

Investigation of the extra-organizational collaborations in reduction environmental pollutions of tourism development on Qeshm Island using network analysis approach

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Abstract:

The environment is the central core of the natural tourism industry; therefore, tourism development directly depends on the environment health. This means that institutional reforms and intra-organizational decisions related to tourism management cannot be considered as an independent and separate issue from environmental management. This research examines the level of cooperation and participation of Qeshm Island's residents with environmental decisions and actions of government organizations to achieve an efficient model for the successful implementation of environmental decisions which guarantee tourism sustainable development on Qeshm Island. For this purpose, various types of public communication and island tourism activists (governors of rural districts, council members, local people, and other individuals) with government organizations were examined regarding their environmental approaches affecting tourism on Qeshm Island through selecting environmental pollution criteria as one of the determinant limitations in the tourism development on Qeshm Island and applying a network analysis approach. At first, 50 questionnaires were completed and data were analyzed by using the Ucinet and Netdraw software to analyze these variables through the snowball sampling method and visiting the organizations and departments which affect impact the tourism industry and also the organizations and departments related to environmental management and protection on Qeshm Island. Regarding the level of referring to government organizations, the results showed that governors of rural districts and local people with a degree centrality of 33 and intermediate centrality of 460/663 and 575/979, respectively, have the most referral to government organizations. Through the cooperation network, the local people with a degree centrality of 38 and intermediate centrality of 456/500 and council members with a degree centrality of 36 and betweenness centrality of 460/663 are the most cooperators in carrying out the activities related to environmental pollution reduction on Qeshm Island. The degree centrality of 42 and the betweenness centrality of 249/398 for the council members showed that they have the highest level of trust in government organizations. Generally, among all the variables, governors of rural districts, council members, and local people have the most relevant activities, cooperation, and trust for environmental pollution reduction related to government organizations on this island, respectively. Therefore, it can be concluded that environmental challenges such as environmental pollution will be reduced by optimizing this network and increasing social capital among this group.

Keywords: Environment health; Tourism development; Qeshm Island; Extra-Organizational collaboration; Social capital

1. Introduction

Even though environmental management is largely considered a core governmental responsibility in most coun-

tries today-with significant public spending allocated to environmental monitoring, protection, and restoration-the state of the environment and its ongoing changes remain

a critical concern of the modern era (Duit, 2014). Furthermore, environmental pollution and the continuous process of environmental degradation severely impact tourism. The relationship between the environment, tourism, and environmental protection is particularly complex, especially when nature is commodified as a tourism product. This underscores that a significant portion of the tourism industry is directly dependent on a healthy environment (Macdonald et al., 2023).

The intricate relationship between tourism and environmental degradation highlights the dual nature of tourism's impact on the environment. While tourism can lead to significant environmental challenges, it also has the potential to foster conservation efforts. Understanding this complexity is crucial for developing sustainable tourism practices. Environmental pollution and degradation significantly impact tourism, as the relationship between tourism and the environment is intricate. The construction of infrastructure and tourism facilities often leads to adverse environmental effects, threatening the very resources tourism relies on. However, tourism can also promote environmental protection by raising awareness and financing conservation efforts. This duality highlights the complexity of commodifying nature as a tourism product, where the benefits and detriments must be carefully balanced to ensure sustainable tourism practices.

In simpler terms, tourism and the environment are intricately and indivisibly connected (George, 2007). On the one hand, tourism's reliance on natural resources and the environment always means that its development creates changes that can be positive and act as a factor in protecting the environment and natural resources (Holden, 2008), such as tourism in developing countries, which can help protect the environment with political and financial support from various organizations (Buckley, 2011). On the other hand, tourism development can be negative and as a negative force causes changes in nature (Holden, 2008). Therefore, environmental protection should be in the whole process of tourism development (Xiao, 2024). Because the environment is the central core of the natural tourism industry, tourism development should be accompanied by environmental management plans and strategies to prevent environmental degradation and pollution.

In this regard, several studies have examined the interaction impacts of tourism and the environment from different perspectives. Baloch et al. (2023) examine the impact of tourism development on environmental sustainability and propose a framework for a model for sustainable tourism. This model balances commercial and environmental interests in preserving the environment. Fobbe (2020) analyzes the practices of organizational collaboration and states that solving the challenges related to sustainability requires cooperation between different organizations and the participation of different organizations is necessary to solve social, environmental, and economic challenges to achieve sustainability. Souza and Dabezies (2019) criticize the difficulty of protecting the values of protected areas accompanied by the economic development resulting from tourism through an investigation of the relationship between tourism de-

