

Assessing the impact of marine production manufacturing on gross domestic product indicators

Analytical comparative study of GCC countries

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Abstract

Purpose – This paper aims to assess and empirically analyze the impact of marine production manufacturing on gross domestic product (GDP) indicators as a comparative study in Gulf Cooperation Council (GCC) countries.

Design/methodology/approach – This study used analytical quantitative approaches to assess the impact of marine production manufacturing on GDP between GCC countries over the period from 2007 to 2015. The data were collected from Global Competitiveness Reports during 2006-2016 and from Food and Agriculture Organization of the United Nations, [FAO 2015](#) reports.

Findings – The results show that Saudi Arabia country has the highest production of marine while Bahrain country is the lowest in GCC. The results of ordinary least squares test show that marine production has a statistical significance on GDP indicators as Pearson correlation matrix shows a strong relationship between all variables.

Practical implications – The main conclusion is that GCC countries must adopt a regional strategy to support maritime activities, especially in the light of green environmental fluctuations. Integrated management plans are also needed to protect vital coastal ecosystems while allowing economic growth and ensuring a better quality of life for all coastal populations. Comprehensive and collaborative leadership provides effective long-term management of coastal ecosystems in the GCC. In addition, GCC countries have high competition with each other for their market share in the global export-based marine production manufacturing.

Originality/value – This paper is the first to present most wealthy GCC countries in terms of marine production manufacturing. Marine production manufacturing introduces to create a new competitive market that generates distinctive internal capabilities for survival and growth in international markets.

Keywords GCC countries, Gross domestic product, Blue economy, Culture environment, Marine production manufacturing, Total aquaculture production

Paper type Research paper

1. Introduction

The blue economy, which includes sustainable development in marine resources, achieved economic growth in many countries. Some scale of fisheries is decline and have negative effect of food and employment for coastal communities. We need to assess the biological and socio-economic conditions to ability to adapt ([Quiros et al., 2018](#)). The blue economy refers to a sustainable ocean-based economic model that is largely dependent on coastal and marine ecosystems and resources ([Adger et al., 2005](#)). The blue economy is required institutional



and financial arrangements to protect our coasts, oceans activities, water and energy to reduce environmental risks of ecological scarcities (Rasmussen *et al.*, 2011). Many countries believe that all public and private sectors in many countries identify a relationship between blue economy and economic growth, where blue economy symbolizes a direct dependence on the ocean and marine resources (Cinner *et al.*, 2007).

These include both ocean-based and ocean-related economic activities. Ocean-based activities are undertaken in ocean industry at different countries that are include, e.g. marine construction, mining, ocean energy, fisheries and offshore oil and gas, aquaculture, while ocean-related activities try to producing products and services from ocean (e.g. marine biotechnology, salt and seafood processing) then shift to ocean-based activities (e.g. ports, tourist resorts, maritime insurance) (Unsworth and Cullen, 2010).

The blue economic industry of different countries is including marine education related with public activities sector such as national defense and marine environmental protection, etc. (Tedeschi and Calhoun, 2004). Also, ocean creates economic values that are not usually quantified, such as habitat for fish and marine life that affects climate and biodiversity (Hunter *et al.*, 2015). Finally, some new activities are created, such as desalination, marine biotechnologies and ocean energy. The innovations activity also plays a vital role in protecting ocean health. All these activities have impact measured in ocean economy accounts (Spalding *et al.*, 2014).

The concept of the blue economy has been used in many areas and methods within a set of policies that always try to isolate any resources we need from oceans to achieve sustainable development, as this requires international cooperation among countries to emphasize a blue economy free from environmental pollution (Boyd and Charles, 2006).

This requires interaction of public and private sectors, which explains challenges, especially in emerging countries; thus, it is important to think about how to manage blue economy (Schroeder *et al.*, 2004). The blue economy contributes to supporting green economy in economic growth of a country and has a social content, including wealth in oceans and coasts, in addition to land, where all countries seek to develop these resources for sustainable development of oceans and maritime navigation. The large heterogeneity in ownership, land covers and funding affect how to adapt of policies for coastal protected lands' wealth (Niell *et al.*, 2017).

This study contributes positively to recognition of human resource activities, which are increasing over time, but some of these activities threaten sustainable development in oceans and affect environmental ecology. Many traditional oceans contain fisheries production, tourism sector and maritime transport while new modern industries of oceans include offshore renewable energy industry, aquaculture, seabed extractive activities, and marine (Grafton, 2005).

The combination of these marine activities in oceans depends on the natural conditions of countries linked to social and economic concepts, which derive from their blue economy concepts, which contribute to economic and social benefits of country. This will protect countries' wealth through productive diversification and enhance the intrinsic value of marine ecosystems (Nicholls and Cazenave, 2010). The aim of managing blue economy within the concept of coastal management goes beyond the business sector to achieve sustainable development in the oceans for all long-term economic activities, especially those associated with ocean wealth (Guénette and Alder, 2007).

