

Original Research Article

## Analysis of the Impact of the Hormozgan Maritime Landscape on the Sustainable Economic Development Model\*

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**Abstract** | The human environment must be compatible with the model of economic activity. There is clear evidence that economic growth, in its early stages, leads to environmental destruction. An examination of the geographical location of Bandar Abbas shows that its proximity to the strategic area of the Strait of Hormuz has made this area a major hub for regional maritime exchanges. Field observations of the vast ports of Bandar Abbas have been effective in establishing oil and gas facilities in the development model of these areas, in addition to commodity exchanges. Studies on the factors of sustainability of the human and animal environment, geographical location, geo and topology, increase the speed of development in developing countries and help their sustainability. This article analyzes the impact of the maritime landscape of Hormozgan province on the sustainable economic development model of the region. By analyzing field observations, library studies, and satellite images, the impact of the maritime landscape of Hormozgan province on the sustainable economic development model of the region has been investigated. The selection of King. Abbas Safavi and his special attention to this area led to the prosperity of the port city of Bandar Abbas and the decline of other ports in Hormozgan province. However, ideologies and policies are not enough to ensure the sustainability of a region. Understanding the development model of ports and port cities provides the basis for planning for the future of the region. In other words, attention to the maritime landscape of the Hormozgan region and the overlap of human environmental factors with the model of economic activities can have an impact on the sustainable economic development of the region.

**Keywords** | *Economic Development, Soft Landscape, Hard Landscape, Hormozgan, Geographical Conditions.*

**Introduction** | A part of the Iranian economy in the past was dependent on the sea. Choosing Bandar Abbas by King Safavi as the trade center, created many opportunities for economic development. With the expansion of industries, humans were able to build larger ships and ports with deeper water, which became more important. However, enough research has not been done on the role of the hinterland of ports in shaping the economic space and regions and

lands located in the geographical area of Hormozgan. Natural factors such as the expansion of the mountain range towards the sea or dryness, the natural depth of the edge of the coast, and the impact of the sea axes also have an important role in the manifestation of the wharves, port cities, and the economic space of the region. In this article, the effect of several natural factors on the economic development of the port cities of Hormozgan province, with an emphasis on the maritime landscape of Hormozgan province, has been discussed. Using the capacities that arise from the perspective of the region and paying attention to the natural resources available in this

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area and the climatic and geographical conditions, can be effective in the economic development of the port cities of Hormozgan province. In addition, more research and studies on the role of the hinterland of ports in shaping the economic space of this region are important. For example, both Shahid Rajaei port and Ba Honar port operate on a national scale, and oil and container goods are exchanged in this port, while in ports that only traded non-oil goods with their neighbors, (such as; Khamir port and Laft port or pearl trade in Lengeh port) the growth of modernity and the need for deep water edges caused them to tend to tourism use rather than commercial use. Hormoz port has a long history of trade, as King. Abbas tried to expel foreigners from this sensitive trade area, but why today we do not see trade on the scale of the past in Khamir, Laft, Kong, or Hormoz ports? How do the landscape infrastructures and geographical conditions of the ports affect the economic development of the ports?

## Research Background

Maritime landscape and coastal cities have a significant impact on economic and tourism development. In this study, an attempt has been made to present a model of sustainable economic development for the Hormozgan region, based on the importance of ports and trade in this region. This model can be used as an effective pattern for economic development in coastal areas. In previous research, only soft and hard engineering in landscape sites have been discussed, but no pattern has been presented for classifying soft and hard coasts. Also, the research that has been done so far pays attention

to the historical background of maritime trade in the ports of Hormozgan province and the reasons for choosing or declining them before the modern era, but no research has addressed the impact of the economy on the landscape. Generally, the topics related to port or coastal cities are discussed from the perspective of human planning. There is no connection between the architecture of the wharf and the impact of the economy on the port city, the field of naval architecture includes engineering studies of marine sciences, and the field of port architecture studies includes planning in the economic field, but this architecture is a type of economic planning, not a practical architecture. "Port architecture is a type of economic organization with architectural texture for ports" (Martin Sharp, 2011). The field of port landscape includes the foundations of hard and soft landscapes<sup>1</sup>, hard and soft structures, or the model of wharf accesses and views and their effects on cultural heritage, not in the sense of practical landscape architecture or the need for coastal architecture. It is discussed but no solution is stated (Table 1).

