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# Sohar Industrial Clusters: Navigating Policy Implementation Barriers

Abdullah Khamis Al Mukhaini<sup>1</sup>, Figen Yesilada<sup>2</sup>

<sup>1</sup> Adar Engineering Consultants P.O Box 27 Postal Code 416, Jalan Bani Bu Ali Sultanate of Oman Email: Abdullahalmukhaini@yahoo.com

<sup>2</sup> Department of Business Administration, Cyprus International University, Nicosia, North Cyprus, Turkey  
Email: fyesilada@ciu.edu.tr  
ORCID ID: 0000-0002-1407-9915

## Abstract

The present study investigates the challenges encountered in the execution of cluster-based policies in Sohar Industrial Area, Sultanate of Oman, with a focus on the role of stakeholders. The research employs a qualitative research approach, consisting of 33 semi-structured interviews conducted with key stakeholders. The findings of the study reveal that government institutions play a critical role in facilitating cluster-based policies through policy formulation, infrastructure provision, coordination, stakeholder engagement, and sector-specific initiatives. Participant firms contribute to cluster development through collaboration and support for SMEs, and alignment with government initiatives. The study highlights the significance of customizing cluster-based policies to address the requirements and concerns of various stakeholder groups, which can be accomplished by nurturing collaboration, establishing transparent facilitators and incentives, cultivating supportive institutions, creating a favorable legal framework, and fostering an investment-friendly environment. The study is a significant contribution to the academic discipline by offering valuable insights into the development of clusters and the effective engagement of stakeholders. The results of the study have the potential to guide policymakers, government institutions, and industry leaders in their efforts to promote economic growth and establish a conducive environment for cluster-based policies in the Sohar Industrial Area.

**Keywords:** Clusters, Cluster Initiative, Cluster-Based Policy, Economic Growth, SMEs, Stakeholder Engagement

## 1. Introduction

In the contemporary era of globalization, nations are diligently striving to establish their competitive edge in the international arena. Governments and policymakers are actively seeking strategies to enhance their nation's competitive position. Ketels and Memedovic (2008) emphasize the significance of a robust business environment that fosters both growth and innovation, beyond the reliance on comparative advantage derived from local input factors or natural resources. Porter's competitiveness diamond is a well-established framework that posits the advantages of businesses being in proximity to one another, referred to as "clusters."

The cluster concept, which has been significantly inspired by Michael Porter's influential article, "The Competitive Advantage of Nations" (Porter, 1990), has gained widespread recognition and is frequently discussed in global policy discourse (Garanti et al., 2014). It has attracted scholarly interest, particularly due to the emergence of various economic sectors and the integration of regional economies into the global economy (Fundeanu and Badele, 2014). Regional clusters can be defined as collections of organizations and entities that are geographically proximate to each other and engaged in similar industries or sectors (Garanti et al. 2014). Porter (1998) suggested that the presence of industrial clusters has a positive impact on productivity, innovation, and competitiveness. The notion was well-received by scholars and policymakers, leading many studies exploring the factors contributing to the success of regional industrial clusters.

The cluster concept has been widely adopted in both developed and emerging economies, leading to the implementation of competitiveness policies. Many countries are striving to replicate successful examples such as Silicon Valley. However, for regional industrial clusters to thrive, the business microenvironment must be adequately prepared. According to Ketels and Memedovic (2008), this entails understanding the present state of enterprises, the achievements of established clusters, and any existing regulations about clusters. The regional industrial cluster represents a form of organized competition and collaboration among geographically proximate businesses. These clusters can emerge either spontaneously or as the outcome of deliberate government policy initiatives (Porter, 1998). The main goal of these clusters is to boost the performance of individual enterprises by promoting improvements in productivity and facilitating the transfer of knowledge and experience. Through this collaborative framework, the participating businesses are strategically positioned to use common resources, expertise, and synergies, resulting in the enhancement of their performances. As a result, these specific collaborations have a significant impact on enhancing the competitiveness and productivity of individual enterprises, as well as enhancing the overall economic performance of the region in which they are situated.

