Fisheries Growth and its Economic Contribution to Zanzibar

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Abstract

This paper examines the contribution of fishing on economic growth of Zanzibar, it also established the relationship between values collected from fisheries and economic growth of Zanzibar. The study used secondary data obtained from Zanzibar Statistical Abstracts downloaded from the website of the Office of Chief Government Statistician and other resources from different websites. The data covered the period from 2002 to 2023. The result showed the fish production in Zanzibar increased by a fold of 3.9 in a period of 22 years, starting form 20,343.tonnes in 2002 to 80,085 tonnes in 2023, the value of fish produced increased in Zanzibar by a fold of 45.4 in a period of 22 years, starting form TZS 12.537295 Billion in 2002 to TZS 569.080 Billion in 2023. The contribution of fisheries to the economic growth shows a continual increase and decrease at different time periods, it increased from 1.1% to 5.8% in 2015, then decreased to 5.5 % then increased to a maximum of 15.1% in 2023. The regression result for fisheries values, fish production and economic growth revealed positive significant coefficient of 0.3041 between fisheries value and economic growth and this suggested that the two variables have positive relationship, on the other hand the regression revealed positive but not significant coefficient of 00.0936 between fisheries production and economic growth.

Keywords: fisheries production, fisheries value, contribution, productivity, Zanzibar.

1. Introduction

Fisheries sector is one among the growing sector in the world, it contributes to the large extent for providing nutritious food and provide for employment for various countries in the world. It was that estimated that the world per capita fish consumption was increased from an average of 9.9 kg in the 1960s to 19.2 kg in 2012, and 58.3 million people are employed in fisheries among those only 37 percent engaged full time (FAO, 2014). In 2022 the fish production was estimated to be 223.2 million tonnes globally with value estimated at USD 472 billion, and estimated human consumption 156 million tonnes of fish production which is equivalent to an annual supply of 20.7 kg per capita (FAO,2024).

The development of Fisheries sector is important for the countries, but the sector often remain underdeveloped and unexploited, the share of fishery exports was observed to increase from 34.6 per cent in 1981 to nearly over 50 per cent in 2013 for the non-Least Developed Countries (LDC), on the other hand for the same period of time fishery exports the share of LDC increased from 1.6 to 3.5 percent (UNCTAD, 2017).

In Zanzibar, the fisheries is one among the priorities of the blue economy, as it provides nutrient reach food for the people of Zanzibar (RGoZ, 2020). Fisheries was identified as one among the comparable advantage sectors that can trigger the economy of Zanzibar, it generates employment and hence help to reduce poverty for those employed in the sector (vision.2050). It also employed more than 24,000 artisanal fishers and provide employment for nearly 3,000 fish traders (Feid, 2005).

Table1 below shows percentage changes from year to year calculated by author for fisheries production, and fisheries value for Zanzibar. The Table revealed unstable increase and decrease for both fish production and fish value realized at different years.

Table 18: Percentage changes for fisheries production, and fisheries value in Zanzibar

YEAR	% change Production	% change Value	YEAR	% change Production	% change Value
2002	-	-	2013	4.4	8.4
2003	2.6	5.2	2014	7.4	13.5
2004	4.8	40.8	2015	3.4	7.1
2005	6.3	32.9	2016	-0.6	0.2
2006	0.1	7.7	2017	3.4	20.5
2007	1.3	30.4	2018	1.1	14.6
2008	5.2	6.5	2019	3.6	4.6
2009	2.4	29.3	2020	3.8	4.4
2010	1.2	29.5	2021	23.6	15.5
2011	11.9	38.7	2022	31.2	65.0
2012	2.3	20.4	2023	29.6	45.4

Source: *the figure drawn from data obtained from Zanzibar Statistical Abstracts*

The aim of this paper is to:

i. Reveal the trends of fish production and fish value for Zanzibar for a period of 22 years.
ii. Find out whether there is any growth of fish production and fish value and their patterns of growth in Zanzibar
iii. Establish the contribution of fisheries in Gross Domestic Product (GDP) of Zanzibar for the last 22years.

