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Factors Affecting Seaweed Exportation in Tanzania

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Abstract:

Seaweeds are among of the marine macroalgae which are also known as green (Chlorophyta. For the women of Zanzibar's coastal communities, this is a vital economic maricultural activity. Now more than ever, seaweed farming is seen as a promising new industry with the potential to improve the economic standing of coastal communities. A number of changes in Zanzibar's trade policy have been made to boost the seaweed export industry. Yet, both domestic output and global exports of seaweed have been steadily falling for several years. Zanzibar's efforts to boost human development and raise living standards due to the decline of seaweed exports are in jeopardy. Using time series data collected between 1985 and 2021 and evaluated using the vector error correction technique, this research examines the determinants affecting seaweed exports. According to the time series analysis, both long-term and short-term seaweed exports were positively impacted by GDP and FDI at the 1% significance level, whereas long-term seaweed exports showed a weak significant negative influence from inflation at the 5% significance level. The government of Tanzania and other stakeholders are urged to increase the country's gross domestic product (GDP) by rapidly industrializing and bettering agriculture, attracting more foreign direct investments, and providing excellent service to international clients. In addition, the country's inflation rate should be stabilized through the implementation of monetary and fiscal policies to reduce inflation, which would also increase seaweed exports.

Key words: Seaweed, Error Correction Model, Export, Zanzibar

Introduction:

Seaweeds are among of the marine macroalgae which are also known as green (Chlorophyta). They are widely used as food, as ingredients in cosmetics and fertilizers, and in hydrocolloid production (For example: agar and alginate). They have a lot of significance as they contribute in supplying oxygen to the sea and act as one of the principal producers in the sea food chain (Chan et al, 2006). It is one of the significant economic maricultural activities for coastal inhabitants in Zanzibar especially women. Nowadays, Seaweed farming is also regarded as a great alternative source of revenue that rises coastal people's socioeconomic status. In addition, many people are employed in seaweed cultivation about 21,970 seaweed farmers were employed in 2010 while 21,000 families are stated to be engaged in seaweed cultivation (The RGZ, 2014). It also produces money from foreign nations and provides an opportunity for coastal people especially women, to earn revenue for their families and themselves (Msuya, 2012; Valderrama, 2013).

The economy of Zanzibar mainly depends on the agricultural sector, particularly on exports of cloves and seaweed. Nevertheless, the dependence of the economy on clove and seaweed exports implies that there are few commodities for

export on the Island. Seaweed from Zanzibar is exported to China, Korea, Vietnam, Denmark, Spain, France and the US. It has become the third largest source of income and accounts for nearly 90% of its marine exports. (RGOZ, 2019).

The Island has historically been the third largest exporter of seaweed in the world, after the Philippines and Indonesia. But exports fell by 4,000 tonnes last year from the 2012 high of 15,000 tonnes. (BBC 2014, March). Moreover, Seaweed export volume also experienced fluctuation over years where a sharp decline was also noticed between 2014 and 2017. Despite a notable increase in 2018, export volume declined from 8700 tons in 2019 to 8000 tons in 2020. Fluctuations in seaweed export volume are linked to fluctuations in production which is hindered by various problems such as occurrence of ice-ice disease which have been a source of production shrinking. Zanzibar has a huge market potential to widen its export base as the quantity of seaweed produced is higher than the quantity exported, and it can produce more if the identified constrains are addressed. (RGOZ, 2019).

Different literatures have point out the importance of export trade as one of the most important sources of foreign exchange in any country. Some scholars like RiveraBatiz and Romer (1991) and Kingu (2014) succinctly support this premise. They argue that export trade stimulates economic growth and development through improvement of balance of payments deficit, enhancing diffusion of technologies, stimulating external demand for domestic products, increasing domestic production and efficient allocation of resources. Others like Krugman and Venables (1995) contend that export trade tends to kill domestic infant industries particularly in developing countries where the industries cannot compete with those in developed countries. The current study considers export trade as a key for socio-economic development in the sense that the argument of the opponents of export trade can be addressed by an import substitution strategy using foreign exchange earnings from exports (Rodrigues, 2010).

Seaweeds are among of the marine macroalgae which are also known as green (Chlorophyta). They are widely used as food, as ingredients in cosmetics and fertilizers, and in hydrocolloid production (For example: agar and alginate). They have a lot of significance as they contribute in supplying oxygen to the sea and act as one of the principal producers in the sea food chain (Chan et al, 2006). It is one of the significant economic maricultural activities for coastal inhabitants in Zanzibar especially women. Nowadays, Seaweed farming is also regarded as a great alternative source of revenue that rises coastal people's socioeconomic status. In addition, many people are employed in seaweed cultivation about 21,970 seaweed farmers were employed in 2010 while 21,000 families are stated to be engaged in seaweed cultivation (The RGZ, 2014). It also produces money from foreign nations and provides an opportunity for coastal people especially women, to earn revenue for their families and themselves (Msuya, 2012; Valderrama, 2013).

