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"EMPOWERING THE SULTANATE OF OMAN": ASSESSING THE IMPACT OF FISHERY PRODUCTION, LICENSING POLICIES, AND EXPORTS ON ECONOMIC GROWTH FOR SUSTAINABLE DEVELOPMENT

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Abstract

The purpose of this study is to identify the causal relationship between fishery GDP and the economic growth of Oman. The study analyzes the contribution of fishery production, licenses issued, and fishery exports to the GDP of the fishery sector. The time series data on fishery production, GDP, license issued, and volume of exports for the period of 1998–2021 has been used in this study. The VAR lag selection criterion, ADF unit root test, pairwise Granger causality, ordinary least squares method, and vector autoregression lag order model have been used as tools for analyses. The finding states that there is a unidirectional relationship between GDPF2 (GDP fishery in second order) and GDPT (Real GDP of the country). The past value of GDPT can predict the value of GDPF2, and there exists a causal relationship (independence) between the real gross domestic product of the country and fishery production. The study also found that, though GDPF2 is mostly affected by fishery production, the number of licenses issued, and the volume of exports have no significant impact on GDP. It has been recommended that the government should focus on its export and licensing policies to improve the fishing industry's proportionate share of economic growth.
Keywords: *Real GDP, fishery production, Export, License, Economic growth, GDP fishery*
JEL Codes: *C3, C4 Q22, Q58, B23, C01, O04*

1. Introduction

The Sultanate of Oman's lengthy coastline faces the Arabian Sea and the Gulf of Oman. Historically, fishing has been an important source of income and food security for thousands of Omani citizens. This sector is very important to the Omani economy and has social implications as well (Oman Observer /1123799) Fishing is the primary economic activity in many coastal communities. Oman exports fish and fish products, making it one of the biggest fish producers in the region. Before oil was discovered at the end of the 1960s, about 80% of Omani workers were employed in fishing. (FAO, Oman). Vision 2040 is to establish a financially successful, globally recognized industry that is environmentally sustainable. The Ministry of Agriculture and Fisheries Wealth, Oman, the World Bank (WB), and industry stakeholders are working together to strengthen the fisheries sector and economic contribution in achieving Oman's Vision 2040. (World Bank,2015).

In achieving Vision 2040, WB and Oman's government are actively promoting aquaculture and fishing, recognizing the country's historical and cultural values. By 2025, 40 million tons of aquatic food will be required globally. The fishing industry, a renewable source of animal protein, can boost GDP, promote job opportunities, and support food security. Despite its small contribution to GDP, roughly 1.9%, it is crucial for food security and regional development. (MAFW, 2012). Alhabsi, M. S., & Mustapha, N. H. N. (2011). overfishing is a big challenge in fishing. Also, this point is situated behind the MSY (maximum sustainable yield) point showing that the catch is declining and the number of vessels increasing. Alshubiri, Tawfik (2020) suggest that due to global oil price reductions, the country needs to diversify income sources from agriculture, fisheries, tourism, and mining to boost economic growth. Though Oman has huge potential in this sector due to its geographic advantage the fishery sector is still underdetermined and contributes minimal in the GDP of the sultanate. The main objective of this study is to understand the contribution of the fishery sector in the overall economic growth and also to find out the significant effect of the export procedure, number of licenses issued method, and the fishery production on the growth of the fishery sector individually.