velopment and environmental protection and the tensions between tourism developments. Mishra et al. (2019) talk about the existence of a chain link between tourism development, economic growth, energy consumption, and environmental degradation. Wäsche (2015) analyzes the social networks of inter-organizational collaborations in sports tourism and states that there is little information about quality and argument about inter-organizational collaboration and the lack of time and incompatible goals are the most important obstacles to inter-organizational collaboration in sports tourism. Rasekhi and Mohammadi (2015) examine the relationship between tourism and environmental performance in the Caspian Sea coastal countries and state that tourism is a multidimensional economic activity that interacts with the environment, therefore, the Caspian Sea coastal countries should pay special attention to environmental issues in tourism development. Duit and Hall (2014) state that stakeholder participation plays a fundamental role in the success of environmental protection programs, but stakeholder participation is influenced by institutional and cultural factors and the political context in which participatory actions take place. Meadowcroft (2014) believes that the recognition of the internal relationships between national behaviors and global and international topics is the most important issue in the study of participation and cooperation in environmental issues on a large scale. Nasernasir and Parvaresh (2020) also examined the environmental risks and consequences of tourism activities on Hormuz Island and identified 18 environmental risks from which, the risks resulting from dumping garbage by tourists and the depot location of the collected garbage have been considered as the most important environmental consequences of tourism activities on Hormuz Island. Tahmasebi and Zavarniya (2020) introduce inter-organizational communications and cooperation between them as the most important management tools, especially in complicated management environments which can create the necessary opportunity for cooperation between individuals and organizations.

Inter-organizational relationships are crucial in the tourism industry, significantly impacting the competitiveness and sustainability of tourism destinations. These relationships facilitate collaboration among various stakeholders, enabling them to share resources, knowledge, and innovations. The following sections elaborate on the importance of these relationships in tourism. Importance of Collaboration: Resource Sharing: Inter-organizational cooperation allows firms to access valuable resources such as information, technology, and capital, which are essential for adapting to market changes (Cutugno and Moretti, 2023).

Enhanced Performance: Companies with strong inter-organizational ties tend to exhibit superior performance, as evidenced by studies showing that effective relationships with other tourism entities lead to better outcomes (Vieira and Hoffmann, 2018). Innovation and Knowledge Exploration: Radical Innovation: Diverse inter-organizational relationships foster knowledge exploration, which is vital for developing radical innovations in tourism. Firms that leverage these relationships are more likely to innovate successfully (Martínez-Pérez et al., 2019). Sustainable

Development: Effective inter-organizational networks contribute to the sustainable development of tourism destinations by enhancing collaboration and resource efficiency (Rubtsova and Solodukhin, 2020). While the benefits of inter-organizational relationships are clear, challenges such as differing organizational cultures and objectives can hinder collaboration. Addressing these challenges is essential for maximizing the potential of these relationships in the tourism sector.

Inter-organizational relationships are crucial in tourism, enhancing competitiveness and service quality. It should be noticed that the custodians of the tourism industry are both governmental organizations and companies and non-governmental organizations. Therefore, organizational cooperation is a key factor in the tourism destinations sustainability, and considering tourism destinations as a network consisting of various actors and the interactions and connections between them provides the opportunity for applying theoretical methods and basics of social networks in the investigation of organizational interactions in the tourism destinations management (Tahmasbi and Zavarnia, 2010). On the other hand, the environmental programs implementation is also not possible without the development and improvement of the cooperation and partnership level between agencies and wherever this cooperation has taken place, significant impacts have been made to improve the environmental situation. In other words, solving many environmental challenges requires coordination and cooperation between agencies and individuals and if there is no participatory management approach to remove these problems, the organizations related to environmental management will not be able to completely resolve environmental problems by themselves. One of the most effective factors in demanding the implementation of laws and duties of organizations in protecting the environment and improving their environmental performance will be encouraging the sense of individual and social environmental responsibility leading to the public participation application and the promotion of the social environmental participation level (Duit, 2014).

Inter-organizational relationships are significantly important in the context of tourism destinations and the importance of these relationships in the tourism industry is recognized, but the manner of these collaborations' impact on the company performance is unclear (Wilke et al., 2019) and requires investigation because tourism activity must be observed within the framework of global community cooperation (Manaf et al., 2018). There are various organizations on Qeshm Island such as the Qeshm Free Zone Organization and the Qeshm International Growth Center which play a role in tourism development by creating infrastructure related to the tourism industry and formulating various policies and directives and also planning to reduce environmental pollution caused by tourism on the island. This research tries to examine the cooperation and participation level between individuals and organizations on Qeshm Island, and also determine the participation level of institutions and individuals in better environmental protection and reducing environmental pollution related to tourism on Qeshm Island. In other words, this research aims to achieve an efficient

model for the successful implementation of environmental decisions that guarantee sustainable tourism development on Qeshm Island by examining the cooperation and participation level of Qeshm Island residents with environmental decisions and actions of government organizations.

2. Materials and methods

2.1 The region under study

Qeshm Island has the largest number of beaches and shores among the islands of the Persian Gulf. With an area of nearly 1333 square kilometers. On the other hand, Qeshm Island is considered one of the most important tourism centers in Iran due to its abundant natural attractions, 230 kilometers of coastline, international wetlands, mangrove forests, and 7 geopark sites (figures 1 and 2). Such a feature urges all organizations and institutions to seek the necessary solutions to increase and develop natural, cultural, sports, and economic tourism on this island. Undoubtedly, the unplanned development of these tourism activities will lead to the island's environmental vulnerability and destruction. Now, it should be noted that generalizing the participation of all institutions, stakeholders, and people in solving the environmental problems of this island will lead to making more correct decisions and reducing nature destruction. Therefore, this research tries to show the level of participation and desirous of institutions, stakeholders, and people in solving the environmental challenges of Qeshm Island by focusing on the network analysis method.

