	0.046
	N	592
Mktgskill2	Pearson Correlation	.259**
	Sig. (2-tailed)	0.000
	N	592
Mktgskill3	Pearson Correlation	.125**
	Sig. (2-tailed)	0.002
	N	592
Mktgskill4	Pearson Correlation	.343**
	Sig. (2-tailed)	0.000
	N	592
Mktgskill5	Pearson Correlation	-.117**
	Sig. (2-tailed)	0.004
	N	592
Mktgskill6	Pearson Correlation	-.196**
	Sig. (2-tailed)	0.000
	N	592
Mktgskill7	Pearson Correlation	-.099*
	Sig. (2-tailed)	0.016
	N	592
Level of skill	Pearson Correlation	1
	Sig. (2-tailed)	
	N	592
**. Correlation is significant at the 0.01 level (2-tailed).		
*. Correlation is significant at the 0.05 level (2-tailed).		

Source: Primary data

Appendix 4.1: Summary of Mann-Whitney group statistics results for socio-demographic variables (i) – Unguja and Pemba

	Island	*N (villages)*	*Mean Rank*	*Sum of Ranks*
Male gender	Pemba	25	27.74	693.50
	Unguja	24	22.15	531.50
	Total	**49**		
female gender	Pemba	25	23.24	581.00

	Unguja	24	26.83	644.00
	Total	**49**		
Nuclear family	Pemba	25	22.64	566.00
	Unguja	24	27.46	659.00
	Total	**49**		
Extended family	Pemba	25	25.68	642.00
	Unguja	24	24.29	583.00
	Total	**49**		
Illiterates	Pemba	25	33.74	843.50
	Unguja	24	15.90	381.50
	Total	**49**		
Primary education	Pemba	25	24.14	603.50
	Unguja	24	25.90	621.50
	Total	**49**		
Secondary education	Pemba	25	19.36	484.00
	Unguja	24	30.88	741.00
	Total	**49**		
Short courses	Pemba	25	23.00	575.00
	Unguja	24	27.08	650.00
	Total	**49**		
Unmarried	Pemba	25	29.72	743.00
	Unguja	24	20.08	482.00
	Total	**49**		
Married	Pemba	25	22.08	552.00
	Unguja	24	28.04	673.00
	Total	**49**		
Widow/er	Pemba	25	27.26	681.50
	Unguja	24	22.65	543.50
	Total	**49**		

Divorced	Pemba	25	28.44	711.00
	Unguja	24	21.42	514.00
	Total	**49**		

Source: Primary data

Appendix 4.2: Summary of Mann-Whitney group statistics results for socio-demographic variables (i) – Unguja and Pemba

Test Statistics[a]

	Gender		**Family background**		**Educational background**				**Marital status**			
	M[1]	***F[2]***	***N[3]***	***E[4]***	***I[5]***	***PE[6]***	***SE[7]***	***SC[8]***	***UN[9]***	***M[10]***	***W[11]***	***D[12]***
Mann-Whitney U	231.50	256.00	241.00	283.00	81.50	278.50	159.00	250.00	182.00	227.00	243.50	214.00
Wilcoxon W	531.50	581.00	566.00	583.00	381.50	603.50	484.00	575.00	482.00	552.00	543.50	514.00
Z	-1.59	-0.89	-1.34	-0.34	-4.45	-0.44	-2.88	-2.11	-2.85	-1.47	-1.17	-1.79
Asymp. Sig. (2-tailed)	0.11	0.38	0.18	0.73	0.00	0.66	0.00	0.04	0.00	0.14	0.24	0.07

a. Grouping Variable: islands
1-Male, 2-female, 3-Nuclear, 4-Extended, 5-illiterate, 6-Primary education, 7-Secondary education, 8-Short courses, 9-Unmarried, 10-Married, 11-Widow, 12-Divorced

Source: Primary data

Appendix 4.3: Summary of Kruskal-Wallis group statistics results for respondents' socio-demographic variables (i)- Unguja

Ranks

Variable	***Island***	***N (villages)***	***Mean Rank***
Male gender	North Unguja	6	15.08

	Central Unguja	3	13.00
	South Unguja	12	11.83
	West Unguja	3	9.50
	Total	**24**	
Female gender	North Unguja	6	10.67
	Central Unguja	3	13.33
	South Unguja	12	13.13
	West Unguja	3	12.83
	Total	**24**	
Nuclear family	North Unguja	6	14.00
	Central Unguja	3	14.00
	South Unguja	12	11.46
	West Unguja	3	12.17
	Total	**24**	
Extended family	North Unguja	6	11.42
	Central Unguja	3	12.00
	South Unguja	12	13.67
	West Unguja	3	10.50
	Total	**24**	
Illiterate	North Unguja	6	18.00
	Central Unguja	3	11.17
	South Unguja	12	11.46
	West Unguja	3	7.00
	Total	**24**	
Primary education	North Unguja	6	9.92
	Central Unguja	3	12.33
	South Unguja	12	12.13
	West Unguja	3	19.33
	Total	**24**	
Secondary education	North Unguja	6	8.25
	Central Unguja	3	16.67
	South Unguja	12	14.58
	West Unguja	3	8.50
	Total	**24**	
Short courses	North Unguja	6	12.75
	Central Unguja	3	14.50
	South Unguja	12	12.38
	West Unguja	3	10.50
	Total	**24**	
Unmarried	North Unguja	6	15.08
	Central Unguja	3	11.00
	South Unguja	12	11.96
	West Unguja	3	11.00
	Total	**24**	
Married	North Unguja	6	10.67

	Central Unguja	3	11.00
	South Unguja	12	14.08
	West Unguja	3	11.33
	Total	**24**	
Widow/er	North Unguja	6	12.58
	Central Unguja	3	15.00
	South Unguja	12	11.96
	West Unguja	3	12.00
	Total	**24**	
Divorced	North Unguja	6	11.83
	Central Unguja	3	13.83
	South Unguja	12	11.92
	West Unguja	3	14.83
	Total	**24**	

Source: Primary data

Appendix 4.4: Summary of Kruskal-Wallis group statistics results for respondents' socio-demographic variables (ii) - Unguja

Test Statistics[a,b]												
	Gender		***Family background***		***Educational background***				***Marital status***			
	M[1]	***F[2]***	***N[3]***	***E[4]***	***I[5]***	***PE[6]***	***SE[7]***	***SC[8]***	***UN[9]***	***M[10]***	***W[11]***	***D[12]***
Chi-Square	2.53	0.55	0.78	0.75	6.97	3.82	5.36	1.17	3.46	1.24	0.49	0.63
df	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Asymp. Sig.	0.47	0.91	0.85	0.86	0.07	0.28	0.15	0.76	0.33	0.74	0.92	0.89
a. Kruskal Wallis Test												
a. Grouping Variable: island 1-Male, 2-female, 3-Nuclear, 4-Extended, 5-illiterate, 6-Primary education, 7-Secondary education, 8-Short courses, 9-Unmarried, 10-Married, 11-Widow, 12-Divorced												

Source: Primary data

Appendix 4.5: Summary of Kruskal-Wallis group statistics for respondents' socio-demographic variables village-wise (i) - Pemba

Ranks			
Variable	***Region***	***N (villages)***	***Mean Rank***
Male gender	Mkoani	8	12.31
	Wete	9	10.94
	Micheweni	8	16.00
	Total	**25**	
female gender	Mkoani	8	13.38
	Wete	9	12.72
	Micheweni	8	12.94
	Total	**25**	
Nuclear family	Mkoani	8	13.50
	Wete	9	13.11
	Micheweni	8	12.38
	Total	**25**	
Extended family	Mkoani	8	13.31
	Wete	9	11.28
	Micheweni	8	14.63
	Total	25	
Illiterate	Mkoani	8	14.94
	Wete	9	15.61
	Micheweni	8	8.13
	Total	**25**	
Primary education	Mkoani	8	8.31
	Wete	9	10.78
	Micheweni	8	20.19
	Total	**25**	
Secondary education	Mkoani	8	13.75
	Wete	9	9.00
	Micheweni	8	16.75
	Total	**25**	
Short courses	Mkoani	8	13.00
	Wete	9	13.00
	Micheweni	8	13.00
	Total	**25**	
Unmarried	Mkoani	8	12.88
	Wete	9	11.44
	Micheweni	8	14.88