As a result, there is no explicit relationship between the landscape and the hinterlands and the type of economy. The present study deals with the port landscape architecture and the indicators of sustainable economic development of the Hormozgan region as a port city at present. Due to the importance and strategic position of port cities, understanding the Hormozgan landscape can help to better understand how to shape and organize the sea-based spaces, and develop commercial and tourism activities and employment in the region.

Table 1. Examining the concepts of landscape gender in past studies. Source: Author.

Landscape concept	Description	Source
Hard solutions Soft solution	This is the use of anything that is not compatible with environmental conditions and manipulation in nature occurs; including morphological, hydrodynamic, and ecological conditions and the purpose of soft solution is to use an ecosystem compatible with nature or include green infrastructure	Schoonees et al. (2019)
Designing hard structures	This is the use of materials that can dominate the existing natural conditions with human interventions	D'Alessandro, Tomasicchio, Frega & Carbone (2011)
Soft actions	Soft actions are actions based on the knowledge of the coasts to reach the ideal solutions. For example, simulating the coast using artificial grass systems	Masria, Iskander & Negm (2015)
Hard landscape	This refers to concrete and structural elements such as buildings, streets, bridges and ports	Nouvel & Beissel (2014)
Hard structures	These are one of the necessities of recognizing coasts and wharves while maintaining and caring for the coasts using hard structures to prevent their erosion	Rangel-Buitrago, Williams & Anfuso (2018)
Soft and hard landscape	This means Using the type of soft and hard landscape can affect tourism development	Valente, Magliulo & Russo (2017)
Hard landscape	"Rajaei port with the trade of industrial and oil products, low-density vegetation cover, and sharp edge of the coast has turned into a hard coastal landscape".	Dadashpour & Arasteh (2017)

Theoretical Foundations

Using the concept of landscape in studying the ports of Hormozgan province, can help to better understand the history of maritime trade. For example, by using a soft landscape, ports can be made attractive as tourist and recreational centers and contribute to the sustainable economic development of the region. By using hard landscape<sup>2</sup>, ports can be introduced as centers for the production and export of valuable commodities such as oil, gas, and other products. In addition, by using hard landscape, ports can be introduced as centers of transportation and international transit in line with economic development and creating suitable employment opportunities for an efficient workforce in the region. In this article, we have studied different landscapes of Hormozgan province, with a focus on the landscape of its ports and cities. Due to the extent and diversity of landscapes, they are divided into three categories: soft landscape, hard landscape, and soft-hard landscape<sup>3</sup> (Cleveland, 2021). Hard landscape usually refers to elements such as paths, corridors, drainage systems, electricity, fences, decks, patios, stairs, and walls. Then these basic elements provide the basis for soft landscape elements such as lawn, plants, and vegetation cover (Bitumen group). Soft landscaping refers to the renovation or maintenance of soft materials in the open space. Soft materials include grass, trees, lawns, shrubs, and flowers. Soft landscapers manage these soft materials using various techniques such as planting, grading, weeding, pruning, digging, and spraying. Hard landscaping is the construction, maintenance, or improvement of non-plant materials in landscape design, such as stairs, fencing, corridors, drainage systems, and patios (Emdeed editorial team, 2023) (Table 2).