Porter (2003) and Singh & Evans (2009) argue that countries endowed with abundant resources should strategically utilize regional clusters as a means to effectively harness their inherent skills and expertise. Oman, a country rich in resources, encounters a distinct challenge in this domain. During the period from 1998 to 2004, the country efficiently developed its industrial infrastructure, encompassing ports, industrial complexes, and supportive infrastructure, also known as "hardware," in key regions such as Sohar, Duqm, and Salalah. Nevertheless, the rapid progress in infrastructure development has surpassed the efforts to cultivate essential complementary components, commonly referred to as the "software." The term "software" in this context alludes to the collective human skills, expertise, and collaborative networks that are necessary for the efficient functioning and utilization of the clusters. In essence, whereas Oman swiftly established the physical infrastructure for regional clusters, the development of the human and collaborative aspects necessary for a successful cluster policy has turned out to be a more gradual and complex process.

Despite the potential benefits associated with clustering the existing body of academic literature highlights a gap in the implementation of the cluster concept within policy-making processes (Porter, 1998; Delgado et al., M., 2014; Wolman & Hincapie, 2015; Wilson, 2019; Wilson et al., 2022;).

The policy framework of Oman's 2040 manufacturing program seeks to enhance industrial growth in three key regions, namely Sohar, Salalah, and Duqm. The policy emphasizes the potential of developing an export-oriented cluster centered around the healthcare products industry, alongside other emerging knowledge-driven clusters. The objective of this study is to address the existing gap in the literature by examining the challenges associated with the adoption of a cluster-based policy in the Sohar Industrial Area, Oman, encompassing both the Sohar Free Zone, a privately-owned enterprise, and the Sohar Industrial City, a publicly-owned organization under the ownership of Madayn. The study also seeks to provide policymakers with valuable insights into the effective design and implementation of cluster-based policies that foster development and economic growth.

## **2. Literature Review**

Recent academic discussions highlight the importance of cluster policies in facilitating regional development. Given the worldwide concerns about economic inequalities among regions, it is imperative to get a comprehensive

understanding of cluster theory and its practical implications. Barca (2008) argues in favor of adopting a place-based strategy for economic development, emphasizing the importance of acknowledging and taking into account the distinct attributes inherent to each specific geographic area.

According to Schmiedeberg (2010), there is a growing emphasis in governance systems on integrating cluster policies into their economic frameworks. Sölvell et al. (2003) classified governance styles into three categories, namely formal institutions, informal networks, and hybrid models that incorporate elements of both. Simultaneously, scholars underscore the significance of trust, cooperation, and flexibility of cluster governance. Considering this information, it is evident that those responsible for managing clusters have the potential to improve their development by identifying key competitive factors and fostering collaboration.

A significant contribution to the cluster theory is the Associative Governance Model proposed by Ebbekink and Lagendijk (2013). This model offers significant insights into the factors that influence the formation and growth of regional clusters. The model highlights four key elements: effective governance strategies, a flexible network infrastructure, supportive institutional structures, and measurable performance indicators. The Associative Governance Model is a place-based governance model that provides a fundamental framework for the utilization of cluster-based policies. The model highlights the importance of collaborative governance, emphasizing the values of trust, transparency, and accountability among all involved parties. To implement this methodology effectively, cluster-based policies seek to integrate various stakeholders, fostering innovation and stimulating growth within industries or regions. At the core of this model lies the vitality of collaboration and coordination, particularly among public and private entities, to achieve sustainable development. One fundamental concept embedded in this model is referred to as "cluster-policy leverage." The proposed model emphasizes the importance of establishing a strong connection between the formulation of cluster policies and the utilization of locally-based "strategic intelligence." This approach is essential for policymakers and practitioners who seek to facilitate the development of sustainable clusters. The framework is an innovative paradigm, for intelligence generation and policy formation.

The cornerstone of the model is based on active involvement with the cluster universe, resulting in strategic actions during the process of policy formulation, ultimately leading to the strengthening of clusters. The actors involved in both cluster entities and policy-making institutions must possess the necessary skills and expertise to play a central role in the process of strengthening the cluster. In the context of this paradigm, "civic entrepreneurs" play a crucial role (Ebbekink and Lagendijk, 2013). A "civic entrepreneur" refers to a visionary leader who bridges boundaries and possesses the ability to establish connections among various stakeholders, potentially acting in the realm that lies between the public and private domains (Andersson et al., 2004). They engage stakeholders in a continuous "unifying" dialogue, mediating conflicting interests and facilitating the resolution of internal conflicts and mistrust among stakeholders (Lundequist & Power, 2002; Andersson et al., 2004; Crone, 2009).