2.2 Materials and methods

The present study is based on the descriptive-analytical method. In such a way that at the first step, informal institutions were introduced through interviews with experts of these organizations and offices using a snowball sampling method and referring to the most important organizations and departments affected the sustainable tourism industry on Qeshm Island and also organizations and departments related to environmental management and protection on this island (Table 1) to obtain information and analyze data and then, they were divided into 10 groups including governors of rural districts, council members, local people, tourists, industrial units, tourism cooperatives, guest houses, handicraft sellers, boat owners and university professors. The active industrial units on Qeshm Island were also identified. It should be noted that the relationships formed between organizations were also identified when referring to various organizations to identify informal institutions participating in reducing environmental pollution which are divided into three types: 1-Inter-organizational referral between governmental and non-governmental institutions. 2-Cooperation between governmental and non-governmental institutions. 3-Desirous of cooperation (trust) among governmental and non-governmental institutions.

In the second step, information about the condition of cooperation between these individuals with organizations and departments was collected using the network analysis questionnaire tool and conducting interviews with key officials. The information collected from 50 questionnaires was finally entered into Ucinet software in the form of a two-

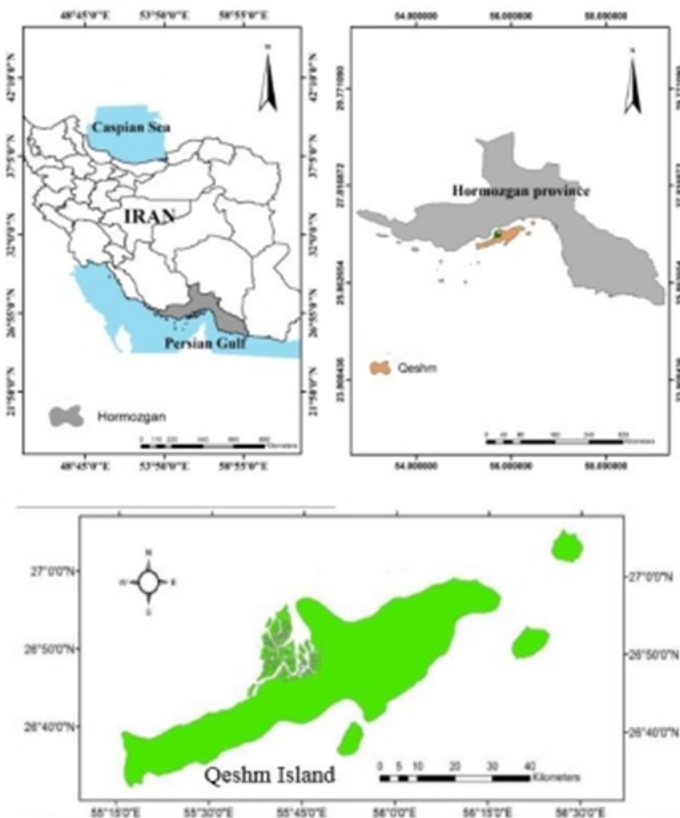


Figure 1. Qeshm Island’s location map.

dimensional matrix whose rows and columns were formed by government individuals and informal institutions (individuals) referring to them and the value of the cells was the intensity of formal and informal connections. Then, the degree centrality and betweenness centrality indexes were drawn using the Netdraw software to identify and determine the most important actors and their connections. The investigation of extra-organizational collaborations in reducing environmental pollution from tourism development on Qeshm Island can benefit from a network analysis approach. This method allows for a comprehensive understanding of stakeholder interactions and the effectiveness of

collaborative efforts in environmental governance. In fact, the network analysis approach is a new method in multi-criteria decision-making which can be used to prioritize factors and criteria. This approach is based on two theories including network theory and graph theory. Network theory implies the study of relationships and its subject is in common with graph theory. Graph theory is also an abstraction of the structural aspects of the model and simulates the network in the form of mathematics. There are some concepts such as centrality, power, and classification in the network analysis approach which are used to process and analyze data to draw different networks and determine the location

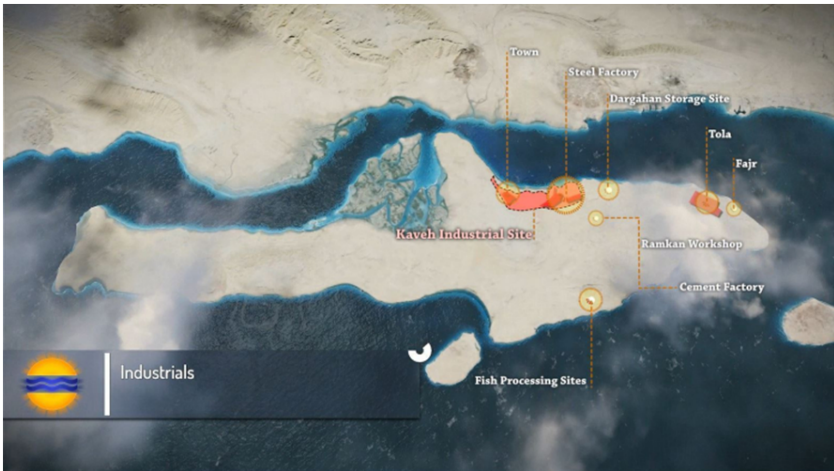


Figure 2. Location of industrial centers of Qeshm island (source: <https://www.qeshm.ir>).