2. Review of Literature

The Oman fisheries sector is vital for food security, nutrition, and economic growth. The Ministry of Fisheries and Wealth is considering strategic methods to encourage industry growth, efficient administration, and sustainable use of resources. Bose, S. (2010, March). Belwal, R., Belwal, S., & Al Jabri, O. (2015) focused on the training needs analysis of fishermen in the Batinah coastal region. The finding states that fishermen are less educated and face financial constraints. According to Al-Marshudi, A. S., & Kotagama, H. (2006) Omani traditional fishermen contribute 8% of the total catch, but they are still facing a lot of challenges like low income, lack of equipment, etc. Al Haziazi, M., Muthuraman, S., Subramanian, K. P., Sherimon, P. C., & Al Husaini, Y (2023) finds that, due to the export of raw fish, the fishing industry is not adding its value to the seafood industry. Rabo, P. D., Zarmai, D. U., Jwanya, B. A., & Dikwahal, S. H. (2014) explore in their paper Oman's finned products' role in trade development and highlight challenges such as by-catch, funding issues, poverty, water barriers, climate change, and insufficient manpower development. Oyakhilomen, O., & Zibah, R. G. (2013) examine the relationship between fishery production and economic growth in Nigeria from 1970 to 2011. Results show that fishery production does not significantly impact economic growth due to low domestic fishery output. Neiland, A. E., Cunningham, S., Arbuckle, M., Baio, A., Bostock, T., Coulibaly, D., & Sei, S. (2016) reveals in his study that the production of Sierra Leone's fish alone can boost the country's GDP under suitable conditions. Sigfusson, T., Arnason, R., & Morrissey, K. (2013) studied the economic significance of the fishery sector, revealing its interlinkages with other sectors and suggesting that clustering fisheries with other sectors can enhance economic growth. Bondad-Reantaso, M. G., Subasinghe (2012) proposed the contribution of the crustacean industry to international trade and food security. The research also reveals that the crustacean industry plays a role in the economic growth and empowerment of developing nations, thereby enhancing food security in both the importing and producing nations. Al Rashdi, K. M., & Mclean, E. (2014) investigates women's involvement in artisanal fisheries in Al-Wusta Governorate. The finding reveals that the majority were illiterate, with 60% having multiple children. Okafor-Yarwood, I. (2019) recommends fisheries play a significant role in reducing poverty and hunger as well as promoting sustainable economic growth as per the Sustainable Development Goals (SDGs

Goal number 2). However, these resources are threatened by unsustainable activities like pollution, overfishing, and illegal fishing.

Campbell, L. M., Fairbanks, L., Murray, G., Stoll, J. S., D'Anna, L., & Bingham, J. (2021) emphasized the sea industry as a means of achieving economic growth. Because despite having a lot of potential to further improve community well-being, this sector is ignored. Dyer (2023) finds that with the "moonlighter policy," which differentiates full-time commercial fishermen (Class A) from part-time fishermen (Class B), the number of traps was reduced under the class-A category for fishermen. Oladimeji, Y. U. Y. U. (2018) investigates Nigeria's arsenal fishery production trends and their impact on economic development, finding states there is no significant causality between production and GDP, and vice versa. Shamsuzzaman, M. M., Mozumder, M. M. H., Mitu, S. J., Ahamad, A. F., & Bhyuian, M. S. (2020) emphasizes the economic significance of Bangladesh by showing that, despite a 20-year increase in fish production, a sizable portion comes from aquaculture as a result of the capture fishery's decline.

Castillo, T. I., Baigún, C. R. M., & Minotti, P. G. (2016) propose an Ecosystem Fishing Legal Approach (EFLA) to address environmental, ecological, social, economic, and institutional issues caused by the traditional fishing system. Rahman, M., Arif, A. A (2021). examines the livelihoods of artisanal fishermen in Sonadia Island, Bangladesh, highlighting how the industry significantly enhances the socioeconomic conditions of vulnerable coastal communities. Sugiawan, Y., Islam, M., & Managi, S. (2019) analyze global marine fisheries and their relationship with economic expansion. The result indicates that economic expansion leads to ecosystem decline and positively impacts their sustainability. Fitri, A. P. B. N. S. (2020) investigates his research on the Sultanate of Oman's fisheries sector, focusing on Sohar, Muscat, and Salalah. The finding reveals that traditional and modern boats are the primary modes of transportation for fishermen, which differentiates the catch of fish.

Although the importance of the fishing industry for economic growth has been well researched and documented, the majority of studies concentrate on the contribution of aquaculture and fisheries to economic development from their own country's perspective. Specifically, none of the studies examined the effects of fisheries exports, licenses granted, and production on the GDP of fisheries and their potential to influence the country's overall economic growth. It's clear that as more licenses have been issued, there are more job opportunities. It's still necessary to assess the effectiveness of the license-granted policy, export regulations, and the fishing industry's output over the previous 25 years, both individually and collectively.

3. Objective and hypothesis of the study

The findings of this study will help the government update its policies on export laws, licensing requirements, and fishery management. To ensure the welfare of all stakeholders in the fisheries subsector, it is essential to address the existing gap in the literature by providing empirical research regarding the causal relationship between fishery production, license issues, exports, and economic growth in Oman. In light of the aforementioned, the main aim of the study is to establish the contribution and causal relationship between the GDP of the fishery and the rate of economic growth over the long term. This study will focus on two major objectives, which are:

Objective 1: TO assess the impact of licensing, Exports, and Fishery production on the Fishery sector's gross domestic product.