	Total	**25**	
Married	Mkoani	8	11.38
	Wete	9	11.17
	Micheweni	8	16.69
	Total	**25**	
Widow/er	Mkoani	8	14.44
	Wete	9	13.17
	Micheweni	8	11.38
	Total	**25**	
Divorced	Mkoani	8	13.75
	Wete	9	13.39
	Micheweni	8	11.81
	Total	**25**	

Source: Primary data

Appendix 4.6: Summary of Kruskal-Wallis group statistics for respondents' socio-demographic variables village-wise (ii) - Pemba

Test Statistics[a,b]

	Gender		***Family background***		***Educational background***				***Marital status***			
	M[1]	***F[2]***	***N[3]***	***E[4]***	***I[5]***	***PE[6]***	***SE[7]***	***SC[8]***	***UN[9]***	***M[10]***	***W[11]***	***D[12]***
Chi-Square	2.49	0.03	0.14	0.91	5.35	12.12	5.18	0.00	1.08	3.02	0.76	0.35
df	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Asymp. Sig.	0.29	0.98	0.93	0.63	0.07	0.00	0.07	1.00	0.58	0.22	0.68	0.84

a. Kruskal Wallis Test

a. Grouping Variable: islands
1-Male, 2-female, 3-Nuclear, 4-Extended, 5-illiterate, 6-Primary education, 7-Secondary education, 8-Short courses, 9-Unmarried, 10-Married, 11-Widow, 12-Divorced

Source: Primary data

Appendix 4.7: Summary of ANOVA results for multiple comparisons of respondents' age, income, and expenditure village-wise (i): Unguja

		Sum of Squares	***df***	***Mean Square***	***F***	***Sig.***
Average age	Between Groups	56.542	3	18.847	.733	.545
	Within Groups	514.417	20	25.721		
	Total	570.958	23			
Income from seaweed farming	Between Groups	157699458333.333	3	52566486111.111	1.034	.399
	Within Groups	1016386500000.000	20	50819325000.000		
	Total	1174085958333.330	23			
Income from other sources	Between Groups	3628125000.000	3	1209375000.000	.404	.752
	Within Groups	59920833333.333	20	2996041666.667		
	Total	63548958333.333	23			
Average household expenditure	Between Groups	24687500000.000	3	8229166666.667	.487	.695
	Within Groups	337708333333.333	20	16885416666.667		
	Total	362395833333.333	23			

Source: Primary data

Appendix 4.8: Summary of ANOVA results for multiple comparisons of respondents' age, income, and expenditure village-wise (ii): Pemba

		Sum of Squares	***df***	***Mean Square***	***F***	***Sig.***
Average age	Between Groups	69.071	2	34.536	.705	.505
	Within Groups	1077.889	22	48.995		
	Total	1146.960	24			
Income from seaweed farming	Between Groups	174294444444.444	2	87147222222.222	.820	.454
	Within Groups	2339305555555.560	22	106332070707.071		
	Total	2513600000000.000	24			
Income from other sources	Between Groups	15762500000.000	2	7881250000.000	1.765	.195
	Within Groups	98237500000.000	22	4465340909.091		
	Total	114000000000.000	24			
Average household expenditure	Between Groups	144806500000.000	2	72403250000.000	7.523	.003
	Within Groups	211737500000.000	22	9624431818.182		
	Total	356544000000.000	24			

Source: Primary data

Appendix 4.9: Post-Hoc results for ANOVA multiple comparison analysis village-wise in Pemba

Multiple Comparisons					
Tukey HSD					
Variables	***Region***	***Districts***	***Mean Difference (I-J)***	***Std. Error***	***Sig.***
Average age	Mkoani	Wete	-3.861	3.401	.503
		Micheweni	-1.000	3.500	.956
	Wete	Mkoani	3.861	3.401	.503
		Micheweni	2.861	3.401	.682
	Micheweni	Mkoani	1.000	3.500	.956
		Wete	-2.861	3.401	.682
income from seaweed farming	Mkoani	Wete	-197222.222	158449.308	.440
		Micheweni	-62500.000	163042.993	.922
	Wete	Mkoani	197222.222	158449.308	.440
		Micheweni	134722.222	158449.308	.676
	Micheweni	Mkoani	62500.000	163042.993	.922
		Wete	-134722.222	158449.308	.676
income from other sources	Mkoani	Wete	42083.333	32470.242	.412
		Micheweni	61250.000	33411.603	.182
	Wete	Mkoani	-42083.333	32470.242	.412
		Micheweni	19166.667	32470.242	.827
	Micheweni	Mkoani	-61250.000	33411.603	.182
		Wete	-19166.667	32470.242	.827

Average household expenditure	Mkoani	Wete	180416.667*	47670.067	.003
		Micheweni	131250.000*	49052.094	.035
	Wete	Mkoani	-180416.667*	47670.067	.003
		Micheweni	-49166.667	47670.067	.565
	Micheweni	Mkoani	-131250.000*	49052.094	.035
		Wete	49166.667	47670.067	.565

Source: Primary data

Appendix 4.10: Summary of group statistics socio-demographic: Unguja and Pemba

Variables	*Islands*	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Age of respondents	Pemba	25	47.96	6.91	1.38
	Unguja	24	47.96	4.98	1.02
Income from seaweed farming	Pemba	25	916000.00	323625.30	64725.06
	Unguja	24	264541.67	225936.31	46119.06
Income from other sources	Pemba	25	84000.00	68920.24	13784.05
	Unguja	24	62708.33	52564.23	10729.63
Average household expenditures	Pemba	25	436800.00	121885.19	24377.04
	Unguja	24	635416.67	125524.26	25622.53

Source: Primary data

Appendix 4.11: Independent *t*-test results for group comparison of socio-demographic variables between Unguja and Pemba

		Levene's Test for Equality of Variances		*t-test for Equality of Means*			
		F	***Sig.***	***t***	***df***	***Sig. (2-tailed)***	***Mean Difference***
Age of respondents	Equal variances assumed	6.05	0.02	0.00	47.00	1.00	0.00
	Equal variances not assumed			0.00	43.66	1.00	0.00
Income from seaweed farming	Equal variances assumed	2.55	0.12	8.14	47.00	0.00	651458.33
	Equal variances not assumed			8.20	42.99	0.00	651458.33
Income from other sources	Equal variances assumed	0.37	0.55	1.21	47.00	0.23	21291.67
	Equal variances not assumed			1.22	44.75	0.23	21291.67
Average household expenditures	Equal variances assumed	0.01	0.92	-5.62	47.00	0.00	-198616.67
	Equal variances not assumed			-5.62	46.76	0.00	-198616.67

Source: Primary data

Appendix 4.12: Mann-Whitney U summary statistics results for farmers' skills (i)