Ebbekink and Lagendijk (2013) caution against a limited focus on the economic and geographical aspects. The authors propose a broader framework for governance, which highlights the significance of clusters as interconnected networks of many participants. The inclusion of a governance perspective enhances the findings of Sölvell et al. (2003), emphasizing the importance of flexible organizational frameworks that are capable of effectively responding to the dynamic characteristics of clusters. Organizations can effectively walk the path toward sustained regional growth by matching their cluster strategies with established real-world paradigms, recognizing the distinctive attributes of their respective regions, and developing strong governance structures.

Spuijt et al. (2014) examined the various roles assumed by scientists in the context of providing advice to policymakers. The researchers also identified key themes that emerged from their study. Nevertheless, a noticeable disparity exists between the theoretical frameworks deliberated in academia and the practical verification that supports these concepts in real-world application.

### 3. Cluster Studies Contextualized in Oman

According to Peter de Valk (2015), Oman's economic development is mainly reliant on its natural resources and is characterized by a significant number of low-skilled migrant labor in its workforce. This indicates the presence of a factor-driven economy. The importance of diversification is emphasized by Al Alawi and Mishra (2016), who highlight the need for a strategic shift. They emphasize the significance of infrastructure, human capital, and collaboration in the development of strong clusters. Several studies into the economic environment of Oman highlight specific concerns. In their study, Chatterji et al. (2014) present an analysis of conventional economic growth models, highlighting the significance of entrepreneurial clusters, such as Silicon Valley, in promoting job creation and economic growth. In addition, Kumar and Al Maqbali (2015) conducted a study on the operational challenges faced by SMEs in Sohar Industrial Port, which is an important hub for investment in Oman. Despite the employment and investment opportunities that the port holds, there is a considerable gap in the literature about the challenges faced by SMEs in this important region of Oman.

Gavrish (2017) provides an in-depth assessment of the industrial collaboration existing in the Sohar Port & Freezone. This research emphasizes an important finding: for sustainable practices like industrial synergy to prosper, it is imperative to effectively integrate them with the local institutional mechanisms. In addition to assessing technical feasibility, achieving success is contingent on successfully interacting with the socio-institutional environments.

In the case of Oman, the utilization of these clusters not only serves as a means of diversifying the economy but also as a method to enhance economic resilience and sustainability. The roadmap for accomplishing this objective involves understanding and leveraging both established and prospective industrial clusters, a task that requires thorough investigation, as demonstrated by the extensive and diverse body of research on industrial clusters in Oman, including areas such as entrepreneurship, logistics, and tourism (Belwal & Belwal, 2010; Taderera & Al Balushi, 2018; Ba-Awain, & Daud, 2018; Asad Ullah et al., 2022).

Swales, Al Said, and Al Fahdi (2012) shed light on the significant challenges confronting Oman's localization policies, particularly regarding the perceived employability of locals and the prevailing preference for a foreign workforce. Within the broader academic debate around Oman's cluster-based initiatives, this study highlights a critical barrier: the effective integration and prioritization of local talent within clusters while avoiding the influence of prevalent biases and labor preferences.

Sarrayih and Sriram (2015) examined the evolution of e-government and emphasized its significance in contemporary governance by enabling citizen accessibility to services. While some countries have successfully implemented e-government frameworks, there are still others, including Oman, that are still in the process of improving their approach. The researchers specifically explore the distinct problems that Oman confronts in this phase. Through the utilization of secondary data, the researchers assess the current level of acceptance of e-government in Oman and propose a customized model for its full implementation.

Taderera and Al Balushi (2018) focused on the infrastructural challenges, particularly on ports, airports, and roads. The achievement of a harmonious integration with key stakeholders remains challenging, despite the implementation of e-government initiatives by Oman's Customs and Excise Department. It also highlights a broader concern which is the complexity of the implementation of multidimensional policies such as cluster policy, especially considering the existing operational constraints.

Al-Makhmari, Al Yaqoobi, and Slimi (2021) shed light on the challenges faced in non-oil sectors regarding the exportation of domestic products, attributing these difficulties to the presence of burdensome government regulations and complex import-export procedures. Addressing these barriers is crucial for Oman to unlock its potential to reach global markets and attract both local and international investors.

Al Alawi & Mishra (2016) emphasize Oman's strengths, including its political stability and resilient oil sector. They also highlight areas of improvement in the private sector and tourism infrastructure as potential strategies to

expand and diversify revenue sources. Belwal & Belwal (2010) highlight tourism as an emerging sector with substantial potential for growth, particularly in the context of a post-oil economy.

Entrepreneurial clusters have also gained attention as game-changers. Chatterji et al. (2014), argue that utilizing these clusters as a means to stimulate regional economic growth, referencing successful examples such as Silicon Valley.