Research Method

In this article, by analyzing the field indicators in the ports of Hormozgan province, the type and nature of the development of each of the ports studied were investigated. This analysis was done with regard to the theoretical concepts of “hard landscape” and “soft landscape” and the regional context criteria, consisting of human and environment, geographical location, geo, and topology status. The research methods in this study are both field visits and library studies. In the field visit, the researcher examined the ports and their landscapes, and in the library studies, by examining the documents and satellite maps and comparing them with the library maps, the analysis and investigation of the required indicators were performed. To answer the theory of the formation of urban civilizations in a soft context, studies related to geology, soil, and water quality were performed. The location of the wharves and the formation of economic centers and hard landscapes were examined using satellite maps and historical studies. As a result, this article analyzes and examines the type and nature of the development of the neighboring ports of Hormozgan province and develops a criterion for creating a soft, hard, and sustainable landscape in the ports. It starts with the theoretical foundations and description of hard and soft landscapes and their indicators based on the theories of theorists and then classifies these indicators to achieve the model of economic development in the ports of Hormozgan.

Analysis of Field Data

The economic development of ports that operate at a supra-local and national scale, such as Bandar Abbas, cannot be considered solely as a result of the decision of King Abbas or the history of their fate, compared to other ports of Hormozgan province that operate at a local and indigenous scale, such as Hormuz, Kong,

Table 2. Classification of Wharves based on field observations. Source: Author.

Wharf model	Description
Tourist wharf	A Wharf whose economic development depends on the tourist and only attracts capital in part of the year. Example: Gavazrin port.
Passenger wharf	A Wharf whose main economic attraction is through passenger transportation. Example: Hormoz port.
Commercial-passenger wharf	A Wharf whose economic income is from both goods and passengers. However, the development model is on a small scale. This development model is specific to port cities. Example: Kong port, Lengeh port, Khamir port.
Dynamic wharf <sup>4</sup>	The edge of the coast varies according to the tide and ebb of the sea in different seasons of the year. Example Gavazrin port.
Urban port wharf	The depth of the edge of the coast in these areas has preserved its nature and the logic is based on geological changes, this Wharf model is mainly specific to port cities.
Deep wharf <sup>5</sup>	This type of Wharf is specific to wharfing giant ships and is accompanied by human intervention.
Commercial wharf	A Wharf whose capital attraction is heavily dependent on commodity-to-commodity trade. Example: Rajaei port. This Wharf model is mainly the result of polarization based on modern thinking and lacks civil society. The city is formed outside the Wharf.

Khamir, Dargahan and. Both the port city of Abbas and the other ports of Hormozgan province have been invaded by colonial governments throughout history; such as the attack of Timur Gerkani and the destruction of Hormuz port (Norbakhsh, 1980, 21) and the colonial attack of the colonial governments on Bandar Abbas (Ghaem Maghami, 1975, 196). In areas that have the conditions for the growth of plant species, both in terms of soil and water quality, the ground for the development of southern cities has been provided and the soft-hard landscape has been formed, such as the ports of Khamir, Lengeh, Kong and . that the port and the city are in one zone and work together, while in ports like Bandar Abbas, Haghani port and the city are in two completely separate zones. "The spatial structure of the land of Iran has been shaped based on the structure of the pole-oriented systems during the last two decades" (Dadashpour & Arasteh, 2018, 14). In Bandar Abbas, the city, the economy, the people, and the power are interrelated. Bandar Abbas is close to the Oman Sea and the Strait of Hormuz and has a security position. In Qeshm Island, the city and villages are formed only in the part that has arable land, and the rest of the areas that have unsuitable soil and water salinity are ecosystems untouched and free of human interventions. In Qeshm city, the density of native plants is higher than in other parts of the island. In fact, one of the reasons for the lack of development of ports and cities on the Hormuz and Qeshm islands is the presence of limestone and unsuitable soil and water salinity. Wherever the percentage of lime decreases, cities are formed (Taken from the analysis of the role of the geology of Qeshm, (Zare Zadeh & Rezaei, 2011, 124)). Therefore, human

intervention increases, and the nature of the landscape goes towards hardening. Therefore, to understand and understand the reasons for the formation of coastal landscapes, one must pay attention to the nature and characteristics of the region. The distance between the mountain and the coast in Bandar Abbas is large and the situation for the growth of backwaters is provided (Fig. 1).