		Ranks		
Sub-skills	***Regions***	***N***	***Mean Rank***	***Sum of Ranks***
FMS1	Unguja	24	22.42	538.00
	Pemba	25	27.48	687.00
	Total	49		
FMS2	Unguja	24	20.52	492.50
	Pemba	25	29.30	732.50
	Total	49		
FMS3	Unguja	24	23.44	562.50
	Pemba	25	26.50	662.50
	Total	49		
FMS4	Unguja	24	18.02	432.50
	Pemba	25	31.70	792.50
	Total	49		
FMS5	Unguja	24	24.33	584.00
	Pemba	25	25.64	641.00
	Total	49		
FMS6	Unguja	24	20.69	496.50
	Pemba	25	29.14	728.50
	Total	49		
FS1	Unguja	24	35.00	840.00
	Pemba	25	15.40	385.00
	Total	49		
FS2	Unguja	24	36.75	882.00
	Pemba	25	13.72	343.00
	Total	49		
FS3	Unguja	24	37.50	900.00
	Pemba	25	13.00	325.00

	Total	49		
FS4	Unguja	24	25.00	600.00
	Pemba	25	25.00	625.00
	Total	49		
FS5	Unguja	24	37.50	900.00
	Pemba	25	13.00	325.00
	Total	49		
FS6	Unguja	24	35.50	852.00
	Pemba	25	14.92	373.00
	Total	49		
FS7	Unguja	24	27.50	660.00
	Pemba	25	22.60	565.00
	Total	49		
FS8	Unguja	24	34.52	828.50
	Pemba	25	15.86	396.50
	Total	49		
RKS1	Unguja	24	37.50	900.00
	Pemba	25	13.00	325.00
	Total	49		
RKS2	Unguja	24	37.50	900.00
	Pemba	25	13.00	325.00
	Total	49		
RKS3	Unguja	24	37.50	900.00
	Pemba	25	13.00	325.00
	Total	49		
MKS1	Unguja	24	28.40	681.50
	Pemba	25	21.74	543.50
	Total	49		
MKS2	Unguja	24	25.79	619.00
	Pemba	25	24.24	606.00
	Total	49		

MKS3	Unguja	24	31.92	766.00
	Pemba	25	18.36	459.00
	Total	49		
MKS4	Unguja	24	31.50	756.00
	Pemba	25	18.76	469.00
	Total	49		
MKS5	Unguja	24	13.31	319.50
	Pemba	25	36.22	905.50
	Total	49		
MKS6	Unguja	24	23.71	569.00
	Pemba	25	26.24	656.00
	Total	49		
MKS7	Unguja	24	15.69	376.50
	Pemba	25	33.94	848.50
	Total	49		
MKS8	Unguja	24	20.19	484.50
	Pemba	25	29.62	740.50
	Total	49		

Source: Primary data

Appendix 4.13: Mann-Whitney U summary statistics result for farmers' skills (ii)

Sub-skills	*Mann-Whitney U*	*Wilcoxon W*	*Z*	*Asymp. Sig. (2-tailed)*
FMS1	238.000	538.000	-1.438	0.150
FMS2	192.500	492.500	-2.548	0.011
FMS3	262.500	562.500	-0.776	0.438
FMS4	132.500	432.500	-3.560	0.000
FMS5	284.000	584.000	-0.357	0.721
FMS6	196.500	496.500	-2.845	0.004
FS1	60.000	385.000	-5.081	0.000

FS2	18.000	343.000	-6.020	0.000
FS3	0.000	325.000	-6.928	0.000
FS4	300.000	625.000	0.000	1.000
FS5	0.000	325.000	-6.928	0.000
FS6	48.000	373.000	-5.294	0.000
FS7	240.000	565.000	-1.261	0.207
FS8	71.500	396.500	-4.843	0.000
RKS1	0.000	325.000	-6.928	0.000
RKS2	0.000	325.000	-6.928	0.000
RKS3	0.000	325.000	-6.928	0.000
MKS1	218.500	543.500	-1.718	0.086
MKS2	281.000	606.000	-0.441	0.659
MKS3	134.000	459.000	-3.541	0.000
MKS4	144.000	469.000	-3.317	0.001
MKS5	19.500	319.500	-5.814	0.000
MKS6	269.000	569.000	-0.684	0.494
MKS7	76.500	376.500	-4.943	0.000
MKS8	184.500	484.500	-2.538	0.011

Test Statistics[a]

a. Grouping Variable: Regions

Source: Primary data

Appendix 4.14: Mann-Whitney U summary statistics results for differences in constraints scores (i)

Ranks				
	Islands	*N*	*Mean Rank*	*Sum of Ranks*
GRC1	Unguja	24	29.48	707.50
	Pemba	25	20.70	517.50
	Total	49		
GRC2	Unguja	24	22.65	543.50
	Pemba	25	27.26	681.50
	Total	49		

GRC3	Unguja	24	19.96	479.00
	Pemba	25	29.84	746.00
	Total	49		
GRC4	Unguja	24	36.69	880.50
	Pemba	25	13.78	344.50
	Total	49		
GRC5	Unguja	24	15.23	365.50
	Pemba	25	34.38	859.50
	Total	49		
GRC6	Unguja	24	27.31	655.50
	Pemba	25	22.78	569.50
	Total	49		
GRC7	Unguja	24	20.27	486.50
	Pemba	25	29.54	738.50
	Total	49		
MKTG1	Unguja	24	23.63	567.00
	Pemba	25	26.32	658.00
	Total	49		
MKTG2	Unguja	24	35.31	847.50
	Pemba	25	15.10	377.50
	Total	49		
MKTG3	Unguja	24	22.63	543.00
	Pemba	25	27.28	682.00
	Total	49		
MKTG4	Unguja	24	34.67	832.00
	Pemba	25	15.72	393.00
	Total	49		
MKTG5	Unguja	24	21.50	516.00
	Pemba	25	28.36	709.00
	Total	49		
MKTG6	Unguja	24	17.35	416.50
	Pemba	25	32.34	808.50
	Total	49		
MKTG7	Unguja	24	23.02	552.50
	Pemba	25	26.90	672.50
	Total	49		
MKTG8	Unguja	24	25.48	611.50
	Pemba	25	24.54	613.50
	Total	49		
MKTG9	Unguja	24	15.17	364.00
	Pemba	25	34.44	861.00
	Total	49		
MKTG10	Unguja	24	14.81	355.50
	Pemba	25	34.78	869.50
	Total	49		

FC1	Unguja	24	24.67	592.00
	Pemba	25	25.32	633.00
	Total	49		
FC2	Unguja	24	21.42	514.00
	Pemba	25	28.44	711.00
	Total	49		
FC3	Unguja	24	33.50	804.00
	Pemba	25	16.84	421.00
	Total	49		
FC4	Unguja	24	22.17	532.00
	Pemba	25	27.72	693.00
	Total	49		
FC5	Unguja	24	22.33	536.00
	Pemba	25	27.56	689.00
	Total	49		
PHIC1	Unguja	24	27.19	652.50
	Pemba	25	22.90	572.50
	Total	49		
PHC2	Unguja	24	33.90	813.50
	Pemba	25	16.46	411.50
	Total	49		
PHC3	Unguja	24	23.69	568.50
	Pemba	25	26.26	656.50
	Total	49		
PHIC4	Unguja	24	27.35	656.50
	Pemba	25	22.74	568.50
	Total	49		
PHIC5	Unguja	24	17.63	423.00
	Pemba	25	32.08	802.00
	Total	49		
VAC1	Unguja	24	27.19	652.50
	Pemba	25	22.90	572.50
	Total	49		
VAC2	Unguja	24	33.90	813.50
	Pemba	25	16.46	411.50
	Total	49		
VAC3	Unguja	24	23.69	568.50
	Pemba	25	26.26	656.50
	Total	49		
VAC3	Unguja	24	27.35	656.50
	Pemba	25	22.74	568.50
	Total	49		

Source: Primary data

Appendix 4.15: Mann-Whitney U summary statistics result for significant differences in scores (ii)

		Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	a. Grouping Variable: Islands
Test Statistics[a]	GRC1	192.500	517.500	-2.185	0.029	
	GRC2	243.500	543.500	-1.159	0.246	
	GRC3	179.000	479.000	-2.532	0.011	
	GRC4	19.500	344.500	-5.715	0.000	
	GRC5	65.500	365.500	-4.804	0.000	
	GRC6	244.500	569.500	-1.146	0.252	
	GRC7	186.500	486.500	-2.362	0.018	
	MKTG1	267.000	567.000	-0.711	0.477	
	MKTG2	52.500	377.500	-5.081	0.000	
	MKTG3	243.000	543.000	-1.222	0.222	
	MKTG4	68.000	393.000	-4.788	0.000	
	MKTG5	216.000	516.000	-1.708	0.088	
	MKTG6	116.500	416.500	-4.127	0.000	
	MKTG7	252.500	552.500	-1.018	0.309	
	MKTG8	288.500	613.500	-0.240	0.810	
	MKTG9	64.000	364.000	-4.835	0.000	
	MKTG10	55.500	355.500	-5.306	0.000	
	FC1	292.000	592.000	-0.167	0.867	
	FC2	214.000	514.000	-1.797	0.072	
	FC3	96.000	421.000	-4.584	0.000	
	FC4	232.000	532.000	-1.587	0.113	
	FC5	236.000	536.000	-1.494	0.135	
	PHIC1	247.500	572.500	-1.076	0.282	
	PHC2	86.500	411.500	-4.670	0.000	
	PHC3	268.500	568.500	-0.673	0.501	
	PHIC4	243.500	568.500	-1.188	0.235	
	PHIC5	123.000	423.000	-3.685	0.000	
	VAC1	247.500	572.500	-1.076	0.282	
	VAC2	86.500	411.500	-4.670	0.000	
	VAC3	268.500	568.500	-0.673	0.501	
	VAC3	243.500	568.500	-1.188	0.235	

ANNEXURES

KERALA AGRICULTURURAL UNIVERSITY

COLLEGE OF CO-OPERATION BANKING AND MANAGEMENT

Research title: Analysis of Zanzibar's seaweed industry competitiveness and strategy implication for its improved performance

Schedule for focus group discussions and group interviews

Respondent group: seaweed farmers

SECTION A: SOCIO-ECONOMIC PROFILE OF THE FARMERS

1. Island:
2. Region:
3. Shekhia:
4. Village:
5. Gender: Male: Female:
6. Age (years):
7. Marital status
    a) Unmarried:
    b) Married:
    c) Widow/widower:
    d) Divorced:
8. Type of family: nuclear: extended:
9. Educational background
    a) Illiterate:
    b) Primary education:
    c) Secondary education:

d) Short courses:

10. Other occupations apart from seaweed farming:

a) Fisher:

b) Gleaner:

c) Land-based agricultural activities:

d) Processor:

e) Small business owner:

11. Income from **farming of seaweed** per production cycle (TZS) __________

12. Income from **other sources** apart from seaweed farming per month (TZS) ________

13. Average household expenses per month (TZS) ___________

SECTION B: PRODUCTION AND MARKETING OF SEAWEED

14. Number of years in farming/cultivating seaweed: ____________________

15. Variety of seaweed cultivated: _________________________

a) Spinosum

b) Cottonii

c) Other; specify:

16. Type of farming: Specialized/diversified (*Please circle the option that applies*)

17. Which production method do you practice out of the following?

a) Peg and line method/off-bottom

b) Broadcasting method

c) Rafting method

d) Longline method

18. Number of plots owned: _____________________

19. Production costs of seaweed: __________________________

a. Farming inputs

Farming input	Quantity	Unit of measurement

b. Labour charges

No of labour	Wage per day (TZS)	No. of days worked per production cycle

c. Other costs

Item	Charges per day	No of days
Transport		

Other expenses cost (TZS): ______________________

20. Total volume of dry seaweed obtained per production cycle (average kg):

____

21. Harvesting costs: _______________________

Item	No. of items	Charges per day (TZS)	No of days

22. Selling price per kg of dry seaweed (TZS): ____________________

23. Please specify your source of capital for the farming practice by *circling* the relevant option as appropriate to you: (*you can select* ***more than one*** *source*)
    a) Own savings
    b) Loans
    c) Other: ______________________

24. To whom do you sell your seaweed? Please *circle* as appropriate:
    a) Collection centres
    b) Farmers' associations
    c) Private buyers
    d) Other: ____________________

25. How frequently do you sell your produce?
    a) Every end of the harvest
    b) On-demand only
    c) Other: __________________________

26. Who determines the price of your products?
    a) Self
    b) Collection centres
    c) Private buyers
    d) Other: _______________________

27. Do you apply any pricing strategies to determine appropriate prices for your produce? Yes/No. (*Please circle the appropriate option*)

28. If circled '**yes**' above, please specify the pricing strategy/is adopted:
    a) Cost-based pricing strategy
    b) Market-based pricing strategy
    c) Other: ____________________________________

29. If circled '**No,**' please elaborate on the reasons why you do not apply pricing strategies for your produce
    a) Exporters determine prices
    b) No training in price determination

c) Other:_________________________

30. Do you apply marketing strategies to create demand for your products? Yes/No. (*Please circle the appropriate option*)
31. If circled '**yes'** above, please specify the marketing strategies applied:
32. If circled '**No**,' please elaborate on the reasons why you do not use marketing strategies for your produce:
33. Do you perform value-addition on the harvested seaweed? Please circle as appropriate: Yes/No
34. If circled "**yes**" above, please specify the value-addition processes performed:___________
35. If you selected "**No**", please specify reasons for not doing so by selecting as appropriate from the below-listed challenges:
    a) Lack of start-up capital
    b) Lack of training in the processing of seaweed
    c) Lack of a place for value-addition
    d) Other ________________________________
36. Are you a member of a farmers' association? Yes/No (please circle the appropriate answer)
37. If circled "**yes**" above, please specify the number of years in the group:
38. What benefits are you receiving from the group?
    a) Training
    b) Collective purchases of the produce
    c) Marketing services
    d) Credit
    e) Farm inputs/implements
    f) Other: ________________________________

SECTION C: FARMERS' AGRI-BUSINESS SKILLS LEVELS AND FACED CONSTRAINTS

39. Please rate the following farm productivity skills as applicable to you on a scale of **1** to **5**; **1** being very weak and **5** very strong:

S/N	Skills	Rating
1	Obtaining farming land for seaweed production	
2	Obtaining labour for the production and harvesting of seaweed	
3	Obtaining drying sites	
4	Obtaining a place for storing dried seaweed	
5	Optimal utilisation of the farming area to increase output	
6	Ability to apply appropriate techniques to counteract environmental challenges affecting the production of seaweed	

40. Please rate the following financial skills as applicable to you a scale of **1** to **5**; **1** being very weak and **5** very strong:

S/N	Skill	Rating
1	Understanding and use of financial skills	
2	Obtaining start-up capital	
3	Negotiating competitive interest rates, loan repayment terms, and collateral requirements	
4	Making effective use of various sources of debt capital	
5	Managing financial risks	
6	Monitoring cost of production	
7	Establish appropriate control procedures for cash expenditures	
8	Monitoring revenue uses	

41. Please rate the following marketing skills as applicable to you a scale of **1** to **5**; **1** being very weak and **5** very strong:

S/N	Skill	Rating
1	Pricing skills	
2	Ability to negotiate better prices	
3	Market identification skills	
4	Market planning skills	
5	Market information acquisition skills	
6	Market information interpretation skills	
7	Market communication skills	

42. Please rate the following financial and record-keeping skills as applicable to you a scale of **1** to **5**, **1** being very weak and **5** very strong:

S/N	Skills	Rating
1	Farm inputs records, labour records, and logbooks	
2	Crop production and disposal records	
3	Cash in and out records	