2. Literature Review

Fisheries was estimated to provide 10 to12 percent for livelihoods of the world's population, and in 2014 it provided employment of 56.6 million people among who 36 percent were employed in fulltime and 23 per cent is part time in both production and support services. (UNCTAD, 2017)

Bangladesh has found an increased trend of overall fish production during the last 18 years, its production increased from 17.81 lakh metric tons to 41.34 lakh metric ton in 2016–17 (Shamsuzzaman, 2020)

Fishing is among the important economic activity in Zanzibar, as in other parts of the world fishing industry in Zanzibar provide nutrition and food security, livelihood, employment, exports and foreign currency (RGoZ, 2020). Fisheries sector contributed 4.9% to the growth domestic product (GDP) in 2020 and the total fish production in Zanzibar was estimated at 38,017 in 2020 (OCGS, 2021).

The study conducted at the three coastal villages of Kizimkazi, Matemwe and Nungwi of Zanzibar Island to study the impact of tourism on the income generating activities of the local fishers along the Coast of Zanzibar Island, revealed that the rapid development of tourism along the coastal villages of Zanzibar Island led to a general increase in Growth National Product (GNP) of Zanzibar and help in improvement of income generation activities of the local fishers (Benansio etal.2016)

Heid (2005) identified some factor that can help, to prepare fisheries sector in Zanzibar to increase its contribution to the economy of Zanzibar. These factors include, investment in handling capture fisheries, investment in aquaculture, investment in fisheries infrastructure, investment in seaweed farming and processing and Government support for investment.

Deng (2020) identified factors leading to reduction on fish production as inefficient fishing gears, poor transportation access, poor postharvest handling, low price at the landing site, improper market place, and fishing methods are of a subsistence basis

The analysis on the contribution of fisheries production on economic growth using the Auto Regressive Distributed Lag (ARDL) model for the data of 1990-2019 at Türkiye, revealed positive relationship between fisheries production and economic growth in the long-term.(Eyüboğlu &Akmermer ,2024).

The investigation on the relationship between rice production, fisheries production and gross domestic product in Bangladesh using annual time series data for the period of 1971 to 2017 revealed positive not significant effect of fisheries production on gross domestic product (GDP), (Dey, (2020).

The examination of the long-run connection between marine fish production, economic growth, and food security. Using annual panel data for the period of 2000–2019 for six Gulf countries shows a positive relationship between fish export and GDP (Elzaki, 2024).

3. Data and Methodology

This study examines the relationship between fisheries production, Fisheries Value (fisheries) on economic growth of Zanzibar. The data were collected from Zanzibar statistical abstracts of 2007, 2017, 2020, 2023 and Zanzibar economic survey of 2013 downloaded from the website Office of Chief Government Statistic (OCGS), the data were presented in Tanzanian Shillings (TZS). The data used in analysis covered the period of 2002 to 2023.The data was tested for the unit roots using the Augmented Dickey-Fuller test, Johansen's integration test, the long run relationship was tested using regression analysis, correlation test, and stability of the model was tested using the CUSUM. The data involved three variables; growth domestic product (GDP) as dependent variable and Fisheries Value (fisheries) and fish production as independent variables, all two variables are measured in Billion Tanzanian Shillings (TZS), and also all variables were transformed to natural logarithm. The results were shown in tables and figures. Fisheries value is measured in TZS and fisheries production is measured in Tons.

The specification for the regression model used is shown below

$$LnGDP = \alpha + \beta_1 \ Ln \ fisheries \ Value + \beta_2 \ Ln \ Production + \mu$$

Where

α is constant

β_1 is a coefficient of Ln fisheries,

β_2 is a coefficient of Ln Units and

μ is error term

This study defined contribution as Fish value per GDP and productivity as fish value per production units of fish

4. Results and Discussion

4.1 Annual fish production trends in Zanzibar

The number of fish production in Zanzibar increased from year to year, figure 1 below shows the number of units produced from 2002 to 2023, and the figure shows that fish production has no stable grows, in some years increased and in some years decreased. From 2002 to 2015 it grew by annual growth rate of 3.8 percent and from 2016 to 2023 it grew by annual growth rate of 13.1 percent, and in 2016 the annual growth rate decreased to 3.5 percent. From 2020 to 2023 annual growth rate increased to 28.1percent.