Objective 2: To examine the causal relationship between the fishery sector GDP and the Real GDP of the Sultanate of Oman.

To fulfill our objective two null hypotheses have been framed.

H0(1): *There is no significant impact of the number of licenses issued, volume of exports, and fishery production on the GDP of the fishery sector.*

HO (2): *There is no causal relationship between the GDP of fishery with the Real GDP of our Sultanate of Oman.*

4. Research Methodology

4.1 Description of Data and Variable of The Study

This study has used secondary data on fishery production, Volume of export, License issued, Real gross domestic product, and fishery GDP for the period of 1998-2021. The data were sourced from the NCSI (National Centers for Statistics and Information) Portal and FAO (Food and Agricultural Organization) publications. The variables used in this study are Fishery production (fish landed, commercial fishing, and aquaculture) (TFP), Volume of export (VFE), Real GDP of Oman (GDPT), Total license issued (TLI), GDP fishery (GDPF). Here, GDPF and GDPT are dependent variables, and TFE, VFE, and TLI are the independent variables.

4.2 Conceptual Framework

The literature mentioned above makes it clear that the contribution of the fishing sector to the nation's overall economic growth reflects both direct and indirect effects on economic output. Policymakers must comprehend the dynamics of fishery-related variables. Changes in the fishery sector, licensing system, and export volume have a multiplier effect on the economy. Many studies highlight how the inappropriate use of fishing nets and boats is reducing fish production, particularly the GDP from artisanal fishing. Additionally, in Oman, the majority of raw fish are being exported, while very little fish product is exported. The amount of fish exported and the licensing system have an indirect impact on the nation's economic performance.

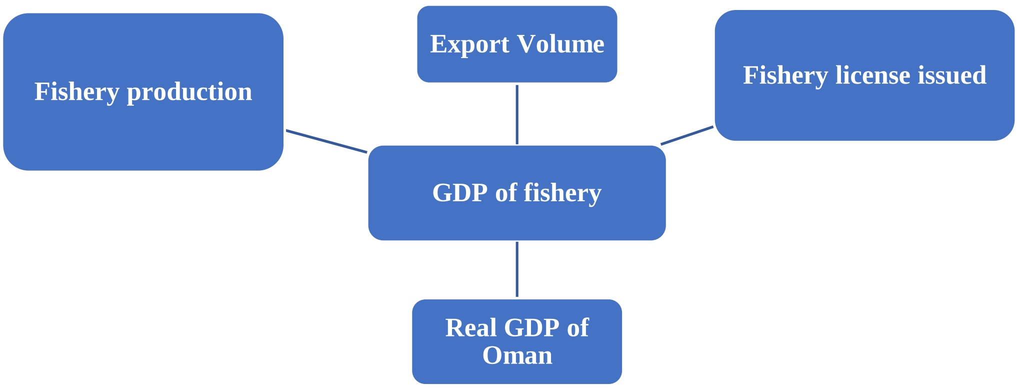

Figure 1. Conceptual Framework

The research indicates that the growth of the fishery sector is influenced by facts such as fishery production, licenses issued, and export volume, which in turn contributes to overall economic growth as shown in Fig. 1. The figure explained that Fishery production, volume of export and number of licenses issued has impact on GDP of fishery sector which further influence the overall gross domestic product of the country. Understanding the dynamics of different economic variables and how it is interlinked with the GDP of the fishery sector which is most important to the overall real GDP of the nation.

4.3 Research Procedure

The study is based on secondary data which has been taken from NCSI and FAO websites. Research is empirical in nature because various time series models have been used to analyze the result. the following steps have been adopted to perform the analysis.

Step-1: Identification of the property (stationary or non-stationary) of time series data of all variables with the Augmented Dickey-Fuller (ADF) unit root test. The unit root test is used to determine whether a time series variable possesses a unit root or nonstationary. To meet the model's assumption which we are going to use to test our stated hypothesis the time series variables that remain constant across time must be defined.