Table 1. Names of the selected organizations used to collect data.

Row	Organization	Row	Organization	Row	Organization
1	Qeshm governorship	7	Qeshm free zone organization	13	Hormozgan general office of natural resources and watershed management
2	Qeshm district government	8	Qeshm Environmental Protection Institute	14	Qeshm natural resources office and watershed
3	Qeshm municipality	9	Hormozgan Province Fisheries Department	15	Hormozgan Environmental Protection Agency
4	Qeshm fisheries department	10	Qeshm County Health Center	16	Hormozgan Province management and planning organization
5	Regional water of Hormozgan province	11	Hara research institute of Hormozgan university	17	Hormozgan ports and maritime organization
7	Qeshm International Development Center	12	Qeshm Ports and Shipping Agency	18	Hormozgan university

of points and the relationships between them. Centrality is a broad concept used to identify and determine the most important actors or connections in a network and has different types in which, degree centrality and betweenness centrality are the most important and useful ones (Hanneman and Riddle, 2005).

Degree centrality: It indicates the number of direct connections that each actor has with other actors. The actor who has more relationships will be more powerful and have more opportunities. A node with a high degree of centrality is active in the actor-network and has a prominent position in the network and he or she will be more influential due to possession of a wider communication network. **Betweenness centrality:** This index indicates the extent to which an actor is in the communication path of other actors and the establishment of communications is done by him. Whatever the betweenness centrality of a node is, it means that that node is located in a more strategic place and this determines the ability of a node to facilitate the expansion of communication between other nodes in the network (Hanneman and Riddle, 2005).

3. Results

3.1 Inter-organizational referral of governmental and non-governmental institutions

Drawing and analyzing cooperation networks between individuals and organizations (governmental and non-governmental institutions) show that among people who refer to organizations to reduce environmental pollution, governors of rural districts with degree centrality of 33 and betweenness centrality of 460/663, local people with degree centrality of 33 and betweenness centrality of 575/979, council members with degree centrality of 30 and betweenness centrality of 313/312, and tourists with degree centrality of 24 and betweenness centrality of 213/607 have the highest degree centrality and betweenness centrality. This means that governors of rural districts, local people, council members, and tourists have the greatest concern and desirous of reducing environmental pollution on Qeshm Island and they have more referrals to carry out the activities related to reducing the environmental pollution than other

people. This is because local people face environmental and challenging problems every day. Industrial units with a degree centrality of 8 and betweenness centrality of 9.359 and handicraft sellers with a degree centrality of 8 and betweenness centrality of 7.170 have the lowest referrals to carry out activities related to reducing environmental pollution and have the lowest degree centrality and betweenness centrality (figures 3 and 4, Table 2). This means that industrial units focus most on maximizing the profits from economic activities and do not pay attention to the assessment of the economic activities' environmental impacts.

3.2 Cooperation between governmental and non-governmental institutions

Drawing and analyzing cooperation networks between governmental and non-governmental institutions shows that local people with a degree centrality of 38 and betweenness centrality of 456/500, council members with a degree centrality of 36 and betweenness centrality of 551/389, and governors of rural districts with a degree centrality of 34 and betweenness centrality of 849/391 have the most cooperation with other people to carry out the activities related to environmental pollution reduction.

Handicraft sellers with a degree centrality of 7 and betweenness centrality of 4/781 and guest houses with a degree centrality of 10 and betweenness centrality of 17/278 have the lowest level of cooperation with other people. Therefore, the lowest degree and betweenness centrality are related to handicraft sellers and guest houses (figures 5 and 6, Table 3). The lack of cooperation between ecotourism lodges (guest houses) and handicraft vendors is due to their excessive focus on economic goals and quantitative development to attract more tourists. Therefore, the components of participation in environmental pollution reduction are not included in their programs.