The blue economy is also related to all countries, but varies by geographical configuration and political interrelationship between countries, where blue economy supports all natural resources and finds them in creative environment (Zaradic *et al.*, 2009). The resources of blue economy affect nature and climate on marine and coastal ecosystems.

In addition, it is very important to measure marine production and evaluate national accounts in developing economic performance of countries and assess the effectiveness of policies to enhance national development. Economic indicators, such as GDP, can measure the wealth of economic performance by evaluating the contribution to the national economy as a whole (Nicholls and Cazenave, 2010).

To date, there has been no study of assessing the marine production as a comparative study in GCC countries, despite the sensitivity of the region, which is considered important in the world and which constitutes an effective size in the assessment of risks surrounding critical region. In addition, GCC countries have huge blue economic wealth, which build the budget of revenue of the country, so this study came to shed light on characteristics of marine resources in six GCC countries and explain the impacts on GDP. The current study intends to fill this gap in the literature review and accomplish three main objectives: to explain the concept of marine resources and the studies related for this topic and the impacts on GDP of a country, to explore the nature and characteristics of marine industry in all GCC countries and to identify the quantitative marine manufacturing production in GCC and empirically analyze its impacts on GDP.

Hence, this study aims to examine and evaluate one of the activities of the blue economy, marine production as an ocean-based activity in GCC countries, to determine the contribution of this activity in improving the economic indicators of a country to the point of preparation for sustainable development. The scientific contribution in this study lies in the diagnosis of the blue economy, which is one of the branches of the economy complementary to the green economy in rich region of environmental wealth, such as the GCC region. This study contributes to assessment of marine production and extent of its reflection on economic values such as nominal GDP and GDP (purchasing power parity [PPP]). This study covered a period of time nine years from 2007 to 2015 with analysis and classification of all countries in GCC.

Remain sections of this study is organized as follows. Section 2 presents the effect of human activities on the natural environment and existing studies of marine policy. The methods are introduced in Section 3, while Section 4 presents the results. Section 5 offers discussion of the results and interpretations, and Section 6 explains the conclusion.

2. The effect of human activities on the natural environment

The impact of human activities on environment takes several forms, including a general effect that reduces water quality, increases pollution and emission of gases, causes depletion of natural resources and contributes to global climate change (Duxbury and Dickinson, 2007). These changes are a direct result of human activities, while others are secondary effects that are part of a series of actions taken by human resource (Hamza and Munawar, 2009).

The impact of humanity on the global environment has increased. This period of time is considered to be the most influential factor in environmental changes, which is called new period of man (Duxbury and Dickinson, 2007). The environment is affected by the burning of fossil fuels, which leads to pollution of land and water, that is, climate change increases the temperature, thus disrupting the sensitive ecosystems in the polar region, which contributes to increase in desertification and influences weather patterns that humans currently depend on for agriculture (Pascoe *et al.*, 2001).

Human resources have the capacity to collect resources from outside their immediate environment and address them to different and more diverse forms (Al-Madany *et al.*, 1991). Rapid development and technology activities in countries have been linked to the depletion

of non-renewable energy sources and increasing exploitation of various natural resources (Kirley *et al.*, 1998).

All mining, dams, construction, urbanization and industrialization have been intertwined with environmental balance of nature because of the increasing influence on the world level (Bulleri and Chapman, 2010). When industrial revolution rises, the people have more concerns of needs than before. Production, distribution and use of these materials often result in more complex residues and/or wastes, many of which are incompatible with or easily digestible. As the needs (or luxuries) are gained, the production chain becomes more complex (Pascoe *et al.*, 2001).

Agricultural sector is considered to have an impact on environment, including impact on site itself. Including pet conservation, deforestation, tree burning and other environmental impacts on the health of the population, large-scale mining operations use large bulldozers and excavators to extract minerals and thus use chemicals that affect the environment (Pascoe *et al.*, 2001). The greatest human impact is come from aquatic systems by increasing nutrient inputs and the most important element is from overuse of fertilizers (Al-Madany *et al.*, 1991), where increased fossil fuel combustion from cars, industrial plants and power plants to pump large amounts of air pollutants. Global warming also leads to the melting of glaciers, the release of water that causes high sea levels and threatens coastal communities and economies dependent on coastal resources.