Step 2: Transformation of Nonstationary data into stationary: Sometimes while using ADF test data series is nonstationary further to meet the assumption of the pairwise Granger causality test and VAR (Vector autoregression) model. Differencing is a method used to stabilize the Mean of a time series by removing changes in the level of a series and thus potentially eliminating (or reducing) trend and seasonality. The difference of the non-stationary time series should be converted into the first or second-order difference.

First-order differencing was done with the given formula and Second-order differencing was done if first-order differencing did not achieve stationarity.

Formula for the first order: $\Delta Yt = Yt - Yt - 1$

Formula for second order: $\Delta^2 Yt = \Delta Yt - \Delta Yt - 1$w

where

- ΔYt is the differenced series.
- $\Delta^2 Yt$ is the second-order differenced series.
- Yt is the original series at time t.
- Yt−1 is the value of the series at time t-1

Step 3: Choosing an optimal lag length: To apply the VAR model and Pairwise Granger causality it is necessary to decide the best lag length by using the VAR lag order selection criterion. This method ensures that you choose a lag length that balances model complexity and goodness of fit. The optimal lag duration to apply the VAR model is determined using either the Final Prediction Error (FPE), Schwarz Information Criterion (SIC), Akaike Information Criterion (AIC), or Hannan-Quinn Information Criterion (HQIC).

Step-4: Application of Pairwise Granger causality, OLS, and the VAR model: The Pairwise Granger casualty test is used to ascertain the causality and relationship between the defined dependent and independent time series variable. In essence, it tests whether the past values of one variable provide statistically significant information for predicting another variable. The OLS (Ordinary least square) is used in regression analysis to estimate the parameters of a linear regression model and to minimize the square error. VAR Model has been used for analyzing the relationships among multiple time series variables. As we have taken four different time series as our data from 1998-2021 This model simultaneously models multiple variables as functions of their own lagged values as well as the lagged values of other variables in the system.

Step-5: Analysis of the result: After the application of the model VAR, OLS, and Pairwise Granger causality tests hypothesis will be accepted or rejected.

5 Empirical Result

Step-1 and Step2: Unit root test (Augmented Dickey fuller Test) as given in table no. 1, Ho (Null Hypothesis): Series is Non-stationary

Table 1. ADF Unit Root Test Result Variables

Variables	I(O)-stationary at level	Inference	I (1)-Stationary at first diff	Inference p>0.05= NS P<0.05=S
Total Production of fishes Production-(TFP)	1	NS	0.99	NS
TFP (1) -Conversion at first order	0.36	NS		
TFP (2) -Conversion at second order	***0.000***	***S***		
Total license issued (TLI)	0.31	NS	***0.000***	***S***
Volume of fish export (VFE)	0.99	NS	***0.000***	***S***
GDP -Total --(GDPT)	0.87	NS	***0.0013***	***S***
GDP-Fishing-(GDPF)	1	NS	0.99	NS
GDPF (1)-Conversion at first order	0.36	NS		
GDPF (2)-Conversion at first order	***0.000***	***S***		

Note: NS-Non-stationary, S =Stationary

Table number 1 displays the stationary and nonstationary characteristics of times series variables. The outcome shows that none of the variables prove to be stationary at the first level I (0) later. GDPT, VFE, and TLI are stationary at the first-order difference following conversion, GDPF, and TFP are stationary in the second order, which is renamed as GDPF (2) and TFP (2). The series is non-stationary, which is our null hypothesis. Since GDPF and TFP are stationary in second order, we reject the null hypothesis for these series by converting them to second order. In contrast, we have rejected the H0 in TLI, VFE, and GDPT at first difference as P<0.05.

Step-3- Estimation of optimal lag

Table 2. Result of VAR lag order selection criterion (GDPT1, GDPF2, TFP2, TLI1, VFE1)

Lag	LR	FPE	AIC	SC	HQ
0	NA	2.62e+36	98.04680	98.29573	98.09539
1	113.3698	1.08e+34	92.45610	93.94970	92.74766
2	41.1263*	2.45e+33*	90.38651*	93.12477*	90.92104*

Table 2 shows how to select an ideal lag length for the Granger causality test and VAR estimate based on VAR lag order selection criteria (LR, FPE, AIC, SIC, and HQ) that were generated from an unrestricted Vector Autoregression (VAR). The two asterisks** indicate that the ideal lag length is two suggested in the VAR model, a lag order of two is deemed appropriate for capturing the dynamic relationships among the variables under consideration which means that each variable is regressed on its own past two values, as well as the past two values of the other variables in the system.