3.3 Desirous of people to cooperate (trust) with governmental and non-governmental institutions

Drawing and analyzing cooperation networks between government and non-governmental institutions shows that most people are willing to cooperate with council members, local people, and governors of rural districts to do activities re-

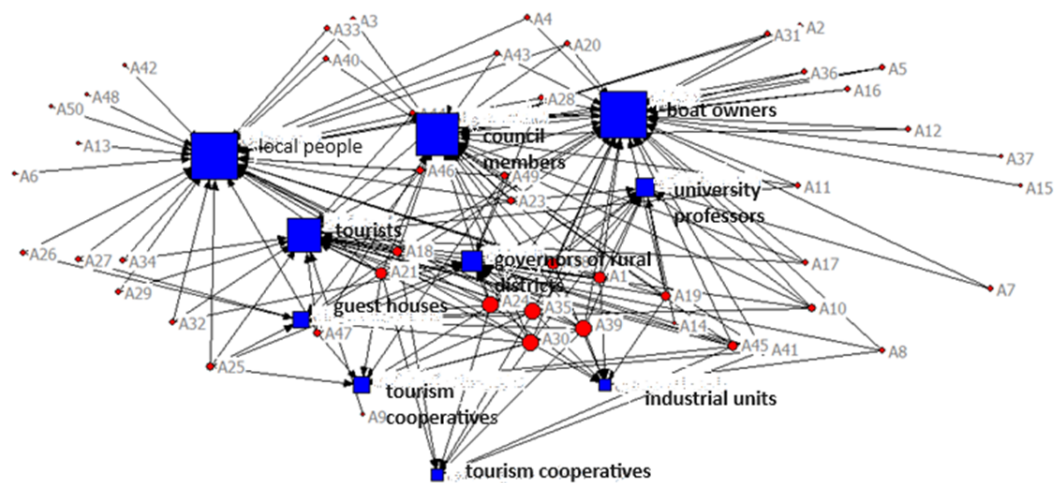


Figure 3. Bipartite graph of degree centrality of inter-organization referral among governmental and non-governmental institutions for environment pollution reduction.

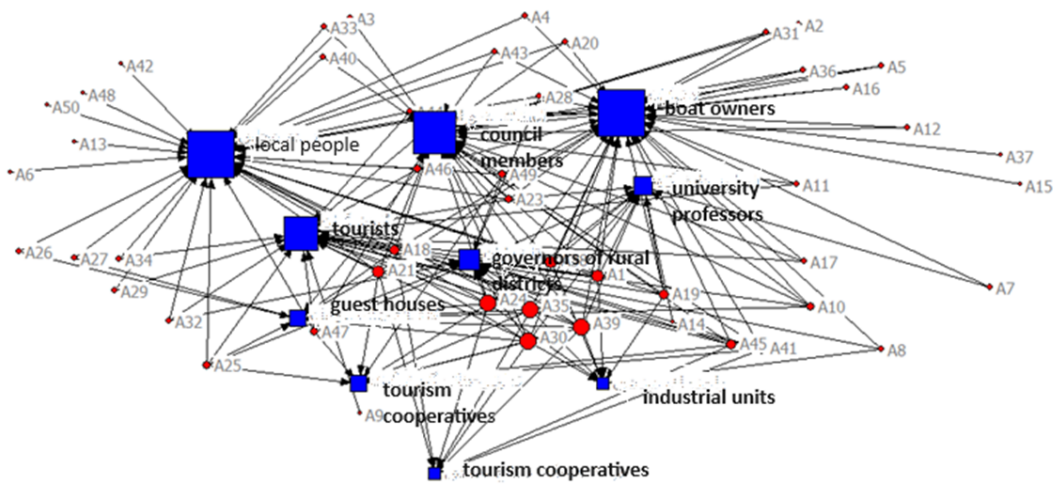


Figure 4. Bipartite graph of betweenness centrality of inter-organizational referral to governmental and non-governmental institutions for environmental pollution reduction.

Table 2. Degree centrality and betweenness centrality of inter-organizational referrals of governmental and non-governmental institutions to reduce environmental pollution.

Member	Degree centrality	Betweenness centrality
Governors of the rural district	33	460.663
Council members	30	312.313
Local people	33	575.979
Tourists	24	213.607
Industrial units	8	9.359
Tourism cooperatives	10	15.681
Quest houses	11	38.994
Handcraft sellers	8	7.170
Boat owners	14	41.777
University professors	12	84.485

lated to reducing environmental pollution. Therefore, council members with a degree centrality of 42 and betweenness centrality of 249/398, local people with a degree centrality

of 40 and betweenness centrality of 946/349, and governors of rural districts with a degree centrality of 37 and betweenness centrality of 772/257 have the highest degree