Economic growth has a positive effect on social growth of GCC countries. The discovery of oil and tourism in some countries has a significant impact on the transformation of desert areas into prosperous coastal green cities (Hamza and Munawar, 2009). The GCC countries' annual growth rate is 2.1 per cent, almost double the global average of 1.1 per cent. Some of the world's richest countries are in this region, including Kuwait, Qatar and the UAE. The oceanic characteristics of the Gulf have created a unique marine environment with ecological systems that may be resilient to some stressors. The unique nature of the coastal seaports in the Gulf and the economic importance of local communities have had a profound impact on all surrounding countries (Al-Madany *et al.*, 1991).

Coastal development has been associated with the percentage of pollution in the environment and the excessive amount of marine biological resources that contribute to the degradation of coastal wealth. For example, 70 per cent of the original coral reef cover in the Gulf could be considered lost. The Gulf coastal region faces continued environmental degradation (FAO, 2015).

The increase in the population growth rate in these countries is an environmental challenge and threatens Gulf coasts in coming years with continuation of green growth across the shores of the sea as the Gulf countries have been affected by 40 per cent of the transformation of coastal ecosystems to green cities, especially in Bahrain, Kuwait and Qatar and the UAE (Hamza and Munawar, 2009). Development has resulted in severe loss and degradation of natural habitats, resulting in pressure on natural environments. Because development has taken place quickly, there has not been sufficient time to develop adequate regulatory, technical and monitoring capacities to appropriately guide this growth.

Current trends suggest that development will not be accompanied by appropriate advanced policies and mechanisms to minimize and reduce the adverse effects on the environment (Kirley *et al.*, 1998). The development of effective policies and tools for the management of coastal ecosystems requires the understanding and measurement of their total value and their inclusion in policy design (Bulleri and Chapman, 2010). There is a rich economic importance to the region of the Gulf States and directly affects the neighboring

countries, but there is a lack of awareness about the possible harmful effects that may be caused to coastal development, either by man or nature.

Ecosystems have led to a decline in investment. Investment policies have had a negative impact on promoting inappropriate development. Governments must be sufficiently aware of the economic value of tourism, which is directly dependent on the nature of the country's healthy ecosystems and coastal waters (Duxbury and Dickinson, 2007).

2.1 Existing researches of marine policy

The marine wealth is one of wealth that has become increasingly important in different countries in recent years. The interest in behavior of these fish resources has enhanced marine navigation. Hence, theoretical literature has evolved in discussion and analysis of economists, anthropologists, sociologists and natural scientists (Branch *et al.*, 2006).

This view has become a major development of administrative decision. This perspective came from recognition that knowledge of fishers' behavior plays a vital role in using fishery-based data for assessment performance that will also affect changes in the distribution of fishing effort of economy (Van Iseghem *et al.*, 2011). To understand the changes in blue economy, marine behavior should be known. Marine policy statement conducts marine activities which can affect coastal socio-economic performance.

Marine planners are working on marine plans to increase social and economic factors that contribute to sustainable development. Understanding behavior of marine resources is playing a vital managerial role on marine policy of country. The perspective of the marine navigation response model is constrained by country restrictions that in turn affect the effectiveness of coastal and marine management (Salas and Gaertner, 2004).

Literature studies have developed in many countries and linked with marine resources and navigation to the formation of economic system of a country that has the social, cultural, ecological and biological concepts to understand the behavior of marine resources (Marchal *et al.*, 2009; Andersen *et al.*, 2012).

A previous study represents the base of bio-economic models usually used to assess possible management scenarios (Van Iseghem *et al.*, 2011). Some studies have suggested that understanding behavior of fish resources, which are part of marine resources, helps to build a model of the country's economic system (Holland, 2008; Herrero and Pascoe, 2003). The indicators of social culture constitute a traditional competitive interaction between countries and play a vital role in determining our choice of marine fisheries wealth (Gillis and Peterman, 1998; Rijnsdorp *et al.*, 2008).

The customs and traditions of a country in determining its marine wealth affect the marine behavior of the coastal beaches and works on the maintenance of all fish models (Marchal *et al.*, 2009). The diversity of climate also plays a dynamic role in determining the size of marine wealth and this will affect how to make a more effective economic decision of marine resources (Andersen *et al.*, 2012).

The individual decision of fishermen is not easy and requires knowledge of fish behavior and species (Salas *et al.*, 2004). Gutiérrez *et al.* (2011) pointed out that the success of the management policy in the institutions is the seed of the basic in improving performance. In other words, the social capitalist economy represents the systems and the basic coordination between the administrative units that facilitate decision-making that affect production of fisheries, which affects the GDP. Zanelletti and Knuth (2004) found that many factors such as community behavior will affect on fish production and contribute positively to increasing the wealth of the country.

This study was characterized by dealing with all the GCC countries, which is considered a very important region in the Middle East and rich in blue marine resources that needs to be studied and analyzed to determine future potential development and classification of these countries according to standard of marine production.