JICA (2010) recommends a shift in Oman's focus, from hard infrastructure to the development of soft, knowledge-based businesses. By integrating Oman's geographical advantages with innovative industrial efforts, there exists the possibility of cultivating clusters similar to those observed in the oil drilling industry in Nizwa.

Oman stands at a crossroads of several opportunities. Despite the existence of ongoing obstacles, the country's strategic geographical location, coupled with insights derived from regional studies and commitment to strategic interventions, can pave the way for building a diverse and sustainable economy. Embracing a holistic approach that takes into account infrastructure, stakeholder integration, and the promotion of new clusters is essential for steering Oman towards sustainable growth in the foreseeable future.

#### **4. Research Methodology**

The purpose of the study is to gain a deeper understanding of the challenges and complexity associated with the implementation of cluster-based policies in the Sohar Industrial Area in Oman. The research methodology employed in this study focused on the collecting of qualitative data, which is a methodical approach that is well-suited for extracting valuable insights. One-to-one semi-structured interviews were made with 33 participants identified using purposive sampling from policymakers, business executives, civic entrepreneurs, academics, collaboration institutions, and nonprofit organizations<sup>1</sup>. The guiding questions were: What are the challenges facing the implementation of cluster-based policies in the Sohar Industrial Area? How can these challenges be surpassed? How can stakeholders help solve problems when implementing a cluster-based policy? What are the ways to improve stakeholder involvement in the implementation of a cluster-based policy? What are the main barriers to stakeholder collaboration in the implementation of a cluster-based policy, and how can they be overcome?

The interviews conducted in this study provided a platform for participants to openly express their experiences, fostering an environment of candid communication. The flexible nature of these interviews allowed the conversation to organically navigate towards relevant topics, ensuring that the dialogue remained focused and meaningful. This approach not only facilitated a deeper understanding of the participants' perspectives but also promoted mutual discovery between the interviewer and interviewee, as highlighted by Neuman (2006). By encouraging open sharing, flexibility, and mutual exploration, these interviews served as a valuable tool for gaining insightful and nuanced insights from the participants. Ethical considerations and permissions were diligently obtained to protect participants' rights and confidentiality. Each session was audio-recorded, and subsequent transcriptions formed the crux of the data analysis phase. Data was analyzed using content analysis methodology. Each transcript was thoroughly reviewed to identify and categorize common points. Each category was further analyzed to extract the themes, which were then cross-referenced with previous study findings. To enhance the external validity, findings were triangulated by interviewing various key participants, including city planners, regional economic developers, and government officials. This comprehensive process provided a thorough understanding of the Sohar Industrial Area cluster initiatives, rooted in empirical evidence and contextualized within Oman's broader economic and cultural framework.

#### **5. Findings & Discussion**

Content analysis revealed five major themes for challenges in implementing the cluster-based policy in the Sohar Industrial Area and five related strategies.

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<sup>1</sup> Profile of the interviewees is presented in the Appendix

### 5.1. Challenges Encountered in the Implementation of the Cluster-based Policy

Six challenges were extracted; economic factors, infrastructure and logistics, government, and policy, market and competition, collaboration and awareness.

#### 5.1.1. Economic Factors

Several interview responses (Respondents 1, 4, 9, 20) emphasized the pivotal role of economic factors in the implementation challenges faced by cluster-based policies in Oman. The dominance of the oil sector and the market contraction due to the COVID-19 pandemic pose significant hurdles to diversifying the economy through cluster development. Some examples quoted from the responses of interviewees are as follows:

*“Oman is still an oil-driven economy.”* (Respondent 1)

*“Well, you see, we are a small market in comparison to the region we are in. If you want to establish export, you have to have a market for it. We do have the raw materials for some industries, but other countries have the infrastructure already there to maybe import raw materials and do the industry somewhere else. If we want to encourage the industries, we have to give incentives”.* (Respondent 9)

*“COVID comes in, everything falls apart. We have lost quite a lot of businesses, unfortunately, because of COVID”.* respondent 4, *“the COVID-19 or Corona, which has affected all companies”.* (Respondent 20)

These obstacles echo earlier research, such as Oman Vision 2040, emphasizing the imperative of economic diversification and reducing reliance on oil revenue.