43. Please specify (*by ticking the appropriate option*) if you have received/are receiving assistance from the following seaweed value-chain actors:

S/N	Source of assistance	Inputs (planting materials)	Capital	Training	Marketing
1	Farming groups				
2	Government institutions (to be specified)				
3	Other institutions				
4	Exporting companies (to be specified)				

44. Please rank the following constraints to the marketing of your seaweed:

Constraint	Sub-constraints		Raking (1 – 7)
Government role	i.	Limited provision of training on cultivation techniques, processing and marketing of seaweed	
	ii.	Provision of credit to farmers	
	iii.	Provision of farming implements	
	iv.	Government procurement and trading of seaweed	
	v.	Development of seaweed marketing infrastructure, grading, and standardisation protocols	
	vi.	Establishment of efforts and measures geared towards preventing the exploitation of farmers	
	vii.	Special schemes to support the farming practice	
Constraint	***Sub-constraints***		***Ranking (1-7)***
Production	i.	Farming inputs costs	
	ii.	Labour costs	
	iii.	Labour availability	
	iv.	Lack of knowledge about the latest farming methods	
	v.	Product quality challenges	
	vi.	Stealing of planted seaweed	
	vii.	Conflicts with hoteliers	
Constraint	***Sub-constraints***		***Ranking (1-3)***
Post-harvest challenges	i.	Lack of storage facilities	
	ii.	Lack of drying areas	
	iii.	Lack of processing facilities	

Constraint	*Sub-constraints*	*Ranking (1-4)*
Financial challenges	i. Lack of subsidies from the government	
	ii. Credit attainability	
	iii. Presence of information on available credit options	
	iv. Financial literacy	
Constraint	***Sub-constraints***	***Ranking (1-5)***
Physical infrastructure	i. Lack of nearby collection centers	
	ii. Accessibility of farming sites	
	iii. Blocked roads to the farming sites	
	iv. Lack of farming area	
	v. Lack of nearby financial facilities nearby	
Constraint	***Sub-constraints***	***Ranking (1-10)***
Marketing challenges	i. Low-price offers	
	ii. Limited domestic consumption	
	iii. Limited sources of information concerning potential buyers	
	iv. Limited demand	
	v. Lack of market planning skills	
	vi. Limited marketing channels	
	vii. Lack of market information acquisition skills	
	viii. Lack of market information screening skills	
	ix. Lack of market information interpretation skills	
	x. Lack of market communication and selling skills	

Constraint	***Sub-constraints***	***Ranking (1-4)***
Value-addition	i. Lack of knowledge and training on value-addition	
	ii. Lack of processing facilities	
	iii. Lack of capital	
	iv. Lack of domestic demand for seaweed products	
Constraint	***Sub-constraints***	***Ranking (1-3)***
Environmental	i. Increase of harmful weeds	
	ii. Diseases and epiphytes	
	iii. Destruction of seaweed due to strong oceanic tides and winds	

45. In your opinion, what should be done to improve this farming practice and industry in general?

____

KERALA AGRICULTURURAL UNIVERSITY

COLLEGE OF CO-OPERATION BANKING AND MANAGEMENT

Research title: Analysis of Zanzibar's seaweed industry competitiveness and strategy implication for its improved performance

Schedule guide for exporters

SECTION A: GENERAL PROFILE OF THE EXPORTING COMPANY

1. Name of the exporting company: ______________________________
2. Address: ______________________________
3. Contact details: ______________________________________
4. Type of business form:
    a) Sole proprietor
    b) Partnership
    c) Company
    d) Franchise
    e) Other: __________________________
5. Type of business form-ownership:
    a) Private-domestic
    b) Private-foreign
    c) Private-multinational
    d) Public-private partnership
6. Is the company a subsidiary of an MNC? Please circle as appropriate: Yes/No
7. If circled "**yes**" in question (2) above, please name the MNC that you operate under: ____

8. Year of establishment: ____________________
9. Place of establishment: _______________________________
10. Number of years in operations since establishment: ____________________
11. Main trading activities of the company: ____________________

SECTION B: MARKETING OF ZANZIBAR'S SEAWEED

12. Services provided to farmers of seaweed:
    a) Farm inputs
    b) Training
    c) Collection
13. What is the average price paid for seaweed procured for the past three years? **Value (TZS)**: ___________________________
14. The average amount charged for seaweed exported in the previous three years? **Value (US$)**: ____________________________
15. How does your company set procurement prices for seaweed? You can select more than one option:
    a) Market price
    b) Cost-based
    c) Other: _____________________
16. Seaweed exporting details:

			Volume sold (kgs)		**Value of exports (US$)**	
Year	**Name of buyer**	**Country**	**Variety**		**Variety**	
			Cottonii	***Spinosum***	***Cottonii***	***Spinosum***
2021						
2020						
2019						
2018						
2017						

17. How does your company select export markets? You can choose more than one option:
    a) Historical relationships
    b) Using business experience
    c) By analysis of the company's potential in the prospective export market
    d) Geographical proximity
    e) PESTEL analysis
    f) Using calculated business ratios
    g) Government assistance/lead
    h) Personal visits
    i) No established criteria
    j) Other: ___________________________________
18. What information sources does your company use to obtain information regarding potential buyers of your seaweed? Please select as appropriate. You can choose more than one source:
    a) Sales and cost records
    b) Company personnel
    c) Export agents
    d) Government trade department
    e) Import agents
    f) Own company investigations in a particular foreign market
    g) Industry associations and stakeholders
19. Which global communication strategies does your company adopt when reaching foreign buyers? You can select more than one option:
    a) Branding
    b) Trademarking
    c) Labelling
    d) Personal selling
    e) Advertising
    f) Sales promotion
    g) Direct marketing
    h) None

20. Which mode of entry does your company use to reach foreign buyers? Please select the appropriate option for you:
    a) Direct exporting
    b) Indirect exporting
    c) Other: ________________________________
21. If you selected "direct exporting" above, please specify which direct exporting methods your company utilise when reaching foreign buyers:
    a) Direct exports to end-user
    b) Direct exports to foreign distributors
    c) Direct exports to foreign retailers
    d) Other, please specify:
22. If you selected "indirect exporting" in question 25 above, please specify which indirect exporting methods your company utilise when reaching foreign buyers:
    a) Sales brokers/commissioned agents
    b) Export management companies
    c) Export trading companies
    d) Piggy-backing
    e) Other, please specify:
23. Which statements best apply to your company when deciding how many markets to enter?
    a) Our company gradually enters countries in sequence (*waterfall approach*)
    b) Our company is entering many countries simultaneously (*sprinkler approach*)
    c) Our company was born global and marketed to the entire world from the outset
    d) Other, please specify:
24. Which global product strategies does your company adopt when reaching foreign buyers?
    a) Product standardisation
    b) Product adaptation

c) None
d) Other, please specify:

25. Which global pricing strategies does your company adopt when reaching foreign buyers?
    a) Uniform pricing
    b) Market-based pricing in each country
    c) Cost-based pricing in each country
    d) None
    e) Other, please specify:
26. Which channel entry strategies does your company adopt when reaching foreign buyers?
    a) Company's international marketing headquarters
    b) We operate channels between nations
    c) We have channels within foreign nations
    d) None
    e) Other, please specify:
27. Please select facilities available within your company:
    a) Packing facilities
    b) Storage facilities
    c) Cleaning and sorting facilities
    d) Weighing facilities
28. Does your company have an export marketing plan? Please circle as appropriate: Yes/No
29. Does your company perform value-addition on the raw seaweed procured from suppliers? Please circle as appropriate: Yes/No
30. If circled "**yes**" above, please specify the value-addition processes performed by your company:
31. If selected **"no",** elaborate why your company does not perform any value-addition on seaweed collected:
32. What were the motivating factors for deciding to enter into seaweed export marketing?