This study applied on sensitive period of time for nine years from 2007 until 2015, this period include two phases before financial crises (2007-2008) and the remain period is between 2009 to 2015 after the financial crisis to know the trend of marine production development. This study took economic method of interpretation and analysis when linking the study variables with each other. This matter distinguishes and differs with the previous studies, which dealt with marine production, types and cheap within blue economy only.

3. Methods

This study was designed to assessing impact of marine production manufacturing on GDP through analytical approaches' comparison between GCC countries over the period from 2007 to 2015. The data were collected from Global Competitiveness Reports in 2006-2016 and Food and Agriculture Organization of the United Nations, [FAO \(2015\)](#) reports. Independent variables assessed included total aquaculture production and marine production. Dependent variables included two measures of GDP and GDP (PPP) per cent world GDP. This study analyzed the effect of sum of two dependent variables (GDP) and GDP (PPP) per cent world on two independent variables of sum total aquaculture production and marine production over the period from 2007 to 2015 so that these variables were determined by following regression models:

$$GDP_{ji} = a + \sum_{i=1}^n \beta_j MAP_{it} + \sum_{j=1}^n \beta TAQUP_{it} + \varepsilon \quad (1)$$

$$GDP (PPP)_{xi} = a + \sum_{i=1}^n \beta_j MAP_{it} + \sum_{j=1}^n \beta TAQUP_{it} + \varepsilon \quad (2)$$

where MAP_{it} refers to marine production collected from average of the period from 2007 to 2015 of six GCC countries, $TAQUP_{it}$ refers to total aquaculture production collected from three categories by culture environment of GCC countries, such as marine, brackish water and fresh water.

GDP_{ji} refers to GDP in each six GCC countries over the period of nine years from 2007 to 2015 and $GDP (PPP)_{xi}$ refers to GDP per cent world GDP in each six GCC countries.

GDP expresses the economic output of the country by means of another means of the amount of money generated from production, while the GDP per capita is the total output divided by the number of people in the population ([Al-Madany et al., 1991](#)).

The two ways to measure the GDP per capita are nominal and PPP. Nominal GDP is a standard that most countries rely on, but it does not measure the differences in cost of living from one country to another. Currency rates may vary over time and thus affect the cost of living, which is directly reflected on nominal GDP.

In contrast, PPP is an attempt at a relative measure, taking factors of each country into consideration to put a number on a person's standard of living within that country. This measure fits in with the differences in cost of living and takes into consideration purchasing power of the exchange rate but does not reflect the value of the economic output in international trade consequently; nominal GDP should also be based on economic estimates

(Liu and Sinclair, 2008). In my opinion, a country's GDP is an important indicator of the total monetary policy of all goods and services, which are produced in one fiscal year. This ratio is measure economic growth, which each country is required to measure quarterly to try to identify any negative gaps for economic correction.

Also, GDP is an indicator of size and level of economic health. The economic health measures the ability of the countries to produce goods and services by themselves; this will helps governments to know the economic situation and predict the financial crises, which leads to the mitigation if it occurs. The business sector will be evaluated using this indicator to make investment decisions and to attract domestic and foreign investments in all sectors.

4. Results

Table I shows the results of average of GDP in billion US dollars over the period of 2007-2015 (nine years). The findings show that the country's largest average gross domestic product GDP was Saudi Arabia country then, UAE, Qatar, Kuwait, Oman and the less is for Bahrain country. The size of average of GDP is directly proportional to the size of the wealth of countries and sub-economic activity, where Saudi Arabia and the UAE are important centers in the export of many industrial products to most countries in the GCC. The development of industry and technological progress in some of GCC countries are play a vital positive role to the economy of countries especially Saudi Arabia country and UAE country because have a lot of in international experiences.

Table II shows results of average of GDP (PPP) per cent world GDP of GCC countries over the period 2007-2015. These results explain extent of the country's ability to acquire technology and industrial wealth that it uses and affects the economies of the rest of the world where Saudi Arabia and the UAE were the most powerful countries possessing wealth and financial surpluses that contribute effectively to building the country.

Table III shows the results of average of total aquaculture production-quantity (tons). The findings show that Saudi Arabia occupies the first place in the total production, followed by the UAE. Bahrain country was ranked in the last of productive wealth, which explains the proportion of the size of the country directly with its production, but all countries try to increase their production of blue wealth to exploit the available investment opportunities and create attractive jobs.