The calculated fish values per production (productivity) increased from 0.62 in 2002 to 2.40 in 2010 then increased to 3.51 in 2012 then rose to 4.02 in 2016, then it raised to 6.33 in 2022 and attained a maximum of 7.11 in 2023. The trend of productivity shows positive increase, meaning fish value per production increased positively, this motivate fisheries agents and other stakeholder to invest in Zanzibar.
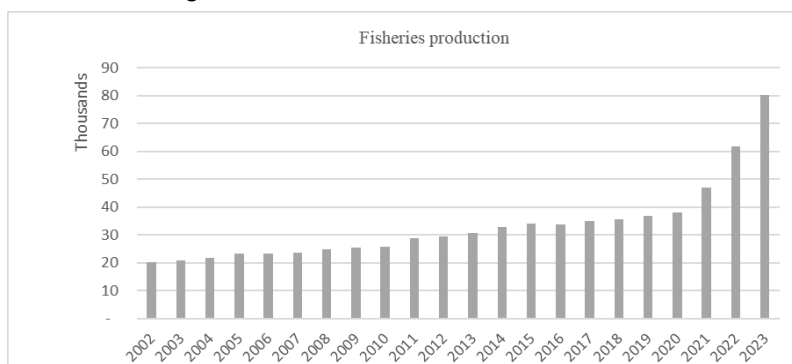

Figure 1: Fisheries production

Source: Author (from data obtained from Zanzibar Statistical Abstracts)

4.2 Trend of contribution per Growth Domestic Product (GDP)

Figure 2 below shows fisheries values from year 2002 to 2023. The figure shows that, the value of fish values increased exponentially from year 2002 to the year 2023. The value increased from TZS12.54 Billion in 2002 to 103.18 in 2012 then increased to 188.01 Billion in 2018 and reached 569.08 in 2023, the calculated fish values per GDP (contribution) increased from 1.1% in 2003 to 2.3 in 2007 then increased to 3.5% in 2010 then rose to 6.6 % in 2018 then decreased to 6.4 % 2019 then it raised to 11.2% in 2022 and attained a maximum of 15.1% in 2023. The trend of contribution shows positive increase, meaning fish value has positive contribution to the economic growth of Zanzibar.

The calculated annual growth rate of fish value from 2002 to 2023 is 18.9 percent. It grew by annual growth rate of 40.5 percent from 2020 to 2023.

The growth in fish production and fish values was contributed by various initiative introduced by government of Zanzibar including developing blue economy policy, giving training to fishermen, new investments in fisheries gears, lending new boats to fisherman communities.

The trends reveals that there is potential for benefiting from fisheries sector advocated by Heid, (2005) and reducing factors revealed by Denng, 2020).
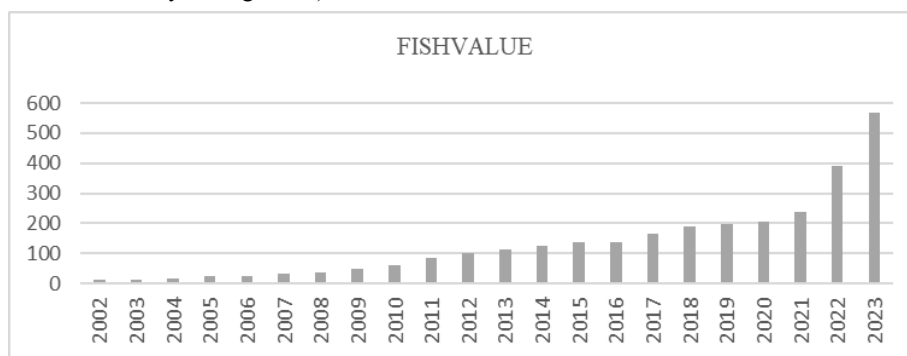

Figure 2: Value of fish Production

Source: Author (from data obtained from Zanzibar Statistical Abstracts)

4.3 Characteristic of data used in analysis

The table 2 below shows descriptive statistics for the GDP, fish production, fish value, contribution and productivity. These variables are mean, median, maximum, minimum, standard deviations.