SECTION C

Please rate your company's capabilities, relative to your major competitors in the areas outlined below using a five-point scale running 1 (very ineffective in comparison to competitors) to 5 (very effective than competitors)

33. Export market screening and entry strategies

Strategy	***Statements***	***Rating***
Marketing planning	i. Planning and executing situational analysis of internal and external market conditions	
	ii. Planning and executing export marketing research	
	iii. Strategic planning, implementation, and control	
	iv. Setting clear export marketing goals	
	v. Formulating creative export marketing strategies	
Market information acquisition	i. Being able to locate information about potential customers from primary, secondary, internal, and external sources	
	ii. Quickly learning about changes in export customer preferences	
	iii. Discovering competitor strategies and tactics	
	iv. Gaining insights about the marketing from distributors and the channel	
	v. Using multiple information sources to learn about competitors	

Market information interpretation	i. Integrating all available information to gain insights into the export market	
	ii. Combining new information with past research to build a richer market view	
	iii. Analysing market information to effectively understand the export market	
	iv. Identifying emerging trends in the export marketplace	
Market information dissemination	i. Making relevant export market information available to decision-makers	
	ii. Sharing available market information widely within the company	
	iii. Ensuring export market information reaches all interested parties	
	iv. Giving other units in the firm easy access to our export market information	

34. Export marketing mix capabilities

Strategies	***Statements***	***Rating***
Pricing	i. Doing an effective job of pricing the company's products	
	ii. Using our pricing skills to respond quickly to any customer needs and changes	
	iii. Communicating pricing structure and levels to customers	
	iv. Being creative in "bundling" pricing deals	
Product development	i. Export product attributes conform to international standards	
	ii. Product packaging conforming to buyers' specifications	
	iii. Successfully launching new export products	
	iv. Setting aside R&D investment funds to	

	develop new export product	
Channel management	i. Attracting and retaining the best distributors in the company market	
	ii. Satisfying the needs of distributors in this export market	
	iii. Closeness in working with distributors/retailers in this export market	
	iv. Adding value to our distributor's businesses	
Delivery management	i. Quickly delivering products once they are ordered	
	ii. Shipping products overseas on time	
	iii. Making it easy for products to be returned	
	iv. Meeting delivery promises to foreign customers	
Post-sale service	i. Delivering high-quality after-sale service overseas	
	ii. Attracting and retaining after-sale service personnel	
	iii. Training after-sale service personnel	
	iv. Responding quickly to service requests of customers	
Marketing communication	i. Developing effective export advertising and promotion programs	
	ii. Advertising and promotion creativity	
	iii. Skilfully using marketing communications	
	iv. Effectively managing marketing communications programs overseas	
Selling	i. The selling skills of the company's salespeople	

	ii.	Retaining good export salespeople and sales managers	
	iii.	Providing effective sales support to the sales force and distributors	
	iv.	Export sales management skills	

35. Marketing segmentation, targeting, and positioning strategy (STP) implementation effectiveness: To what extent do you **agree** or **disagree** with the following statements regarding how your company's current marketing strategy and associated programs have been implemented? Five-point scale running **1** (Strongly Disagree) to **5** (Strongly Agree).

S/N	***Statements***	***Rating***
1	The company can effectively identify potential country-based or individual consumer groups.	
2	The company can effectively measure and estimate potential foreign consumers' size and purchasing power.	
3	The company can conceptually distinguish markets abroad using set criteria that are distinct and identifiable/actionable.	
4	Potential market segments identified by our company can effectively be reached and served.	
5	The company has developed an effective marketing mix elements programs/value proposition for attracting and serving identified potential segments.	

36. Internal and external marketing strategy implementation effectiveness: To what extent do you **agree** or **disagree** with the following statements concerning how your company's current marketing strategy and associated programs have been implemented? Five-point scale running **1** (Strongly Disagree) to **5** (Strongly Agree).

Strategies		***Statements***	***Rating***
Internal Marketing Strategy Implementation Effectiveness	i.	We have effectively executed the actions detailed in our export marketing plan	
	ii.	We have deployed the resources needed to make our company's export marketing strategy work	

	iii.	Rewards in our company are linked to the requirements of our export marketing plan	
	iv.	Our monitoring/control system is well aligned with the needs of our export marketing plan	
External Marketing Strategy Implementation Effectiveness	i.	The export market channel has been less enthusiastic about supporting our current export strategy than we anticipated	
	ii.	The current export strategy is being received in ways consistent with delivering on its planned objectives.	
	iii.	The marketplace has not responded to our current export marketing strategy in the way we intended	

37. Please rank the following constraints with regard to the marketing of Zanzibar's seaweed as faced by your company:

S/N	***Constraints***	***Sub-constraints***		***Rank (1-7)***
1	Government role	i.	Lack of established seaweed industry market strategy	
		ii.	Conflicting investments priorities	
		iii.	Government perception of the seaweed business	
		iv.	Limited seaweed export promotion measures	
		v.	Lack of seaweed industry policy	
		vi.	Conflicting issuing authorities for export permits	
		vii.	Delays in the export permits processing time	
S/N	***Constraint***	***Sub-constraints***		***Rank (1-8)***

2	Financial control and related aspects	i. Exchange rates	
		ii. Inflation	
		iii. Conflicting compulsory taxes	
		iv. Lack of uniform measurement for administrative charges	
		v. Skill development levies on casual labourers	
		vi. Omission of input expenses in government tax calculations	
		vii. Multiple conflicting government charges	
		viii. Port charges	
S/N	***Constraint***	***Sub-constraints***	***Rank (1-4)***
3	Marketing	i. Limited demand	
		ii. Limited applications of URT's seaweeds	
		iii. Non-availability of the product in sufficient quantity	
		iv. Non-availability of a desirable variety	

34. In your opinion, how can this farming practice and the industry's overall performance be improved?

____

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KERALA AGRICULTURURAL UNIVERSITY

COLLEGE OF CO-OPERATION BANKING AND MANAGEMENT

Research title: Analysis of Zanzibar's seaweed industry competitiveness and strategy implication for its improved performance

Focus group discussion guide for stakeholders of seaweed farming practice in Zanzibar, Tanzania

Stakeholders' institutions: ______________________________________

Location of the discussion: ___________________________

Date: (DD/MM/YYYY): ____ / ____ / _______

Facilitator (s): ______________________________________

Group name/description: ______________________________________

# of male participants: ______   # of female participants: ______

EXPERTS PANEL DISCUSSION GUIDE

This discussion guide aims to identify factors that:

a) Promote (incl. encouraging or facilitating) commercialisation of Zanzibar's seaweed

b) Impede the farming practice and its overall export/export marketing process

Tools to be adopted: Porter's Diamond model and Five forces analysis, SWOC and PESTEL analysis.