Table IV shows the results of marine production by culture environment of GCC countries-quantity (tons) over the period of 2007-2015. The findings show that marine

Years GCC countries	Average of GDP 2007-2015, billion US dollars					
	UAE	Qatar	Saudi arabia	Kuwait	Bahrain	Oman
2007	192.6	67.8	376	111.3	19.7	40.1
2008	260.1	102.3	481.6	158.1	21.2	52.6
2009	230	83.9	369.7	111.3	20.2	53.4
2010	301.9	129.5	443.7	131.3	22.7	55.6
2011	360.1	173.8	577.6	176.7	26.1	71.9
2012	358.9	183.4	727.3	173.4	27	76.5
2013	396.2	202.6	745.3	185.3	32.2	80.6
2014	401.6	210	752.5	172.4	33.9	77.8
2015	345.5	185.4	653.2	120.7	30.4	58.5

Table I.
Average of GDP of
GCC countries for
2007-2015

Source: The Global Competitiveness Index (GCI) Reports from 2006-2016 © World Economic Forum

Table II.
GDP (PPP) % world
GDP of GCC
countries for 2007-
2015

Years	GDP (PPP) % world GDP 2007-2015					
	GCC countries	UAE	Qatar	Saudi arabia	Kuwait	Bahrain
2007	0.26	0.12	0.87	0.20	0.04	0.09
2008	0.27	0.14	0.87	0.20	0.04	0.10
2009	0.27	0.15	0.86	0.20	0.04	0.10
2010	0.33	0.20	0.84	0.19	0.04	0.11
2011	0.33	0.23	0.87	0.20	0.04	0.1
2012	0.33	0.23	1.09	0.18	0.04	0.11
2013	0.31	0.23	1.08	0.18	0.05	0.11
2014	0.56	0.30	1.49	0.26	0.06	0.15
2015	0.57	0.28	1.48	0.25	0.06	0.15

Source: The Global Competitiveness Index (GCI) Reports from 2006-2016 © World Economic Forum

GCC countries	Average of total aquaculture production-quantity (tons) for 2007-2015					
	UAE	Qatar	Saudi arabia	Kuwait	Bahrain	Oman
2007	644	36	18,410	348	1	96
2008	1343	36	22,340	291	2	121
2009	130	36	26,441	272	2	118
2010	198	36	26,374	310	3	127
2011	415	36	16,076	319	3	157
2012	420	36	12,737	309	1	168
2013	780	56	9,266	303	0	353
2014	788	56	23,880	297	5	282
2015	790	10	30,000	262	6	170

Table III.
Average of total
aquaculture
production of GCC
countries 2007-2015

Source: Food and Agriculture Organization (FAO) of the United Nations, Fishstat 2007-2015

Years	Environment	Marine production by culture environment of GCC countries, quantity (tons) for 2007-2015					
		UAE	Qatar	Saudi arabia	Kuwait	Bahrain	Oman
2007	Marine	632	0	14,560	55	1	10
2008	Marine	1,322	0	18,482	17	2	34
2009	Marine	102	0	22,360	10	2	0
2010	Marine	182	0	22,610	10	3	0
2011	Marine	395	0	11,214	10	3	0
2012	Marine	390	0	7,392	10	1	0
2013	Marine	660	0	3,240	2	0	0
2014	Marine	640	0	17,440	2	5	0
2015	Marine	640	0	24,434	2	6	0

Table IV.
Marine production
by culture of GCC
countries 2007-2015

Source: Food and Agriculture Organization (FAO) of the United Nations, Fishstat 2007-2015

production was concentrated in Saudi Arabia and the UAE and weakly in Kuwait and Oman, while it was almost exhausted in Bahrain and there is no production in Qatar.

Table V shows results of regression analysis of total aquaculture production of GCC countries (tons) and GDP indicators over the period of 2007-2015. The findings show that total aquaculture production are high significant on GDP indicators of GCC countries at 1 per cent and 5 per cent significant level and high correlation 87.9 per cent and 96.4 per cent, while the R^2 is also high at 77.3 per cent and 92.9 per cent. The results indicate that GCC countries are rich in navigational resources, especially fish, which explains the existence of a strategy at the regional level for these countries, which sets a clear policy positively reflected on the GDP of these countries, and the integration of the work between them helps significantly to the bloc of economic power. During this time, the future generation will achieve a clear luxury. These results confirm that the quality of management is very important to determine the behavior of blue wealth in the countries (Gutiérrez *et al.*, 2011).

Table VI shows results of regression analysis of marine production of GCC countries (tons) and GDP indicators over the period of 2007-2015. The findings show that marine production are high significant on both GDP indicators (GDP and GDP(PPP) per cent world GDP) of GCC countries at 1 per cent and 5 per cent significant level and high correlation between variables at 88.2 per cent and 96.5 per cent, while the R^2 is also high at 77.9 per cent and 93.2 per cent. The maritime production is evident in the GCC due to the high morale and outstanding performance in the economies of the countries. The results thus explain the extent to which these countries are developing their economic policies which are reflected in the level of production, which contributes directly to GDP. Also, Cinner *et al.* (2007) mention that the cooperative of both public and private sectors are enhanced adapts to variables of the surrounding environment and constant fluctuations that can be achieve sustainable development.