The exchange rate and export volume have a positive and considerable association (Allaro, 2015; Bereket, 2020; Karagöz, 2015; Karamuriro & Karukuza, 2015). Exchange rate and export volume were found to be negatively and statistically significantly correlated in a number of studies (Mengistu, 2014; Sertoglu & Dogan, 2016; Victoria & Samuel, 2017; Zeray & Gachen, 2014). However, Haitho (2013) found a significant and negative correlation between export volume and exchange rate. According to certain studies, agricultural exports and GDP have a favorable and considerable relationship (Bekele & Mersha, 2019; Cheffo, 2020; Geda & Seid, 2015;

Haitho, 2013; Hutchinson, 2019; Kebede, 2016). Karamuriro and Karukuza (2015) conducted a panel data analysis on Uganda's export performance from 1980 to 2012 and found a substantial and negative correlation between export and GDP. Gururaj et al. (2016) and Narayan & Bhattacharya (2019) found a significant and negative correlation between agricultural exports and the consumer price index.

Agricultural export determinants vary by context. Sharma (2001) and Babatunde (2009) show that the currency rate is a crucial factor determining export performance in India and sub-Saharan Africa. According to Ahmed (2000) in Bangladesh, Bashir (2003) in Pakistan, and Santos-Paulino (2006) in the Dominican Republic, trade liberalization has an impact on export performance. Menji (2010) demonstrates using co-integration analysis that terms of trade, real effective exchange rate, and foreign direct investment (FDI) all influence Ethiopia's export performance. African exports are also impacted by GDP manufacturing share, FDI, and per capita income (Mold and Prizzon 2008). Gasheja et al. (2017) used the vector error correction (VEC) model to study Rwandan exports. That analysis included data from 1976 to 2013. Export growth was enhanced by GDP, FDI, savings, and industrial value added. Using ordinary least squares (OLS), Abdulai and Rieder (1995) and Abolagba et al. (2010) in Nigeria show that rainfall determines cocoa exports but domestic output, producer price, currency rate, domestic consumption, and interest rate affect rubber exports. Kingu (2014) found that the real exchange rate and world market price maximize clove export earnings.

Importantly, while Zanzibar's economy substantially depends on seaweed exports following clove exports, there is inadequate evidence on the factors that determine seaweed exports on the Island. In addition, most of the studies that have been done on exports have used OLS modelling, which is a weak estimation method; therefore, the results are not reliable. To avoid the problem to produce erroneous the researcher uses the error correction model (ECM).

Methodology:

Mostly secondary data was used for this study. This data was obtained from a variety of national and international entities, including the International Monetary Fund, the World Bank, The Food and Agriculture Organization (FAO), Bank of Tanzania (BOT), theEconStats, and the Afristat. The vector error correction (VEC) model is utilized in the quantitative analysis in order to make an estimate of the seaweed export response in Zanzibar from the years 1985 to 2021. The cointegration method and the VEC model were utilized in the research project to assess the short-run and long-run effects of several factors that determine seaweed exports. Before beginning the model estimating process, several processes, including tests for stationarity and cointegration, were taken into consideration. This method is superior than modelling with the ordinary least square (OLS) because it provides both short-run and long-run correlations between the variables. Granger (1986), which is cited in Gujarati (2004), claims that testing for unit root and cointegration of the regression residual is an essential condition because it is a pre-test to eliminate the possibility of producing spurious regression output. This assertion is supported by the fact that testing for unit root and cointegration of the regression residual is a prerequisite.

Results:

Prior to beginning the process of estimating the model, a test for stationarity based on the unit root was carried out. In the results, there was not one variable that was shown to be constant. After conducting a

differencing and then retesting the data, the researcher discovered that all of the variables were stationary.

1. Findings from long run model:

The findings from table 1 show that, GDP and FDI were statistically significant at one (1) percent level of significance. Both have positive relationship with export of seaweed. Moreover, the findings also show that there is weak significant negative relationship between inflation and seaweed export volume at 10% level of significant. Thus, an increase of GDP by 1% percent will increase exportation of seaweed by 23.53%. On the other hand, an increase of FDI by 1 percent will increase exportation of seaweed by 3.84 percent while a 1% rise in inflation rate will decrease seaweed export volume by 19.22%.