Step-4 -Application of test and testing of hypothesis

The relationship between the variables has been assessed using the Pairwise Granger causality test, VAR estimate, and regression analysis to accept and reject the hypothesis.

Result of Ordinary Least Square Analysis (OLS)

The mathematical model can be written as:

GDPF=a+b1TFP+b2TLI+b3VFE+e

GDPF represents the GDP from the fishery sector (dependent variable). a=intercept, b1, b2, b3 represent the coefficient associated with independent variable license issue (TLI), total fish production (TFP), and volume of export (VFE), and e represents the error term. Our first null hypothesis is:

H0(1): *There is no significant impact of the number of licenses issued, volume of export, and fishery production on the GDP of the fishery sector.*

Table 3. Regression result

	C	VFE	TLI	TFP2
Coefficient	-3.9632	5.56E-05	2.56E-06	0.000315
T-stat	-0.627688	1.933024	0.002891	11.44192
Prob/chances of error /P	0.5381	0.0691	0.9977	0.0000
Inference R square=0.997033 Adjusted R-squared-0.996588 F(Statistics)/prob-0.000		Insignificant (P>0.05)	Insignificant (P>0.05)	Significant (P<0.05)

Note: Level of significance 0.05(5%), Obs=24

In table number -3 r2 is 0.997033 which indicates that 99.70% of the dependent variable (GDPF2) is explained by all our three independent variables. Even adjusted r2 is closer to r 2 which means 99.70% GDPF can be forecast by our independent variable. Here, the variable Total fish production (TFP2) is significant for the GDP of the fishery, but TLI and VFE are insignificant as the P Value is >0.05. Overall, we see the combined effect of all the independent variables where the F statistic (0.000001<0.05) indicates that there is a significant impact of VFE, TFP2, and TLI on the overall production of the fishery (GDPF2). Hence, we can reject our null hypothesis.

Vector autoregression Estimate (VAR)

We can investigate the long-term relationship between each of our time series using the VAR estimate. To accept or reject the hypothesis, this model requires an understanding of the VAR equations and the coefficient of lagged variables. Estimated equation (Lag length=2)

1. *GDPF2=C (1) *GDPF2(-1) +C (2)* GDPF2(-2)+ C(3)*TFP2(-1)+C(4)* TFP2(-2)+ C(5)*TLI(-1)+C(6)* TLI(-2)+ C(7)*VFE(-1)+C(8)* VFE(-2)+C9*
2. *TFP2=C (10) *GDPF2(-1) +C (11)* GDPF2(-2)+ C(12)*TFP2(-1)+C(13)* TFP2(-2)+ C(14)*TLI(-1)+C(15)* TLI(-2)+ C(16)*VFE(-1)+C(17)* VFE(-2)+C18*
3. *TLI=C (19) *GDPF2(-1)+C(20)* GDPF2(-2)+ C(21)*TFP2(-1)+C(22)* TFP2(-2)+ C(23)*TLI(-1)+C(24)* TLI(-2)+ C(25)*VFE(-1)+C(26)* VFE(-2)+C27*
4. *VFE=C (28) *GDPF2(-1)+C(29)* GDPF2(-2)+ C(30)*TFP2(-1)+C(31)* TFP2(-2)+ C(32)*TLI(-1)+C(33)* TLI(-2)+ C(34)*VFE(-1)+C(35)* VFE(-2)+C36*

Table 4. Result of VAR Mode- l

Variables	GDPF2	TFP2	TLI	VFE
R-squared	0.892770	0.9373	0.57795	0.905538
Adjusted R-Squared	0.814785	0.8917	0.27101	0.83683
Mean	3.172753	3589.900	7263.000	111615.0
F-Statics /P value	11.4479	20.5716	1.8829	13.18110
Inference	Insignificant	Insignificant	Insignificant	Insignificant