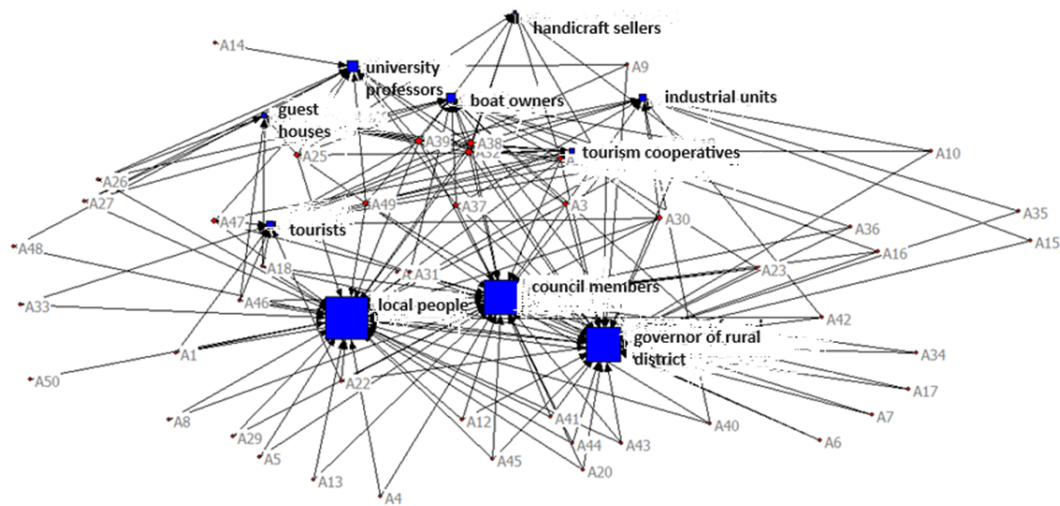


Figure 5. Bipartite graph of betweenness centrality of cooperation between governmental and non-governmental institutions to reduce environmental pollution.

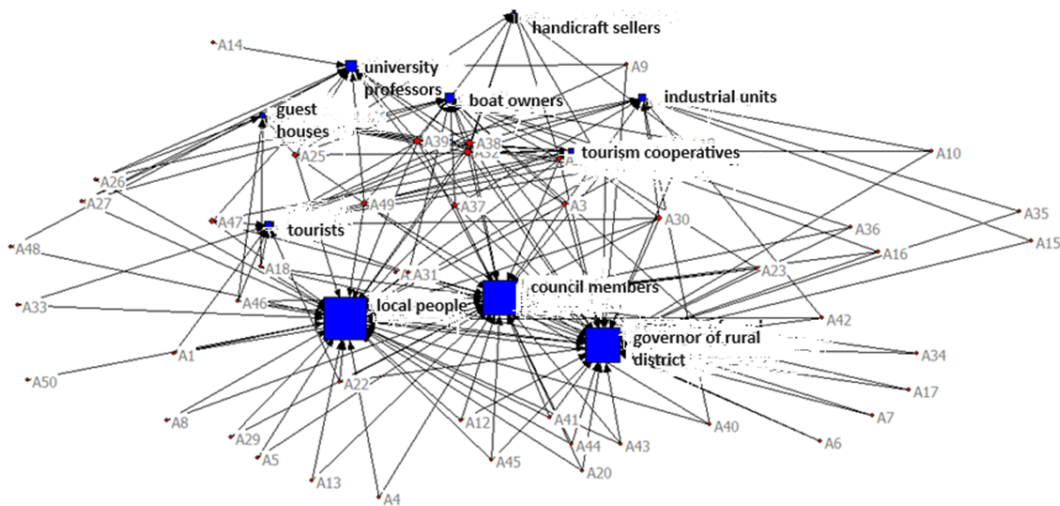


Figure 6. Bipartite graph of degree centrality of cooperation between governmental and non-governmental institutions to reduce environmental pollution.

Table 3. Degree centrality and betweenness centrality of governmental and non-governmental institutions to reduce environmental pollution.

Member	Degree centrality	Betweenness centrality
Governors of the rural district	34	391.849
Council members	36	389.551
Local people	38	500.456
Tourists	15	52.335
Industrial units	11	41.262
Tourism cooperatives	11	24.164
Quest houses	10	17.278
Handcraft sellers	7	4.781
Boat owners	17	63.777
University professors	13	94.547

centrality and betweenness centrality. The lowest level of the tendency of individuals to cooperate is related to tourism cooperatives with a degree centrality of 16 and betweenness centrality of 639/36, guest houses with a degree centrality of 18 and betweenness centrality of 189/40, and handicraft

sellers with a degree centrality of 18 and betweenness centrality of 916/40 (figures 7 and 8, Table 4). This lack of tendency of tourism cooperatives, guest houses, and handicraft sellers shows the realization of economic goals and the existence of a purely economic vision.