PORTER'S DIAMOND MODEL ANALYSIS OF ZSI

Table 1: Sources of competitive advantages for ZSI (i)[1]

Diamond Factor	*Sub-factors*	*Source of competitive advantages/disadvantages?*
Firm strategy, structure and rivalry	Industry strategy, goals, objectives	
	Industry innovation and intellectual property	
	Rivalry	
Factor conditions	Physical resources	
	Human resources	
	Capital resources	
	Infrastructural resources	
	Knowledge resources	
Demand conditions	Segment structure of demand	
	Nature, demand size and number of buyers	
	Rate of growth of home demand	
Related and Supporting Industries	Shared activities in the value chain (marketing, distribution, procurement, production)	

[1] Sub-factors adapted from Porter, 1980

	Shared technologies Shared R&D activities	
Government role	Catalyst/challenger/influencer Impedes	
Chance conditions	Unexpected discoveries/invention Wars Significant shifts in exchange rates Surges in world demand Political decisions by foreign governments Major technological discontinuities	

PORTER'S FIVE FORCES ANALYSIS OF ZSI

Table 2: Drivers of competitive rivalry and profitability potential (i)[2]

S/N	*Forces*	*Driving factors*	*Threat to ZSI profits (low/high)?*
1	The threat of new entrants	• Buyer switching costs • Capital entry requirements • Restrictive government policies • Branding • Economies of scale • First-mover advantages, irrespective of size	•

[2] Five forces and driving factors adapted from Porter, 1980

		• Expected retaliation from incumbency • Unequal distribution advantages	
2	Bargaining powers of buyers	• Number and intensity of buyers • High buyer information • Low switching costs • Nature of offerings (differentiated vs standardised)	•
3	The threat of substitute products	• Low switching costs • High buyer information • Low-priced substitutes • Higher performing substitutes	•
4	Bargaining power of suppliers	• Concentration level of suppliers • Suppliers group do not depend heavily on the buyer for their revenues • High switching costs for buyers • Lack of substitutes for suppliers' products • Suppliers' offerings are differentiated	•
5	Rivalry among existing competitors	• Nature and intensity of competitors • Branding • Product differentiation • Exit barriers	•

BUSINESS ENVIRONMENT ANALYSIS OF ZSI

Table 4: SWOC matrix

Kindly identify the strength, weaknesses, opportunities and threats of ZSI and subsequent impact on its performance (as a threat or opportunity)

Factors	***Critical issues***	***Impact (threat/opportunity)***
Strength of ZSI		
Weaknesses of ZSI		
Opportunities		
Challenges		

Table 7: PESTEL matrix

Kindly identify the political, economic, sociocultural, technological and ecological factors in ZSI's business environment affecting its performance:

Business environment	***Critical issues***	***Impact (threat/opportunity)***
Political-legal		
Economic		
Socio-cultural		
Technological		
Ecological		

CODE SHEET

Farmmgtskills	Farm management skills
Finskills	Financial skills
Records	Record-keeping skills
Mktgskills	Marketing skills
FMS	Farm management skills
FS	Financial skills
RKS	Record-keeping skills
MKS	Marketing skills
GRC	Government-related constraints
MKTG	Marketing constraints
FC	Financial constraints
PHIC	Physical infrastructure constraints
VAC	Value-added constraints

ABSTRACT

ANALYSIS OF ZANZIBAR'S SEAWEED INDUSTRY COMPETITIVENESS AND STRATEGY IMPLICATION FOR ITS IMPROVED PERFORMANCE

By

Nina Joan Burra

(2019-25-003)

ABSTRACT OF THE THESIS

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DEPARTMENT OF RURAL MARKETING MANAGEMENT

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KERALA, INDIA

2023

ABSTRACT

ANALYSIS OF ZANZIBAR'S SEAWEED INDUSTRY COMPETITIVENESS AND STRATEGY IMPLICATION FOR ITS IMPROVED PERFORMANCE

The United Republic of Tanzania (URT) is the leading producer and exporter of red seaweeds under genera *Eucheuma Denticulatum* (commercially known as *spinosum*) and *Kappaphycus Alvezerii* (commercially known as *cottonii*) in Africa and fourth in the global red seaweed industry. The contribution of the URT to the global seaweed industry remains minute (0.30%) despite bringing in considerable foreign currency reserves for the Revolutionary Government of Zanzibar (RGoZ).Zanzibar island produces ninety per cent of total seaweeds from the URT, and the Zanzibar seaweed Industry (ZSI) is the third revenue earner for RGoZ. The industry has brought in significant socio-economic contributions, including; creating employment for rural Zanzibarians and uplifting the rural coastal livelihoods, especially those of women. However, despite its noteworthy contributions, recent times have witnessed ZSIfailing to tap into the growing demand for red seaweed globally. A review of existing literature on the industry revealed several factors inhibiting ZSI from expanding, summarised by two significant factors: its production system and competition from Asian producers. As a result, ZSI has been attracting low-price offers which have led to substantial farm abandonment and a decline in production.

Therefore, the present study titled "Analysis of Zanzibar's seaweed industry competitiveness and strategy implication for its improved performance" was conducted with four main objectives, namely; to perform a structural analysis of the Zanzibar seaweed industry, to assess its trade performance from 2009-2019, to evaluate the export marketing strategies used by the industry and lastly, to identify current constraints faced by the seaweed farmers and exporting companies in Zanzibar. The study adopted a cross-sectional research approach and followed a mixed-method survey design. The study utilised three sample designs, i.e. seaweed farmers, exporters, and representatives of government institutions linked to ZSI. Farmers' sample (592) was selected through multistage, quota and convenience sampling techniques. Exporters (4) and representatives of government institutions samples (9) were selected through purposive sampling. Primary data was collected through group interviews, focus group discussions, pre-tested survey schedules and direct observation. Secondary data was collected through the official websites of FAO, UNICTAD Stat, Zanzibar Revenue Board, Tanzania Revenues Authority, Office of Chief Government

Statcian Zanzibar, International Trade Centre map and World Bank data. The seaweed section, Department of Fisheries Development, Zanzibar, provided data regarding ZSI farmers, exporters and industry's production.

Primary data were analysed using appropriate descriptive and inferential statistical tools in SPSS version 22. Similarly, theoretical models for competitiveness analysis (Porter's five forces and Porter's Diamond Model) and business environment scanning tools (SWOC and PESTEL frameworks) were adopted. Secondary data was analysed using appropriate trade indices. Trend analysis and forecasting were done through the least squares method (exports) and the Holt-Winters smoothing exponential method (production). Preliminary findings from primary data analysis revealed that most farmers were smallholder female farmers (91%). The majority had attained primary education (42%) as the highest qualification. Most of the farmers (42%) were found to be aged between 48-50 years and lived in extended families (94%).The seaweed production system in Zanzibar was found to be off-bottom/peg and line. Production costs were found to be Rs. 10,251 for a 100 m^2ocean area.

The number of seaweed plots owned by farmers differed between Unguja and Pemba, with a maximum of eight plots in Unguja and three in Pemba. Most farmers (32%) were found to earn between Rs. 26,240 – 32,819per production cycle (45-60 days) from seaweed farming.Further, most farmers (65%) made between Rs. 1,607 and 3,290from other sources, including land-based agriculture and small-scale entrepreneurial activities. The average household expenditure for the farmers ranged between Rs. 19,661 and 26,240per month. Farmers in Unguja receive between Rs. 21.42 per kg of dry *spinosum,* while those in Pemba receive Rs. 16.83for the same. The price differences are mainly due to the buying company and seaweed supply per production cycle. However, farmers get paid Rs. 32.90for *cottonii* as it is a highly desired variety by foreign buyers and attracts higher export per unit price than *spinosum*. It was found that a seaweed farmer's margin is 40% in *spinosum* export unit value and 34% in *cottonii* export unit value.

Furthermore, it was found that the number of exporters has significantly reduced from 15 companies in 2013 to seven in 2021. The reduction is mainly due to the seaweed business's unpredicted nature, mainly at the global level. Most of the exporters were found exporters to be foreign-owned/subsidiaries of multinational companies in the Philippines and USA. The exporters were found to have reduced offering farm input subsidies to farmers due to perceived disloyalty from farmers during selling and failure of the RGoZ to recognise farming inputs subsidies as operating expenses hence not factored in during tax calculations. C-WEED and ZANEA companies were found to be the dominant collectors and exporters from Pemba and Unguja, respectively. No exporter was found to perform seaweed value-addition activities.