Note: Level of significance 0.05(5%), Lag length=2

Table 5. Result of VAR Mode- lI

Coefficient	Value	Prob/P value	Inference (P>0.o5) =insignificant, (P<0.05=significant)
C (1)	0.900087	0.2401	Insignificant
C (2)	0.061628	0.9305	Insignificant
C (3)	-0.00334	0.2635	Insignificant
C (4)	4.71E-07	0.9989	Insignificant
C (5)	-0.0001349	0.4210	Insignificant
C (6)	0.001538	0.3580	Insignificant
C (7)	**-0.000580**	**0.0019**	**Significant**
C (8)	**0.000847**	**0.0002**	**Significant**
C (9)	-12.7158	0.0019	Significant
C (10)	**5527.92**	**0.0002**	**Significant**
C (11)	2048.707	0.1740	Insignificant
C (12)	**-2.1508**	**0.0020**	**Significant**
C (13)	-0.46716	0.5408	Insignificant
C (14)	-4.1392	0.2678	Insignificant
C (15)	3.930210	0.2909	Insignificant
C (16)	**-1.5342**	**0.0003**	**Significant**
C (17)	**2.2098**	**0.0000**	**Significant**
C (18)	-2.883071	0.1653	Insignificant
C (19)	54.3731	0.6785	Insignificant
C (20)	25.4319	0.8347	Insignificant
C (21)	0.00074	0.8841	Insignificant
C (22)	-0.000617	0.9917	Insignificant
C (23)	**0.5881**	**0.0459**	**Significant**
C (24)	0.10174	0.7231	Insignificant
C (25)	-0.02309	0.4497	Insignificant
C (26)	0.0268	0.4532	Insignificant
C (27)	2136.352	0.1849	Insignificant
C (28)	3687.696	0.0653	Insignificant
C (29)	1357.18	0.4582	Insignificant
C (30)	-0.66923	0.3835	Insignificant
C (31)	-0.02265	0.9796	Insignificant
C (32)	-5.99056	0.1692	Insignificant
C (33)	5.936712	0.1716	Insignificant
C (34)	-0.366187	0.4236	Insignificant

C (35)	**1.847492**	**0.0011**	**Significant**
C (36)	-16657.51	0.4867	Insignificant

Note: Overall Regression result, Level of significance 0.05(5%), Lag length=2

The overall result is insignificant because the p-value is greater than 0.05 given in Table No. 4, indicating that the variable and its lag value are unrelated. We can therefore accept the H1(O) that the quantity of fisheries produced, the number of licenses granted, or the volume of exports have no noticeable impact on the GDP of the fishing sector in Oman. Therefore, accepting the alternative hypothesis (H1), which presumably states that the quantity of fisheries produced, the number of licenses granted, or the volume of exports does not significantly impact the GDP of the fishing sector in Oman, implies that the variables in question do not significantly influence the GDP of the fishing sector.

Table 5 displays the value of the coefficient of each variable and their lagged values. The analysis indicates that certain variables have statistically significant effects on the dependent variable, while others do not. The statistical analysis reveals that the variables GDPF2(-1), TFP2(-1), VFE (-1), VFE (-2), TLI (-1), and VFE (-2) have a significant effect on the dependent variable as the P value is less than 0.05 (P<0.05) as stated in the estimated equation.

The rest of the variable's coefficients are insignificant because P>0.05 indicates that there is insufficient evidence from the observed data to conclude that the variables have an effect or relationship with the dependent variable. This suggests that there is insufficient evidence to conclude that these variables have a significant relationship with the dependent variable. In other words, changes in these variables do not seem to have a discernible impact on the dependent variable based on the data analyzed. The percentage contribution of each associated variable to the dependent variable is shown by the coefficient value given in the above table number. These coefficients indicate the strength and direction of the relationship between each independent variable and the dependent variable.

Pairwise Granger Causality Test

HO (2): There is no causal relationship between the GDP of fishery with the Real GDP of our Sultanate of Oman

Table 6. Result of Pairwise Granger Causality

Null Hypothesis	Obs	F-stat	Probability	Inference	Hypothesis
1. GDPT does not granger cause GDPF2	20	4.22750	0.0350	casualty Exist	Reject/Causality exists, P<0.05
2. GDPF2does not granger cause GDPT	20	0.14104	0.4717	No causality	Accept/ No causality P>0.05

Note: Level of significance 0.05(5%), Lag length=2, Sample (1998-2021)

The result of pairwise Granger causality as shown in Table 6 indicates the two outcomes. GDPT predicts GDPF2. This indicates that the past value of the real gross domestic product (GDPT) can predict the value of fishery production (GDPF2). This suggests that changes in GDPT have predictive power over the future values of GDPF2. The finding of a significant p-value (presumably less than 0.05) implies that there is strong statistical evidence to reject the null hypothesis, indicating that there is a causal relationship between GDPT and GDPF2. In other words, GDPT Granger causes GDPF2. However, GDPF2 cannot predict GDPT which indicates that GDPF2 cannot predict overall economic growth, presumably represented by

GDPT, as the p-value associated with this relationship is greater than 0.05. The result further elaborates that the causal relationship between GDPT and GDPF2 is unidirectional. This means that while GDPT can predict GDPF2, the reverse is not true; GDPF2 cannot predict GDPT. The implication of unidirectional causality suggests asymmetry in the relationship between the two variables. Hence the hypothesis is being rejected as the relationship is unidirectional.