The averages for GDP, fish production, fish value, contribution, and productivity are 2199.64, 33330.64, 133.09, 0.05 and 46.64 respectively. The Growth domestic product GDP shows the TZS 1148.0Billion and a maximum value of TZS 3759.0 Billion with an average value of TZS 2199.64 Billion. The fish Production of Zanzibar has the minimum value of 20343.Tons and a maximum value of 80085 Tons with average value of 33330.64 Tons. The fish value of Zanzibar has the minimum value of TZS 12.54 Billion and a maximum value of TZS 569.08 Billion with average value of TZS 133.09 Billion. The contribution of fish value per GDP for Zanzibar has the minimum value of 0.01 and a maximum value of 0.15 with average value of 0.05. The productivity shows the minimum value of TZS 0.62 Billion and a maximum value of TZS 1000 Billion with average value of TZS 46.64 Billion and

In general Table 2 reveals higher variability in productivity, this suggest that there was higher price variations for fish at different seasons.

Table 19: Characteristic of Data

	GDP	Production	fish value	Contribution	Productivity
Mean	2199.64	33330.64	133.09	0.05	46.64
Median	2046.50	30062.00	107.53	0.05	3.64
Maximum	3759.00	80085.00	569.08	0.15	1000.00
Minimum	1148.00	20343.00	12.54	0.01	0.62
Std. Dev.	794.14	14173.66	134.69	0.03	207.83

Source: Author (from data obtained from Zanzibar Statistical Abstracts)

4.4 Relationship between Fisheries Values and Growth Domestic Product

Before estimating the long run relationship between fisheries values and growth domestic product were tested for the unit root test and cointegration, and stability test after generating the model.

4.4.1 Unit root tests

This test is conducted so as to avoid misleading spurious regression. Testing the order of integration is a pre-requisite for nearly all time series analysis. The results of ADF unit root test supported that all variables are integrated, all variables are unit root at level and become non-unit root at the first difference T-statistics and PV in for. -4.404682 (0.0028) and -4.404682 (0.0420) for GDP and Fisheries Value respectively, meanwhile fish production obtained a stationary at second difference with T-statistics and PV in bracket -4.713760 (0.0016)

4.4.2 Cointegration

The Johansen's cointegration test is used to observe long-run relationship between the dependent and independent variables. The results was presented in Table 3. The results suggested the presence of unique co-integrating relationship among the variables under consideration at 5% level of significance. Since trace statistic is 34.91416 is greater than critical value and the probability of 0.0118 is less than 5 percent, we reject the null hypothesis (no cointegration equation exists). This suggests that the series under consideration are determined by at most one common trends, which indicates our variables have long-run equilibrium relationships. This means that fisheries value, level of production and economic growth has long term relationship.

Table 20: Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.683662	34.91416	29.79707	0.0118
At most 1	0.354491	11.89525	15.49471	0.1620
At most 2	0.145335	3.140918	3.841466	0.0763
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author (from data obtained from Zanzibar Statistical Abstracts)

4.4.3 Estimate long run relationship regression

Table 4 shows the regression results between Lnfishvalue, Ln production (independent variables) and LnGDP (dependent variable), the table revealed that Lnfishvalue has positive, significant coefficient of 0.304092 and can influence the economic growth in Zanzibar. This means fisheries value has positive relationship to the economic growth of Zanzibar and it contributes TZS 30.41 for every 100 TZS of the GDP of Zanzibar, this result resemble *.(Eyüboğlu &Akmermer ,2024)*. On other hand production has a positive non-significant coefficient of 0.093567, this means that it is not significant in explaining the GDP of Zanzibar, this result resemble *(Dey, (2020)*.