Additionally, Benea-Popușoi and Rusu (2021) contribute valuable insights, indicating that a dense concentration of firms doesn't automatically translate into robust collaboration networks. The economic challenges highlighted by the interviewees encompass Oman's small oil-dependent market, lack of clear policies for cluster development, uncertain government stances on natural gas pricing and renewable energy, high energy tariffs and land costs impacting industry competitiveness, market shrinkage due to COVID-19, difficulties in attracting investments and developing support industries, weak government commitment to cluster policies, fluctuations in raw material prices and export-import regulations, limited budget for cluster promotion, challenges in securing long-term investment returns, financial constraints for industrial investment from Oman Development Bank (ODB), reliance on government's strategic planning, and the manufacturing industry's heavy dependence on low-wage expatriate labor.

#### 5.1.2. Infrastructure and Logistics

Cluster development relies heavily on robust infrastructure and logistics, as highlighted by various speakers (Respondent 3, 16, 24). The challenges related to inadequate infrastructure, utilities, connectivity, and supply chain support pose significant barriers to cluster establishment and growth. Fowling illustrates some samples of responses recorded during interviews:

*“If we had to do this kind of a cluster, we need to be ready. Our infrastructure has to be ready. Our procedure has to be ready. So we could accommodate those investors and accommodate those clusters”.* (Respondent 3)

*“If I want to make a cluster, I think the challenges will be to provide for this kind of companies a supply chain to provide all the products that they need.”* (Respondent 16)

*“I think one of the difficulties which we are facing to collaborate in the industrial area, at least in the food sector, is a lack of information in one place. Secondly, the industrial area still is not completed”.* (Respondent 24)

These issues resonate with studies, including Porter's cluster theory, underscoring the pivotal role of strong infrastructure and logistics networks in successful cluster initiatives.

Specific challenges cited in the sample encompass insufficient infrastructure and utility services in the Sohar Industrial Area, lack of clarity on tariffs and procedures, the necessity for seamless connectivity and robust logistics, difficulties in securing energy supply and skilled talent, limited availability of downstream industries, lack of regulations and coordination among government ministries, challenges in relocating existing industries and expanding clusters, absence of organization and clear clustering systems in the industrial area, space constraints impeding cluster expansion, absence of modern automated supply chains to support clusters, logistics constraints hindering business development, lack of industrial disposals and necessary services, and incomplete infrastructure. These challenges highlight the pressing need for comprehensive solutions in infrastructure and logistics to foster successful cluster development initiatives.

### 5.1.3. Government and Policy

Government policies are pivotal in cluster development, a point emphasized by several interviewees. Challenges such as the absence of clear policies, weak stakeholder commitment, fragmented regulations, and coordination issues between ministries hinder the implementation of cluster-based strategies. Some of the stakeholders' views are as follows:

*"The boundaries for the decision to develop clusters is not properly charted, it's not properly illustrated, that's why the role is really important I'm not saying it's not important, it's important but because there is no developed written policy that's why we still go back and forth it's will take a long time to be clear on that. There is a trend towards a cluster but what are the enablers it's not written anywhere". (Respondent 2)*

*"What we have seen in the past three, four decades, unfortunately, has become a gap between the government and the organizations". (Respondent 5)*

*"The main thing is in the previous, before OPAZ, two years ago, there were a lot of entities looking for organizing, and regulating all the investments in the free zone and the port or in the small clusters and different regions in Oman". (Respondent 6)*

*"Governmental process and the way that is to do the investment, it needs to be reviewed". (Respondent 17)*

*"The government was reluctant to provide these services". (Respondent 27)*

*"The cluster policy starts with focus on attracting major strategic players in specific industries and this project will develop a value chain in the surrounding region. Unfortunately, this is not the case in Oman. We have industrial facilities but not specialized in a specific field". (Respondent 33)*

These difficulties align with existing studies stressing the necessity of supportive government policies and effective coordination mechanisms for successful cluster development, as outlined by Schmiedeberg (2010).

Respondents cited obstacles like the lack of established cluster-based policies, insufficient long-term policy efforts from stakeholders, absence of shared visions among stakeholders, fragmented regulations and fees, absence of a centralized investor support channel, weak local policy coordination to tackle competition, difficulties in processing cluster plans and expansions, lack of clear legal frameworks enforcing clustering, fluctuating border customs requirements, government commitment needed to maintain utility rates, necessity for smart incentives for utilizing free trade agreements, absence of incentives for cluster formation between Sohar industrial city and the Sohar free zone, and regulatory challenges in government regulations and requirements.

These challenges echo Wilson's (2019) discussions on cluster policy resilience and align with Burfitt & MacNeill's (2008) concerns about shared visions and governance structures in cluster policy.