5. Finding and Discussion

The findings of the research state that as seen in the regression result *(Table number 3)* the number of licenses issued (TLI), and volume of exports (VFE) are insignificant and TFP2 (Total fish production at second order) is significant. This means that the GDP of the fishery sector is not affected by VFE and TLI but TFP2 has a significant impact on the GDPF. Hence, we have rejected the null hypothesis based on the overall p-value which is less than (0.000<0.05). Even the result of the VAR model *(Table number 5)* indicates that overall, all the variables (GDPF2, TFP2, TLI, VFE) and their lagged value have no significant impact on the GDP of the fishery sector. As the P value is greater than 0.05 hence null hypothesis has been accepted. This shows that the GDP of the fishery sector has no significant impact on the volume of exports, number of licenses issued, and fishery production. Fish landed is a significant factor in the overall growth of the fishery sector. On the other hand, the result of greater casualties *(Table number 6)* shows that GDPT causes GDPF2 but GDPF2 does not granger cause GDPT as indicated in Table number 6. Which states that the relationship is unidirectional. Hence, H0(2) Has been rejected. There is a relationship between the GDP of the fishery sector can predict the Real GDP of the country but from the GDPT we cannot predict the GDP of the fishery sector. Numerous academic works have demonstrated that the nation's proportional share of fisheries is extremely low, and that the socioeconomic status of fishermen is extremely poor. Our study agrees with the NCSI's overall relative share of GDPF in GDPT, which is 0.5 from 1998 to 2021, and it also supports the finding of Oyakhilomen, O., and Zibah, R. G. (2013), Dyer (2023), Bingham, J., D'Anna, L. (2021), A. F., Mitu, (2020), Oyakhilomen, O., & Zibah, R. G. (2013). which shows that the fishery sector does not contribute much to the overall economic growth of the nation. This study also agrees with the finding of Alhabsi, M. S., & Mustapha, N. H. N. (2011) which states that even if a greater number of vessels increases still does not have an impact on the GDPF. Overall, Mismatching the ratio of species in the water poses a danger to environmental sustainability with the increase in bycatch and overfishing. This also reveals that the utilization of fish as a renewable resource is not effective in the country which is a threat to environmental sustainability and food security in the near future. Even the government expenditure on fishery is very high (World Bank Group 2015). This once more emphasized that the fishing industry produces little profit and that resources are not used effectively. This study is different as more variables number of license issues and volume of export have also been taken into consideration to understand its impact on the growth rate of the fishery sector. The Sultanate of Oman aims to diversify its economy by focusing on fishing and aquaculture as per Oman Vision 2040. However, a study found no significant effect on fishery production and economic growth from a period of 1998-2021.

6. Conclusion

This study has presented the empirical relationship between the fishery sector GDP and the Real GDP of the country with a specific contribution of export, license issued, and fishery production for the sustainable development within the nation's economy. Even though exports are increasing and every year more licenses are issued, they are not showing a prominent effect on the overall growth They have a minimal role in the country's GDP, which indicates that overall economic growth over the study period was not significantly influenced by fishery GDP. The Sultanate's GDP is not very encouraging, despite the strong prospects and potential of the fisheries. We can therefore conclude that the GDP of the fishing industry is unpredictable. The overall GDP of a country cannot be determined by the GDP of the fishery sector. Even the literature study reveals that fishing production does not contribute much to the overall GDP of the country like Nigeria and Bangladesh. Most of the studies contribute that overfishing and bycatch a major issue that the fishing industry is facing. The paper recommends revising licensing and export policies, enhancing institutional frameworks, and implementing adequate fish farming enterprises to achieve self-sufficiency, foreign exchange earnings, and employment opportunities, ultimately contributing to sustainable economic development in Oman.

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