The regression model was tested for stability CUSUM of square test at 5 percent and was found to be stable, it can be used for making estimation

Table 21: Regression

Dependent Variable: LNGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.326155	1.042278	5.110110	0.0001
LnProduction	0.093567	0.115062	0.813190	0.4262
Lnfishvalue	0.304092	0.036788	8.266152	0.0000
R-squared	0.968945	Mean dependent var		7.633322

Source: Author (from data obtained from Zanzibar Statistical Abstracts)

5 Conclusion

This paper intended to examine the contribution of the fisheries to the economy of Zanzibar, using secondary data from 2002 to 2023 obtained for Zanzibar. The result revealed that the fish production has shown positive trend, it increased nearly for four folds in two decades, on the other hand the value of fish produced positive trend and value of fish sold increased for nearly 45.4 in period of two decades. The contribution of fisheries to the economic growth was not stable, it shows a continual increase and decrease at different time periods, and reached the maximum point at 15.1 percent in 2023.The study also revealed the existence of long long-term relationship between fisheries values, fish production and economic growth. The results also revealed positive significant relationship between fisheries values and economic growth and the model was found to be stable

This study will help, the policy-makers and Zanzibar Fisheries Company (ZAFICO) and other fisheries agencies in the world, in their efforts to reshape the industry, towards an increased economic growth and attaining sustainable fisheries activities

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Appendix

Year	GDP	Fish value	Production	lnGDP	lnfishvalue	LN Production	Productivity	Contribution
	Tzs billion	Tzs billion	Tons				Tzs billion/Tons	
2002	1,148	12.5373	20,343	7.0458	2.5287	9.9205	0.62	1.1%
2003	1,215	13.18768	20,868	7.1025	2.5793	9.9460	0.63	1.1%
2004	1,295	18.56255	21,871	7.1663	2.9211	9.9929	0.85	1.4%
2005	1,358	24.67141	23,255	7.2138	3.2056	10.0543	1.06	1.8%
2006	1,439	26.56174	23,286	7.2717	3.2795	10.0556	1.14	1.8%
2007	1,532	34.63922	23,582	7.3343	3.5450	10.0682	1.47	2.3%
2008	1,598	36.89554	24,803	7.3765	3.6081	10.1187	1.49	2.3%
2009	1,696	47.71408	25,397	7.4360	3.8652	10.1424	1.88	2.8%
2010	1,774	61.78431	25,693	7.4810	4.1236	10.1540	2.40	3.5%
2011	1,897	85.66782	28,759	7.5480	4.4505	10.2667	2.98	4.5%
2012	2,003	103.181	29,411	7.6024	4.6365	10.2891	3.51	5.2%
2013	2,090	111.8729	30,713	7.6449	4.7174	10.3324	3.64	5.4%
2014	2,219	126.9232	32,974	7.7048	4.8436	10.4035	3.85	5.7%
2015	2,356	135.886	34,104	7.7647	4.9118	10.4372	3.98	5.8%
2016	2,493	136.1539	33,892	7.8212	4.9138	10.4309	4.02	5.5%
2017	2,685	164.099	35,057	7.8954	5.1005	10.4647	4.68	6.1%
2018	2,870	188.011	35,441	7.9621	5.2365	10.4756	5.30	6.6%
2019	3,075	196.647	36,728	8.0311	5.2814	10.5113	5.35	6.4%
2020	3,116	205.350	38,107	8.0443	5.3247	10.5482	5.39	6.6%
2021	3,275	237.148	47,111	8.0941	5.4687	10.7603	5.03	7.2%
2022	3,499	391.370	61,794	8.1602	5.9697	11.0316	6.33	11.2%
2023	3,759	569.080	80,085	8.2319	6.3440	11.2908	7.11	15.1%