The border between the mountain and the sea in Bandar Abbas is large, but the border between the mountain and the sea in a port such as Khamir, Lengeh, and Kong is not so much that a city can be located purely commercial behind its wharves, in the alleys of the port city that we walk The mountains are seen at close range, but in Bandar Abbas the mountains are seen in the background and at a distance from the port (Figs. 2 & 3). Therefore, port cities such as Khamir, Kong, and Lengeh cannot polarize. Coastal studies show that the water depth in Bandar Abbas and Hormuz Island is greater than in other ports. The most important advantage of Bandar Abbas is the deep edge of the coast and the long distance between the mountain and the sea (Fig. 4). Other ports, despite having a deep edge and the conditions for becoming a port terminal, do not have the scale of Bandar Abbas. As a result, they cannot develop oil and gas infrastructure and lag in competition with large-scale ports. If in the past political decisions of individuals shaped the development model, today the situation of hinterlands and modernity needs have replaced individual decisions. Therefore, we need a deep-sea section for marine facilities and oil and gas transfer. Bandar Abbas port is an economic hub and is Empty of native people. But ports like Bandar

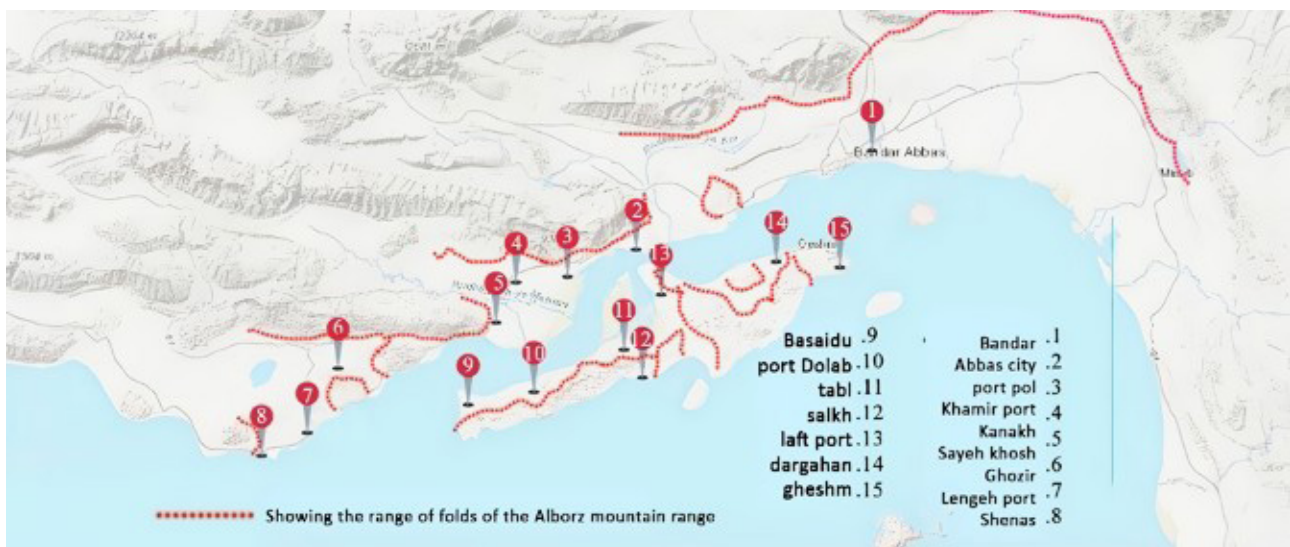


Fig. 1. The range of erosion of the Alborz mountain range in Hormozgan province and the place of emergence of some cities, villages, and ports based on Global Mapper. Source: Author.





Fig. 2. The mountain in the alleys of Bandar Khamir.  
Photo: Fahimeh Hasanifar, 2023.



Fig. 3. View of the mountain in Bandar Abbas.  
Photo: Fahimeh Hasanifar, 2023.



Fig. 4. The depth of the sea at the edge of the coast of Hormozgan province based on Global Mapper. Source: Author.