Table VII shows results of Pearson correlations matrix analysis of all variables of GCC countries (tons) and GDP indicators over the period of 2007-2015. The findings show that all variables are highly correlated with each other. The results explain the existence of a strong relationship between all variables of study in the sense that interaction, integration and

Table V.
Total aquaculture production of GCC countries (tons) and GDP indicators

GDP Indicators	Average rank between 2007-2015 GCC countries				Un standardized Coefficient	
	<i>R</i>	R^2	T-value	Sig	St-Error	B
GDP (US\$ billions)	0.879	0.773	3.691	0.021**	0.006	2.131E-02
GDP (PPP) % world GDP	0.964	0.929	7.250	0.002***	0.000	4.260E-05

Source: OLS regression analysis test from SPSS program; Denote **Sig at $p < 0.05$; *** Sig at $p < 0.01$

Table VI.
Marine production by culture environment of GCC countries (tons) and GDP indicators

GDP Indicators	Average rank between 2007-2015 GCC countries				Un standardized Coefficient	
	<i>R</i>	R^2	T-value	Sig	St-Error	B
GDP (US\$ billion)	0.882	0.779	3.753	0.020**	0.007	2.789E-02
GDP (PPP) % world GDP	0.965	0.932	7.398	0.002***	0.000	5.562E-05

Source: OLS regression analysis test from SPSS program; Denote **Sig at $p < 0.05$; *** Sig at $p < 0.01$

similarity between policies of the GCC countries is significant in this kind of economic wealth blue, which in one way or another positively reflected on green wealth related to the environmental resources that contribute to construction of economies of countries. The future plan for all GCC countries at this difficult stage, which is sensitive especially after the global financial crisis, is now thinking about how to diversify economic wealth of all the countries they own in the sense that economic diversification contributes to reducing the risks to the lowest Sunday and not rely on a single source of income for the state such as gas or oil. The formation and adoption of this policy is not easy for these countries, which require building of industrial cadres and policies, and expertise contribute to building of countries, especially industrial and service side. These results explain that similarity in climate is very high between these countries so the correlation is high, as the result shows in study of [Andersen *et al.* \(2012\)](#).

5. Discussion

This study provides preliminary indicators on marine production manufacturing in the GCC countries, which are important in assessing GDP. Moreover, it is necessary to verify characteristics of these marine resources as a theoretical framework between GCC countries. The population used in this study for all six GCC countries to collect data over the period 2007 to 2015 to test the hypotheses. There are three integrated pillars in modern economies which includes economic, social and environmental (GCI-reports 2006-2016).

However, it is very important to concentrate of coastal impacts on a marine plan specifically on GCC countries. Any economy is affected by its regional role, as GCC countries are influenced by each other in how to form their societies, which in turn affect negatively or positively on economy depending on local conditions, which explain economy of each country (GCI-reports 2006-2016). GCC is one of leaders in aquaculture in the world; the GCC was founded in 1981 and includes Saudi Arabia, Qatar, Kuwait, Bahrain, Sultanate of Oman and UAE. In recent years, marine spatial planning (MSP) is one of way for helping to assess the operations and goals of shareholders to achieve sustainable development and growth in ocean activities and coastal areas. Marine spatial planning includes all ocean users that depend on a healthy ocean environment for Diagnosis of marine plan. A state of the Emirates is rich in natural lakes and has a wide range of its marine wealth of fish and shrimp, where the Ministry of Environment was established in 1984 (IMF, 2018).

Ministry of Sustainable Development has been interested in maritime activities, which are an important wealth of the country and source of income. Many local species of fish are

Variables	Pearson correlation - Sig (2-tailed)	1	2	3	4
Total aquaculture production (1)	P C Sig (2-tailed)	1			
Marine production (2)	P C Sig (2-tailed)	1.000** 0.000	1		
GDP (US\$ billions) (3)	P C Sig (2-tailed)	0.879* 0.021	0.882* 0.020	1	
GDP (PPP) % world GDP(4)	P C Sig (2-tailed)	0.964** 0.0020.002	0.965** 0.002	0.973**	1

Notes: *correlation is sig at the 0.05 level; **correlation is sig at the 0.01 level (2-tailed)

Table VII.
Pearson correlations
matrix between all
dependent and
independent
variables of GCC
countries

produced domestically, where the UAE was interested in aquaculture. Nine farms were established in 2014, as well as various projects of finfish, crustaceans and oysters. Aquaculture has been important in the country for past few years, with a number of fish ponds that are concerned with aquaculture, making demand and consumption more than fish, which requires immediate treatment to increase aquaculture production (FAO, 2015).