Analysis of the ZSI's structure revealed that the industry attracts low profit and has a high degree of rivalry due to high buyer power, high supplier power, lack of industry barriers, presence of substitutes and an increased number of similar producers. Similarly, ZSI was foundto lack sources of competitive advantages due to having basic factor conditions, the absence of a domestic market, industry policy, strategy, vision and goals. In addition, the industry was found to have no linkages to other supporting or related industries. The role of the RGoZ in regulating the activities of ZSI was found to be limited. Similarly, analysis of the ZSI business environment revealed several vital findings; a SWOC analysis of ZSI revealedthat ZSI faces challenges such as; fluctuations in global demand and supply of red seaweeds and increased oceanic tidal winds and temperatures.

Similary, PESTEL analysis revealed that the industry faces political-legal challenges, such as a lack of industry policy and conflicting investment priorities by the RGoZ. The economic environment revealed that the industry faces global supply and demand fluctuations of red seaweeds, high unemployment and poverty rates in rural Zanzibar, high-interest rates and inaccessibility of finance and credit sources. Socio-cultural environment revealed negative local attitudes towards seaweeds, and low literacy levels were the industry's key challenges. Analysis of the technological climate environment revealed that ZSI has limited technology integration into its activities. Ecological environment analysis revealed that ZSI faces ecological challenges such as increased temperatures and oceanic tidal waves leading to plant breakage and high die-offs.

Secondary data analysis revealed several key findings. First, between 2010 and 2017, seaweed production in Zanzibar fluctuated significantly. Causes include boom and bust conditions, production challenges and the anticipatory price behaviour of the farmers. Between 2017 and 2020, production further declined mainly due to production challenges and farm abandonments driven by low prices from previous trading years. On the other hand, between 2010 and 2014, exports increased significantly, mainly due to increase in global demand for red seaweed driven by the global hydrocolloid market. Between 2015 and 2017, there was a significant decline in exports mainly due to a reduction in production, specifically of *cottonii,* and a decrease in demand for *carrageenan* at the global level. From 2018 towards 2020, export trends revealed an increasing trend despite a fall in production. This observation is explained by exporting previous unabsorbed logs during the preceding trading years and increased cottonii production.

Instability analysis of production trends revealed that ZSI had a low instability index (18%) between 2010 and 2020, while export volume and value had medium (30%) and high instability (47%), respectively. Further, trade performance analysis revealed that the URT was found to have a low export propensity, trade dependence and RCA values compared to major competitors. The URT was not competitive (competitive index = 0%) in the export of red seaweeds. Comparing export unit prices revealed that URT received the lowest price margins compared to competitors between 2000 and 2013, but from 2014 to 2019, the prices increased significantly. The export unit price increased due to the production of high-priced *cottonii* during the same period. Analysis of market share performance revealed that between 2000s and 2013, the URT was the third largest producer and exporter of red seaweeds globally. However, the country dropped position to 5th in 2015, surpassed by Madagascar and has remained in the same position till present The global seaweed industry was found to be an oligopoly and had a consistently high market concentration index of above 4000 (HHI).

Export marketing strategies utilised by the seaweed exporters in Zanzibar were as follows; exporters select foreign markets based on historical relationships, past sales records and analysis of business potential in the foreign market. Exporters were found to apply product adaptation strategies and used personal selling as a promotion strategy. The pricing strategies used by exporters were identified as cost and market-based. Place strategies identified were direct and indirect exporting. On the evaluation of the perceived effectiveness of the export marketing strategies, there was a high degree of agreement among exporters (W=0.807) that internal implementation strategies, specifically concerning monitoring/control systems in the company, are well aligned with the needs of the company's export marketing plan. Similarly, there was a high degree of agreement among exporters that the marketplace has not responded to the company's current export marketing strategy as intended.

Analysis of constraints revealed that the highest-rated constraints for the farmers differ in Unguja and Pemba concerning government-related production, physical infrastructure and value addition. No differences were observed regarding post-harvest, financial, marketing and environmental constraints. Overall, leading challenges for farmers were the limited provision of farming implements, lack of knowledge about the latest seaweed farming methods, limited farming land, lack of capital for value addition, low price offers, lack of processing facilities and seaweed-related diseases. Exporters ranked lack of seaweed policy, limited demand and taxes as the highest faced constraints. Therefore, ZSI was found to be not competitive mainly due to a lack of sources of competitive advantages and facing several challenges from its business environment. Notwithstanding, this study concludes that ZSI is still a valuable tool for enhancing the welfare of rural Zanzibarians as well as being a contributory source of Zanzibar and URT's national prosperity.

Thus, several approaches are suggested to improve the industry's performance. First, creatinga seaweed-integrated industry policy for the sustenance of ZSI is crucial. The policy, among other things, should focus on efficiently utilising the water resources in Zanzibar, establishing special zones for seaweed farming, establishinggovernment-based procurement and trading, and expanding of marketing channels of ZSI. The policy interventions should also include introducing mechanisms for seaweed disease control and improving extension services to seaweed farmers. At the government level, the interventions should create an enabling environment for foreign direct investment flows into the ZSI to improve its production and value-addition, enhancing exporters' product variety and various risks associated with the oligopsonistic nature of the seaweed industry. Processing and value-addition will create opportunities for ZSI to be linked to its domestic and regional markets. Further, researching ways to improve the quality of exported seaweed variety to enable differentiation in quality at the global level.

In addition, there is an urgent need to increase the pool of marine scientists in Zanzibar by promoting and funding marine education in the URT. Further, farmers' skills should also be upgraded through appropriate training to cope with environmental challenges associated with seaweed production. Development of a marketing plan to tap into new markets for red seaweeds at the global level, for example, the United Kingdom, Germany, Canada and the Netherlands, is crucial. Similarly, remarketing URT seaweed exports in the human food category apart from industrial raw material can be an innovative market strategy to circumvent the oligopsony nature of the global seaweed trade.Revival of seaweed farmers' associations through capacity building (leadership training, revising the existing structure, financial assistance) and establishment of seaweed-related cooperative societies is vital to aid

ZSI’s efficiency and productivity. Lastly, there is a need for active participation and collaboration of marketing and aquaculture academia in the URT with ZSI’s exporters with regard to global seaweed industry trends and market conditions.

PLATES

A seaweed farm in Jambiani

Interaction with seaweed farmers

A farmer explaining the seaweed farming process

Harvested seaweed

Drying of seaweeds

Seaweed value-addition site (i)

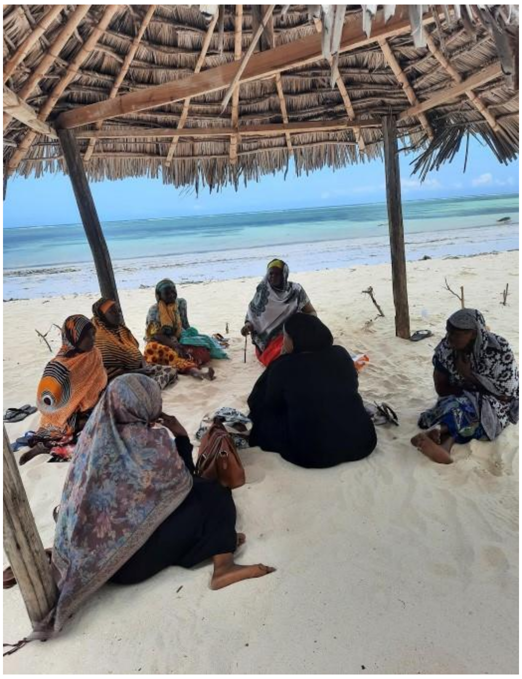
Seaweed value-addition site (ii)

Value-added seaweed products (i)

Value-added seaweed products (ii)

Group discussions with seaweed farmers (i)


Group discussions with seaweed farmers (ii)

Group discussions with seaweed farmers (iii)

Panel discussions with government representatives, Zanzibar (i)

Panel discussions with government representatives, Zanzibar (ii)