#### 5.1.4. Market and Competition

Understanding market dynamics and competition is crucial for cluster development, a sentiment emphasized by various speakers. Challenges such as the competitiveness of Omani products, intense competition from imports, and the necessity for incentives and protection for local clusters align with prior research highlighting the significance of market-oriented policies, competitive advantages, and supportive measures for local industries, as discussed in works like; Porter (2007), Ketels (2013). Quoted samples of various interviewees' concerns are as follows:

*"We have lost quite a lot of businesses, unfortunately, because of COVID. So, the challenges that we had, let's say pre-COVID, is more of energy and more of the land itself. So, the energy tariff was high, the land cost was also going high, but of course, it comes COVID, and when it comes COVID, you know, market has shrunk".* (Respondent 4)

*"To develop the national economy and also to increase the local value added to the country. This is not possible without the so-called policies of import law".* (Respondent 10)

*"Ministry of Commerce & Industry need to organize some of the laws and legislations that allow to compete internally and internationally".* (Respondent 12)

*"The companies in Oman are relying on their own efforts..... We are asking to have a monitoring to import of products that can be made in Oman".* (Respondent 15)

Specific challenges outlined include the struggle of Omani products to compete, the overwhelming regional competition in the local market, the need for incentives to boost export-oriented products, policy coordination weaknesses in facing competition, difficulties in safeguarding local clusters from regional rivals, and the requirement for laws and legislations to back local manufacturers. Vicente (2014) addresses the skepticism surrounding cluster policies, a skepticism likely rooted in challenges like intense regional competition and the necessity to shield local clusters, issues highlighted in the current study.

#### 5.1.5. Collaboration and Awareness

Collaboration and awareness among stakeholders are fundamental for the success of clusters, as highlighted by various speakers. The interviewed stakeholders revealed acceptable amount of understanding on challenges facing cluster-based policy in Sohar Industrial Area. Some of their responses are as follows:

*"Madayn should take an initiative to have at least three to four times meeting the investor with the main authorized person over there. Madayn is the excellent platform, honestly speaking. Madayn or the public establishment for industrial sector not from now since long time".* (Respondent 7)

*"Let's take an example of such collaboration in Sohar, some time ago there was an entity established called 'jusoor Sohar', it's an arm for social development of three companies, by doing that they are forming an entity which is strong. It is a reputational strength for them and they share the cost of that entity but when it comes to the benefit the three of them get the same benefit of any project that they fund".* (Respondent 9)

*"The main challenge is probably the administration of the cluster. I think the government should take initiative in terms of increasing the relationship between the industries within Sohar industrial estate of the free zone".* (Respondent 21)

Challenges such as difficulties in enhancing collaboration among manufacturing industries, lack of awareness, skills, and mindset to support virtual collaboration platforms, companies opting for individual promotion channels, limited cooperation between the government, private sector, and research institutions, and hesitancy to utilize shared facilities and limited dialogue between policymakers and manufacturers are obstacles that resonate with studies emphasizing the importance of effective collaboration, knowledge sharing, and stakeholder engagement for cluster development, as discussed in works like Ucler (2017).

These challenges underscore the crucial need for improved collaboration strategies and increased awareness and communication among stakeholders to foster successful cluster initiatives.

In sum, the outlined challenges are well-documented in academic discourse, emphasizing their widespread nature. Yet, certain unique aspects, such as dependence on oil and COVID-19's repercussions, cast a distinct shade on the challenges in the Sohar Industrial Area. As cluster strategies advance, reconciling these specific hurdles with wider academic insights can foster more tailored and effective policy strategies.

### 5.2. Stakeholder Contributions to Surpass the Challenges

The second main question asked during the interviews was about the stakeholders' contributions in overcoming the challenges faced in the implementation of a cluster-based policy in the Sohar Industrial Area. Content analysis of the data revealed nineteen subthemes, which were further categorized into five themes: government support and policy changes, stakeholder collaboration and communication, stakeholder involvement, infrastructure and resource allocation, and cluster formation and coordination (Table 1).