The government is also reforming fisheries to establish projects and experiences on natural resources in aquaculture, which requires intensified government and private efforts to raise fish and shrimp, particularly in view of the availability of coastal land and non-agricultural agricultural activities (IMF, 2018). Aquaculture started in Qatar in 1988 and is involved in many research projects. Sultanate of Oman in recent years depends on diversification aquaculture production which is an important source of budget country, especially in light of fluctuations in oil prices globally (FAO, 2015).

It also focused on sustainable development of environment and fish in country, which is a friendly environment that meets all the needs of high quality. Oman's experience has helped to transfer technology in aquaculture projects (FAO, 2015). Ministry of Fisheries has also taken care of standards for production of environmental posters in publications that have contributed to facilitating aquaculture industry and how to choose most suitable and modern sites (IMF, 2018). Aquaculture in Sultanate of Oman began in 1986 with experiments to produce giant shrimp, but was halted due to technical difficulties. Government has therefore paid attention to fisheries for government revenue and establishment of an aquaculture laboratory. Aquaculture education is still in its early stages in Kuwait, despite the government's interest in commercial fish production, which began in 1997 and has been expanded for local landings from capture fisheries (FAO, 2015).

Two new aquaculture sites have been identified for shrimp farming. Kuwait started developing aquaculture options in 1990. Boubyan Fisheries began commercial production of denim and spoons in floating cages in the Gulf of Kuwait, especially in the cultivation of tilapia in 1997, as an integral part of salt aquaculture. The country of Bahrain establishment at the end of 2014 both of two products a fish hatchery and a tilapia hatchery which are important aquaculture products of the country and because on this the aquaculture began to growth. Government established the National Aquaculture Center for Applied Research in Mari culture (FAO, 2015).

Kingdom of Bahrain is the largest producer and exporter of marine finfish in the region and agriculture activities are limited to applied research activities. Due to the scarcity of freshwater resources in Bahrain, all efforts have been diverted to marine species. However, it is useful for the country to encourage private sector investment in intensive inland aquaculture (Marchal *et al.*, 2009). All research and production efforts focus on development and improvement of efficient and economically efficient technologies and production of marine finfish. Kingdom of Bahrain has good potential for aquaculture because of its good advantages in climate, location, coastal zone and market. Statistics of the country's fish decline indicate a significant shortage of fish supplies. The public awareness of health benefits of fish consumption has also increased, leading to increased investment in aquaculture sector in long term. This will lead to attracting foreign currencies through investments due to food security and self-sufficiency of country (Rijnsdorp *et al.*, 2008).

Kingdom of Saudi Arabia is rich in fish wealth and marine resources due to existence of appropriate climate and wet environment for breeding of all kinds of aquatic organisms within fresh water and various lands (FAO, 2015). Ministry of Agriculture has also been interested in aquaculture to develop the economy. Authorities have established aquaculture projects from time to time to encourage domestic and foreign investments to meet local and export needs of this important source. Aquaculture projects in Kingdom of Saudi Arabia are

either internal projects or within or near agricultural projects or coastal projects along the Red Sea coast (IMF, 2018).

Many of challenges and constraints associated with ocean industry and activities hinder sustainable development process and affect GDP such as unsustainable extraction from marine resources, unsustainable fishing, physical issues and destruction of marine, marine pollution, dynamic of climate. Sometimes unfair trade and political factors in countries affect on investment economic zones and become use of marine resources very crucial in economies of small countries.

The results in [Table VIII](#) show classification of the top ten GDP countries in the world; USA has the largest economy in the world in terms of nominal GDP economy (20,412.870). This because the US economy has highly advanced technology, infrastructure and natural resources. China has shifted from a closed economy to an economy that exports a lot of goods across countries, with GDP around 14,092.514. The Japanese economy is the third largest in the world after having encountered many problems in 2008, while Germany as a European country is considered strong, possesses many chemical industries and faces many economic challenges. The UK has a GDP of 2,936.286 and depends on service economy (IMF reports 2018).

The nominal GDP of India is 2,848.231 because high population leads to a decline in per capita nominal GDP, and there is considerable dependence in India on agricultural sector for GDP compared to Western countries.

France is one of largest exporters and importers in the world through its GDP economy of 2,925.096, where the poverty rate is low and standard of living is high, which is reflected in GDP (PPP) per capita of 2,960.251. Brazil now ranks as the eight largest economy in terms of nominal GDP. Italy is among prominent economies of the Euro zone; Debt is high in this region. Canada has a strong economy in services, manufacturing and oil (IMF reports 2018).