Khamir, and Bandar Kong, which have developed over time and are the result of the adaptation of the culture of the people to the sea, not only impose modernity but also preserve the local community. But natural reasons such as sea depth, and close distance of the mountain to the sea prevent their development on national scales in the present era. Analysis of field data shows that the development of a port or region does not depend only on political or historical factors, but also on natural factors. Ports such as Bandar Abbas, due to the characteristics of their natural areas, have the best conditions for economic and commercial development, while ports such as Bandar Khamir, due to the lack of suitable conditions in the city and nature, do not have competitive power. In Table 3, ports are divided according to their objective characteristics. Therefore, landscapes play an important role in the economic development of ports.

## Discussion

The islands of Hormozgan include large structural and salt islands. The large structural islands are formed by the Zagros folding, such as Qeshm Island. The salt islands are formed by the rising of salt domes. The development of offshore industries in this region is vital considering the extent of gas and oil reserves in the seabed. The exploration and production of these reserves are important and since most of the oil and gas reserves are located in this region, the development and exploitation of them will enhance the economic growth. On the other hand, in the soft coastal landscape, indigenous life is more prevalent than industrial economic growth, in the economic development model, this possibility is provided that the economic development takes place by using the tourism industry. In contrast, wherever the mountains are away from the edge of the coast, human interventions increase and wharves and ports are formed. Nowadays, one of the important factors in the advancement of port development is the distance of them from the sea.

Table 3. Classification of ports and landscape criteria based on field observations based on Iran's maritime statistics, Google maps, and online sources. Source: Author.

Name of the port or port city	Area of the port or hinterland city (square kilometer)	Approximate distance of the sea edge from the mountains (kilometers)	Depth of the coastal waterway (meters)	Wharf model	Hinterland use
Rajaei port	16.5	More than 7	15-7.5	Model Container/oil and oil products/multi-purpose	Industrial-refinery City
Haghani port	144000	More than 4	3.35	Passenger-tourism	City
Khamir port	8	Less than 2	7	Tourism-fisheries and customs wharf on a small scale	Lagoon-commercial-tourism City
Dargahan port	7.6	-	5.5	Passenger	City on the island
Gavarzin port	2.3	-	9	Gas facilities+tourism	Village on the island
Hormuz port	40	-	36-110	Tourism	Island
Lengeh port	9.7	2	5.5	Multi-purpose	Pearl trade-tourism
Qeshm pol port	4.8	7	0-30	Cabotage	Port city
Kong port	5.6	5	5.5	Tourism	Port city-city of sailors
Laft port	3.24	-	6	Tourism	Village on the island

In the Bandar Abbas region, because the Zagros folding is farther from the sea than other ports, the ground for the development of hinterlands is provided. The effective criteria in formulating the economic model are Determined at three levels. (Table 4 & 5). The economic development model is based on the regional situation and the industrial and tourism infrastructures, including cities with a central skeleton, port cities, large ports with industrial and tourism infrastructures, and passenger terminals (Table 6).

## Conclusion

Sustainable economic development requires regional and landscape infrastructures. Due to its geographical location and access to the sea Hormozgan province, has the potential for tourism, cultural, economic, and marine research development. Port cities such as Khamir,

Dargahan, and Gavarzin, due to the proximity of the folds to the edge of the sea, lack the necessary backshore. Also, the low depth of water at the edge of the coast prevents their development on a large scale. However, due to the history of international trade, they have soft-hard landscapes and can somehow achieve sustainable economic development. In hard landscape sites, the environment is shaped by two economic and urban life poles dependent on the world of modernity. According to the environment and the nature of the landscape of Hormozgan province, wherever the density of native vegetation cover increases and the nature of the landscape tends to be soft, urban civilizations are formed, while wherever the mountains move away from the edge of the coast, human interventions increase and the landscape becomes hard. Sustainable development of Hormozgan ports requires planning and using the existing

Table 4. Landscape and background criteria based on general characteristics based on direct observations. Source: Author.