Table 1: Themes Extracted Regarding the Strategies to Surpass the Challenges

		THEMES EXTRACTED				
		Government Support and Policy Changes:	Stakeholder Collaboration and Communication:	External Stakeholder Engagement and Involvement:	Infrastructure and Resource Allocation :	Cluster Formation and Coordination:
SUBTHEMES	All government and public services leaders need to open their doors for all investments.	Businessmen and investors deserve a higher level of appreciation and must be considered stakeholders.	Support and cooperation from external stakeholders are important for successful implementation.	Shared vision is critical to align the strategy for labor market and higher education.	Clusters will naturally form, but intervention and support are required for faster progress.	
	Policy makers must change their minds and mentality to support investors.	Continuous follow-up from the cabinet is needed for effective policy implementation.	Commitments from the Ministry of Health are needed for the pharmaceutical industry.	Small participant firms rely heavily on coordination from Madayn, the landlord.	Manufacturing firms will participate and contribute to cluster formation when they perceive the benefits.	
	Government intervention is required to encourage large establishments to provide opportunities for SMEs.	Participants within a cluster need to agree on standards and align around proper governance.	Cooperation is needed through the Ministry of Agriculture and the Port Authority for the food cluster.	Access to port facilities, storage, and silos are crucial for the food cluster's success.	Dedicated teams within organizations can communicate requirements with other stakeholders.	
	Government representation and support from relevant ministries are crucial for strategic cluster formation.	Stakeholders should form committees for collective approaches, sharing knowledge and experience	The government, customs, and relevant ministries should intervene and support strategic food cluster formation.		Polymer Park at Sohar Industrial City can facilitate the formation of a plastic cluster.	

#### 5.2.1. Government Support and Policy Changes

Several respondents emphasized the vital role of government support and policy adjustments in implementing successful cluster-based strategies which is also highlighted by Power and Lundmark (2013). Respondents also mentioned that governments should support strategic industry clusters through the implementation of customized policies, which aligns with the recommendations put forth by Brenner and Schlump (2011). Another significant recommendation addressed to the creation of a conducive investment climate and the fostering of collaboration between stakeholders and the government, which aligns with Kline and Moretti's (2014) broader perspective on "place-based" strategies. Stakeholders' support, government interventions, off-taker agreements, and customized education curricula were also cited as critical strategies to overcome the challenges of implementing a clustered-based policy. These suggestions underline the shared understanding among stakeholders and scholars regarding the essential components for effective cluster-based policies, emphasizing the need for government support, industry collaboration, and strategic alignment for successful cluster development.

#### 5.2.2. Stakeholder Collaboration and Communication

The importance of effective collaboration and communication in policy implementation is widely recognized. The respondents' reference of migrating from rigid interventions to more flexible, 'soft' approaches echoes the findings of Warwick's (2013) research. The government's role, highlighted by the respondents, is seen as a facilitator fostering collaboration and alignment, which is a concept supported by O'leary and Vij (2012). Bommert (2010)

and Cooke (2002) in their study suggested collective troubleshooting, emphasizing the need for shared problem-solving among stakeholders. Yu et al.'s (2014) empirical findings underscore the instrumental role of government-led coordination, emphasizing the essential nature of effective communication and collaboration in policy enactment. Stakeholders stress cooperation, regular dialogues, committee formations, mutual support among companies, networking opportunities, and open communication channels as important factors to overcome challenges. This emphasis resonates with academic insights, emphasizing trust, knowledge dissemination, and relationship-building for cluster prosperity. The focus on community engagement and awareness campaigns underlines the importance of structured, government-supported teamwork for successful clustering strategies.

### 5.2.3. Stakeholder Engagement and Involvement

Stakeholder involvement emerges as a central theme in discussions, emphasized by the respondents, who stress accountability and a shared vision for prosperous cluster development. Respondent 22 emphasizes private sector leadership and contributions from research institutions, while Respondent 25 highlights logistics and infrastructure, underlining stakeholders' key role in resource allocation. These viewpoints align seamlessly with Porter (1998), which emphasizes collaboration and stakeholder engagement for successful cluster outcomes. Stakeholder involvement is summarized through key points, including acknowledging responsibility, fostering private sector engagement, nurturing leadership, and encouraging research institution contributions.

These insights underscore the importance of stakeholder involvement in cluster resilience and expansion. The proposition to involve research institutions emphasizes academia-industry collaboration for innovation within clusters. Additionally, the establishment of dedicated departments, troubleshooting units, and provision of incentives and infrastructure services highlights the need for continuous support mechanisms to sustain stakeholder involvement and facilitate cluster evolution.

### 5.2.4. Infrastructure and Resource Allocation

The cluster-based policy implies resource allocation and intensive public expenditure on supportive infrastructure. The stakeholders' responses point out the importance of public investment in supportive infrastructure and resource allocation based on a comprehensive strategic plan. Respondent 14 claims that a shared vision is critical to aligning the strategy for the labor market and higher education.