The findings are quite similar with Gururaj et al., (2016); Narayan & Bhattacharya, (2019) discovered a negative and substantial link between consumer price index and agricultural export. Njong, (2008); Amelia and Santos, (2000) also reported that FDI boosts export structure in emerging nations. Moreover, Mold and Prizzon (2008); Gasheja et al (2017) revealed that GDP boosted export growth.

The results from the long run model also revealed that the R-squared was 0.7240, indicating that 72.40% of the variations in seaweed exports were explained by the variables specified in the model. The F-statistical probability of 0.000 implies that the model, as a whole, was statistically significant at the 1 % level of significance.

Table 1 Long run model

Variables	Coefficients	Standard Error	P>|z|
DGDP	0.2352	0.0383	0.000
DExchange rate	619.7389	430.46	0.160
DInflation	-0.1922	0.1106	0.092
DFDI	0.03841	0.0046	0.000
Constant	-5002.77	17824.7	0.781
R-squared	0.7240		
Adj R-squared	0.6884		
F (4, 31)	20.33		
Prob> F	0.0000		

Source: Researcher own computation, 2023

2. Engle-Granger tests for cointegration result:

The Engle-Granger test for cointegration was performed before estimation of the short run model to see if there was cointegration between the series—that is, testing if the variables had long run and stable dynamics. Table 2 depict the result from the test and it revealed that the variables were cointegrated and have stable dynamics. Thus, test statistic value is greater than critical value of 5% suggesting, the results indicate that there existed a long-run equilibrium relationship between the series.

Table 2 Engle-Granger test for cointegration

	Test Statistic	1% Critical value	5% Critical value	10% Critical value
Z(t)	-5.641	-5.620	-4.827	-4.442

Source: Researcher own computation, 2023

3. Short run model results (ECM):

The findings from table 3 show that, GDP and FDI were statistically significant at 1% level of significance. Both have positive relationship with export of seaweed. Thus, an increase of GDP by 1% percent will increase exportation of seaweed by 14%. On the other hand, an increase of FDI by 1 percent will increase exportation of seaweed by 3.99 percent.

The results from the ECM model presented in Table 3 show that the R-squared was 0.8706, indicating that 87.1 per cent of the variations in seaweed exports were explained by the variables specified in the model. The F-statistic probability of 0.000 implies that the model, as a whole, was statistically significant at the 1% level of significance. The coefficient of the error correction term in the first cointegration equation measured the speed of adjustment. The -1.011 indicates that about 101% departure from long-run equilibrium was corrected in each year. Put differently, the previous period's deviation from long-run equilibrium was corrected in the subsequent period at an adjustment speed of 177 per cent. The p-value of 0.000 shows that the speed of adjustment was statistically significant at the 0.1 per cent level.

Table 3 Short run model

Variables	Coefficients	Standard Error	P>|z|
DGDP	0.25	0.03	0.000
DExchange rate	462.87	350.30	0.197
DInflation	-0.12	0.08	0.133
DFDI	0.04	0.00	0.000
Error	-1.01	0.19	0.000
Constant	-470.40	14858.07	0.975
R-squared	0.85		
Adj R-squared	0.87		
F(5, 29)	38.83		
Prob> F	0.0000		

Source: Researcher own computation, 2023

4. Normality test for residuals:

After estimation of the short run model (ECM), Shapiro-Wilk W test for normal data was used to check whether the predicted residuals in the model were normal distributed or not. The findings from table 4 revealed that cannot reject the hypothesis residuals in the estimated model is distributed normally since p value is greater than 0.05%

Table 4 Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
Residuals	35	0.9639	-4.827	0.530	-4.442

Source: Researcher own computation, 2023

5. Portmanteau test for white noise Test for residuals:

From table 5 the findings depicted p value is greater than 0.05% that the residuals are white noise this prove that the estimated model is adequate.

Table 5 Portmanteau test for white noise

Portmanteau (Q) statistic	56.6833
Prob > chi2(15)	0.0702

Source: Researcher own computation, 2023

Conclusion:

The regression result showed that GDP and FDI are positively and significantly related to Zanzibar seaweed exports while inflation has a weak negatively and significantly related to Zanzibar seaweed exports. The study recommends to the government of Tanzania and to other stake holders to actively promote foreign direct investments, to handle the oversee customers with a great care, promoting exports to the oversee through its organs such as TANTRADE, and improving the Tanzanian GDP through rapid industrialization and agriculture improvement. In addition, the country's inflation rate should be stabilized through the implementation of monetary and fiscal policies to reduce inflation, which would also increase seaweed exports.

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