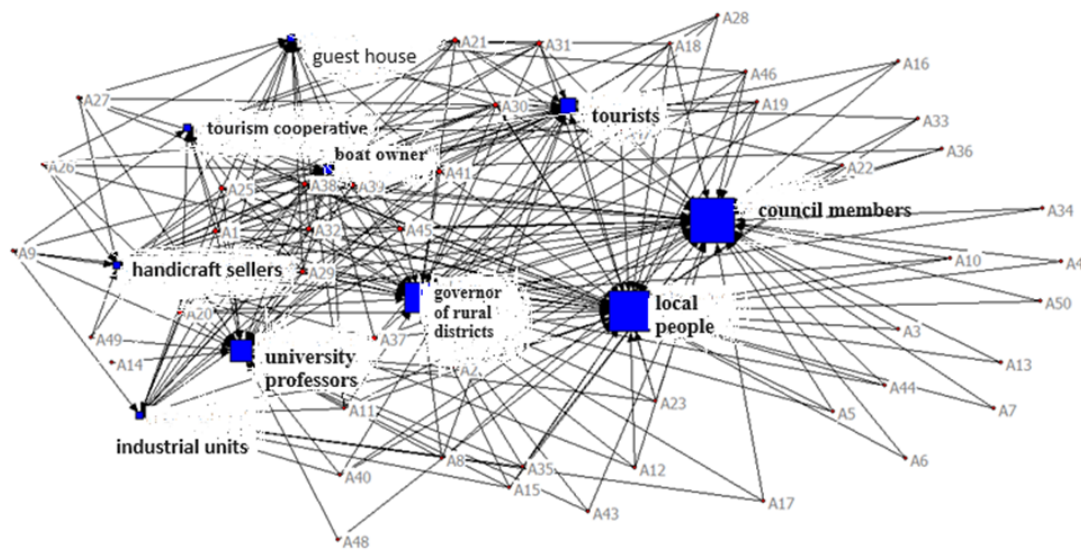


Figure 7. Bipartite graph of betweenness centrality of desirous of people to cooperate (trust) with governmental and non-governmental institutions.

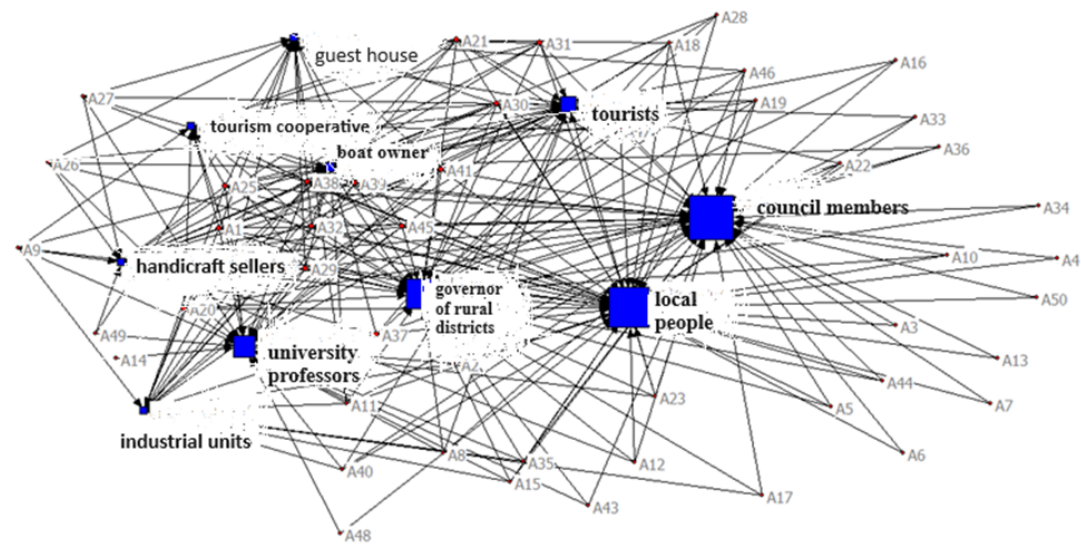


Figure 8. Bipartite graph of degree centrality of desirous of people to cooperate (trust) with governmental and non-governmental institutions.

Table 4. Degree centrality and betweenness centrality of desirous of cooperation (trust) among governmental and non-governmental institutions.

Member	Degree centrality	Betweenness centrality
Governors of the rural district	37	257.772
Council members	42	398.249
Local people	40	349.946
Tourists	27	124.505
Industrial units	19	39.712
Tourism cooperatives	16	36.639
Quest houses	18	40.189
Handcraft sellers	18	40.916
Boat owners	23	68.688
University professors	27	175.385

4. Conclusion

The significant interplay between tourism and the environment, along with tourism's substantial impact on environmental management, has drawn considerable attention to the study of social cooperation in the context of tourism development and environmental protection. In developed countries, tourism is often viewed as a threat to environmental protection. This dual nature of tourism—being both a tool for and a threat to the environment—has increasingly captured the interest of researchers across the natural and social sciences (Buckley, 2011). Research consistently shows that the tourism industry cannot achieve its full potential without cooperation among diverse stakeholders (Wilke et al., 2019). Essentially, the very existence and sustainability of tourism hinge on the active participation of all stakeholders (Manaf et al., 2018). Therefore, Interorganizational cooperation is crucial in tourism destinations, as it helps reduce uncertainties, broadens opportunities, and enhances the customer experience. The tourism industry cannot achieve full development without collaboration among various stakeholders, highlighting the importance of these relationships.

Inter-organizational networks are crucial for the competitiveness of tourist destinations, as identified in the research. The study highlights the significance of these relationships in influencing policies and decision-making within the tourism industry, emphasizing their role in collaboration and competitiveness. In other words, an investigation into inter-organizational cooperation between governmental and non-governmental institutions for tourism development on Qeshm Island reveals a consistent pattern: local non-governmental entities, including rural district governors, council members, and local residents, are the primary initiators of efforts to reduce environmental pollution. They also demonstrate the strongest desire for cooperation with, and trust in, governmental organizations. These findings align with research by Li et al. (2021) and Wang et al. (2020), which also highlight the significant role of non-governmental institutions in improving management and addressing environmental issues.