Criteria for Level 1 economic model	Landscape		Background factors		
Criteria for Level 2 economic model	Landscape type	Human and animal environment	Geographical location	Geo and topological status	Economic model
Criteria for Level 3 economic model	Soft/Hard Landscape	Favorable conditions for city formation	Distance of mountain slope from the sea	Depth of the coast	Type of goods

Table 5. Classification of landscape quality of Hormozgan province based on empirical data. Source: Author.

Landscape type	Density of self-propelled vegetation	Economic development model	Case study
Hard landscape	Low	Large economic ports	Shahid Rajaei Port
Hard-soft landscape	Medium	Port city	Laft port, Khamir port, Kong port
Soft landscape	High	Formation of historical cities based on ecological needs	Qeshm city, Dargahan city, Soheli village, Chahkhouh

Table 6. Data analysis and landscape and background elements and the manifestation of sustainable development. Source: Author.

Manifestations of sustainable economic development	Commodity economic development model.	Wharf model	Geo and topological status	Geographical location	Environment	Landscape type	Example
Commercial city	Type of trade goods	-	Depth of the coast	Distance of mountain slope from the sea	City formation conditions		
Commercial city	(Oil and gas)	Commercial					Rajaei port
Port city	(Non-oil goods)	Commercial passenger					Haghani port
Port city	Non-oil and agricultural goods	Tourism commercial					Khamir port
Port city	(Non-oil goods)	Commercial					Dargahan port
Tourist city	-	Tourism					Gavarzin port
Tourist city	Ecotourism	Tourism					Hormuz port
Port city	(Non-oil goods)	Commercial					Lengeh port
Commercial city	Vehicle	Transit					Qeshm pol port
Commercial city	(Non-oil goods)	Commercial					Kong port
Port city	(Non-oil goods)	Commercial					Laft port
Depth of the coastal waterway (meters)				Less than 4 kilometers	Distance between city and wharf	Hard landscape	
				More than 4 kilometers	No distance between city and wharf	Soft landscape	
						Hard-soft landscape	

advantages in the environmental and geographical region. The development of some ports has taken place without regard to the landscape infrastructure and has been very successful. The presence of the local community and the need for commercial facilities have a significant impact on the expansion of the sea-based economy. Initially, the landscape of Hormozgan province was divided into three categories: hard, soft, and hard-soft. The location of the wharf was studied based on the distance between the mountain and the sea and the different products that are traded in these wharves. It can be concluded that the depth of the sea, the distance of the mountains from the edge of the coast, and the type of goods present in the ports and wharves, are effective in the type of trade and the expansion of the sea-based economy. In large economic ports such as Bandar Abbas, due to the presence of commercial wharf and the need for transportation of oil products, the sea-based economy is very dynamic. In some wharfs such as

Bandar Kong, despite the ecological manipulations and the formation of the port city wharf, it is not possible to create a wharf with a greater depth. As a result, the development of the sea-based economy in these ports is limited. In ports such as Laft, Khamir, and Kong, due to the lack of economic facilities and infrastructure, the development of these ports is limited. According to the study of different landscapes, it seems that hard landscapes devoid of vegetation have the most impact on sustainable economic development, while soft landscapes with vegetation have the best impact on sustainable development. Different landscapes can have different effects on sustainable economic development. Recognizing the development model of port cities and ports provides the grounds for planning for the future of the region. In other words, paying attention to the seascape of Bandar Abbas and the overlap of the human environment with the economic activity model can affect the sustainable economic development of the Hormozgan region.

## Endnote

1. Soft landscape: Soft landscape refers to ecologically untouched spaces and biomes that have formed over time in response to ecological needs.
2. Hard landscape: Hard landscape refers to a landscape that has no plant cover or local community and is primarily used for commercial and industrial activities.
3. Soft-Hard landscape: Soft-Hard landscape includes spaces where

humans have made changes to the ecology, but ecological indicators are still present.

4. Dynamic wharf: A dynamic wharf is designed to accommodate vehicles in areas with irregular water levels and seasonal weather changes.

5. Deep wharf: A deep wharf is designed to accommodate large ships with a water depth of more than 30-40 feet (12 meters).

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