	2018 GDP Nominal (billion US dollars)	Rank	2018 GDP PPP (billions of Int.USD)	Rank
192 countries (World)				
USA	20,412.870	1	20,412.870	2
China	14,092.514	2	25,238.563	1
Japan	5,167.051	3	5,619.492	4
Germany	4,211.635	4	4,373.951	5
UK	2,936.286	5	3,028.566	9
France	2,925.096	6	2,960.251	10
India	2,848.231	7	10,385.432	3
Italy	2,181.970	8		
Brazil	2,138.918	9	3,388.962	8
Canada	1,798.512	10		
Russia			4,168.884	6
Indonesia			3,492.208	7
GCC countries				
	GDP Nominal (billion US dollars)		GDP PPP (billions of Int.USD)	
Saudi Arabia	748.003	19	1,844.751	17
UAE	411.827	30	716.173	33
Qatar	183.807	55	357.338	52
Kuwait	135.305	58	301.916	59
Oman	82.620	69	194.820	69
Bahrain	37.841	98	74.215	98

Table VIII.
Classification the top
ten GDP countries in
the world

Source: International Monetary Fund (IMF) World Economic Outlook (April 2018)

GCC countries are rich region of export oil and every country established its wealth through oil resources which enhance to create jobs in this sector. However, recently, efforts have been intensified to diversify the economy.

Qatar is one of Gulf countries with highest share of GDP per capita and is largest natural gas. Saudi Arabia is one of countries that holds 20 per cent of the world's oil reserves and is therefore one of the most important economies in the world, in addition GDP nominal is 748.003 followed by the UAE, which GDP nominal is 411.827, also it is succeeded in economic diversification where About 71 per cent of the GDP comes from non-oil sectors and UAE has been strongly attracted to foreign investment and investments to boost its tourism position. Finally, Bahrain has a significant importance in the economic transition from dependence on oil to non-oil industries especially in Islamic banking to give a prominent image in international financial services (IMF reports 2018).

Economic analysis and figures show that Kingdom of Saudi Arabia was ranked first in economic terms due to the large environmental wealth it possesses and large areas which are qualified in terms of industrial, agricultural and maritime sectors in the formation of a reliable wealth in economic growth. The country of Bahrain is small in the size, which is reflected directly on the size of its marine wealth and therefore do not have a global impact, although it is an oil exporter. The agreements between the Kingdom of Saudi Arabia and the world give them a source of strength in economic relations, which is reflected in the size of international trade, while the country of Bahrain is limited to international agreements, depending on the small size of this country and its limited resources.

6. Conclusion

The difference in activities of blue economy depends on nature of country and its priorities in achieving its economic objectives. Countries must adopt the following concepts to be able to manage ocean activities; countries should accurately determine the value of their contribution to the wealth of oceans to achieve welfare of communities in a way that facilitates decision-making in marketing products in market.

It is important for GCC countries to exploit the level of technology they possess in the ocean industry, which can contribute to increase long-term policy governance. In this way, the country can measure each activity of ocean and its contribution to economic growth according to priorities. Also, the countries should expect and adapt of climate changes and emphasis on health of oceans that contribute to creating a clean environment conducive to increase investment.

Private sector and society are also key factors in cooperation with government in adopting concept of a healthy blue economy that contributes to economic growth and to meet future challenges constantly. The results of this study showed that Saudi Arabia and the UAE have the highest sea production due to nature of the composition of natural resources of country and large area, in addition to the ability of these countries to deal with natural resources efficiently and effectively, which led to the development of these countries quickly. Marine production is the lowest in Bahrain because of its geographical configuration and few resources compared to other countries.

Although sea production is uneven among the GCC countries, there is a significant correlation between marine production and GDP of these countries. This explains a high correlation between GDP and marine wealth based on green wealth of environment and land products. The role of these resources is effective in development of countries and improving

their competitive ranking at the world level, and technology plays a prominent role in increasing the extraction of these resources, both land and sea.

The researcher recommends the need to pay attention to continuous evaluation of marine resources and their corresponding ecosystem services to give a country more explanation about importance of oceans and seas. Furthermore, countries need to understand the relationship between oceans and different sectors in economic to ensure an efficient and sustainable management of activities. More coordination is required between ministries, regulatory bodies and industry in the market to manage the activities.

It is very important to continue the assessment of marine production and to diagnose the nature of these marine resources under a stable economic sea system. Countries should also raise sufficient awareness of marine economic culture and should pay attention to environmental wealth that is created in such sensitive areas as GCC region. Understanding economic relations between the maritime sector and other industrial sectors in each country is important. These sectors should be studied in detail and their needs should be identified to achieve sustainable development and continuous growth. This requires coordination among all ministries at country level, and international coordination between countries is now focusing on talks to create an economic value. Future research requires greater cooperation and coordination among governments to improve well-being of their communities based on economic and economic wealth. Broader indicators such as regional GDP, international trade, inflation, foreign trade, governance, international finance and oil wealth can be studied. Indicators with marine production will certainly lead us to more investment innovation so that marine wealth is in a healthy country always active.

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