The prominent and influential role of non-governmental organizations in the tourism industry, particularly the finding that local populations exhibit the highest levels of cooperation, referral, and trust in governmental institutions, is consistent with studies by Sharpley and Harrison (2019) and Fobbe (2020). These studies underscore the necessity for non-governmental organizations to continuously pursue diverse methods of participation in social change and development. Non-governmental organizations (NGOs) play a pivotal role in the tourism industry by promoting sustainable practices, enhancing community engagement, and preserving cultural heritage. Their influence extends across various regions, as they act as intermediaries between stakeholders, facilitate educational initiatives, and contribute to the economic development of tourism destinations. NGOs play a crucial role in Qeshm Island's tourism sector by addressing socio-economic sustainability concerns, influencing development, and enhancing stakeholder engagement. However, they face challenges such as financial constraints and limited ability to influence state policy consistently.

It should be noted that the participation of all the governmental and non-governmental institutions including industrial units, tourism cooperatives, guest houses, handicraft sellers, etc. in environmental pollution reduction on Qeshm Island requires increasing the three components including social trust, social consistency, and social participation and each one of these components strengthens the other one. However, these three components are less considered on Qeshm Island. So, the respondents to the questionnaire even do not consider the existence of social trust, social consistency, and social participation as the reason for their referral and desire to cooperate with governors of rural districts and council members. They believe that the participation of governors of rural districts and council members is due to the following reasons including: 1- They perform their duties as governmental officials. 2- They are the final decision-makers. 3- They have economic budgets to carry out these activities. 4- They are the government's representatives and it is their legal duty they also believe that local people are obliged to cooperate and participate in reducing environmental pollution because environmental pollution causes the most danger to their health and directly and indirectly affects them.

The mentioned reasons for the cooperation of governors of rural districts and council members show that this issue of environmental protection and environmental pollution reduction are the duties of governmental agencies and organizations is one of the thoughts governing Qeshm Island. Greater success can be achieved in implementing conservation programs through the participation of other institutions including tourists, guest houses, handicraft sellers, and boat owners. Therefore, the first step on Qeshm Island is increasing public awareness of adopting community-oriented approaches (such as local institutions and engaging users through these institutions) among industrial units, tourism cooperatives, guest houses, handicraft sellers, and boat owners to reduce environmental pollution and achieve sustainable development goals.

On the other hand, we should note that the main reason for the decrease in participation of all individuals is also due to the lack of social trust and an increase in social participation can be observed to reduce environmental pollution if the social trust component is increased by raising awareness among individuals and trust network is formed between individuals, groups and various organizations. Therefore, as a first step, it is suggested that more measures should be taken to increase social capital, promote public awareness, and increase the social trust component on this island by facilitating participatory processes and using a wider set of policy tools. The increase in attention to the relationship between people (beneficiaries) and institutions will lead to the enhancement of a sense of trust and confidence and the organizations in charge of environmental and natural resource management can take into account the role of all beneficiaries and stakeholders in environmental and natural resource management.

This highlighting of the social trust component also increases new policy tools such as voluntary and quasi-voluntary implementation of environmental regulations

which also is a benefit for governmental organizations because they do not need to spend additional costs to reduce environmental pollution and public participation and other institutions reduce these costs.

Its benefits for government organizations include:

- Reduced enforcement costs: If companies or individuals voluntarily comply, governments spend less on monitoring, inspections, and legal action.
- Increased efficiency: Policies can be implemented more quickly and effectively when there's a higher degree of cooperation.
- Enhanced legitimacy and public support: When citizens and businesses trust the government's intentions and actions, it fosters greater buy-in for environmental policies.
- Greater flexibility and innovation: Voluntary approaches can allow for more tailored and innovative solutions to environmental problems, rather than rigid, one-size-fits-all regulations.
- Better environmental outcomes: Ultimately, increased compliance, whether voluntary or enforced, leads to better environmental protection.

It should be noted that it is necessary to pay special attention to the capacity of environmental problem settlement rather than focusing on the principles of stakeholders' participation at the time of focusing on participatory actions. This means that during discussions about increasing participation, the focus should be on the method by which, the industrial units, tourism cooperatives, guest houses, handicraft sellers, boat owners, and even university professors can participate in solving environmental problems and achieving sustainable development, both individually and socially and that these roles should be taught to them. This training and informing will lead to the emergence of all the stakeholders' participation. In other words, making education more serious is one of the efforts that encourages quasi-voluntary compliance. Therefore, stakeholders will be encouraged to play a greater role in participatory management and local ownership by focusing on the increase in public awareness, information campaigns, and training.

In addition to the above-mentioned cases, it is suggested that some steps can be taken to reduce the negative impacts of economic activities by making it obligatory for factories and active industrial units to conduct environmental impact assessments and continuously monitor them and also encourage them to assess. This is because conducting this assessment can significantly help the further development of policy capacities in collaborative networks and spaces.

Authors contributions

All authors have participated in (a) conceptualization, design, and/or analysis and interpretation of the data; (b) drafting or editing the article, meaningfully contributing to intellectual content; and (c) approval of the final version.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Conflict of interests

The author declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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