*“The labor market is not ready for these sectors, and this requires a kind of comprehensive strategic plan between the labor market and higher education so that the next generation is ready and capable of these industries.”* (Respondent 14)

Additionally, Participant 22 argues *“We need to work hard to improve our industries. Now this will require investment. Investors will not come and people even inside Oman, will not invest in industry because they will say it's high risk. We need to have a full system, an ecosystem to support to develop”*. (Respondent 22)

*Respondent 16 suggests that small participant firms rely heavily on coordination from Madayn, the landlord to allocate supportive infrastructure and resources. For instance, Participant 24 states “access to port facilities, storage, and silos is crucial for the food cluster's success.*

Most respondents emphasize the importance of infrastructure and resource allocation for the implementation of cluster-based policies."

### 5.2.5. Cluster Formation and Coordination

The concept of funding and ownership in cluster development highlights the vital role of sponsors who recognize the potential in clusters, drawing in stakeholders and fostering collaboration. Sponsors advocate for clusters, translating their support into concrete strategies such as establishing autonomous organizations or joint ventures for efficient cluster management and utilizing local resources.

Collaborative initiatives between significant stakeholders, integration of experienced firms into cluster development, and the establishment of independent bodies also play a crucial role. This approach resonates with the emphasis on committed leadership expressed by Respondent 28 and is consistent with Warwick's (2013) conclusions on governments transitioning to a more collaborative and guiding role.

Furthermore, the importance of native resources highlighted by Respondent 32 mirrors regional governmental policies in other contexts, emphasizing the significance of tailored approaches. The overarching theme emphasizes the power of collaboration, aligning strategies with cluster life-cycle stages, and capitalizing on local resources, underscoring the complex interplay of local contexts and stakeholder insights in shaping successful cluster initiatives.

### 5.3. Barriers That Impede Stakeholder Collaboration

Regarding the barriers hindering stakeholder collaboration during cluster-based policy implementation, six themes were extracted; Lack of Supportive Environment, Stakeholder Communication, Government Role and Initiatives, Barriers to Collaboration, Trust and Incentives, and Shared Vision and Cluster Development.

These themes encapsulate recurring suggestions and insights from stakeholders, providing a comprehensive overview of challenges hindering stakeholder collaboration in cluster policy implementation.

#### 5.3.1. Lack of Supportive Environment

Stakeholders express profound concerns regarding the challenging environment hindering robust investor engagement. They point out the ambiguousness of procedures, lack of transparency in licensing and tariffs, and inconsistent government support, all of which impede the holistic development of clusters.

*Respondent 1 explained "Still the policymakers have not thought of the cluster as the possible way forward for developing the manufacturing sector in Oman. The thought has not been embraced. So, in my humble opinion, there is no policy framework for the development of clusters in Oman".*

These concerns confirm Engel's (2015) study, emphasizing the significant role institutions play in fostering innovation. Leonidou et al.'s (2020) research further underlines the importance of stakeholder engagement, highlighting the need for synergistic relationships to ensure thriving innovation ecosystems. Additionally, Foray's (2014) concept of "Smart Specialisation," focusing on regional collaboration and government facilitation, aligns with the collaborative approach emphasized by stakeholders. These insights emphasize the necessity of a stakeholder-centric approach, clear governmental policies, and consistent collaboration, offering strategies to address the concerns raised by stakeholders in the cluster development process.

#### 5.3.2. Lack of Stakeholder Collaboration and Communication

Stakeholder collaboration challenges are multifaceted, encompassing issues like fragmented business landscapes, unpredictable demand, and the need for expertise and discernment in partnerships. Interviewees emphasize the complexities involved, highlighting the importance of institutionalizing collaboration through dedicated teams or departments for effective communication and problem-solving.

*Respondent 11 argues that "Cluster is within our shareholders' mandates. So, it's not about getting the mandate from external stakeholders, With the shareholders and top management, we can go ahead and establish any new cluster based on the needs of the markets... We have a stakeholders mapping matrix and we define who is the strongest and the top important stakeholders and the other type of levels in the stakeholders mapping".*

These observations align with Leonidou et al.'s (2020) examination of the synergetic relationship between stakeholders and entrepreneurs and Kasabov and Sundaram's (2013) emphasis on balancing diverse stakeholder voices.

Fjørtoft et al. (2020) advocate for shared understanding, echoing the speakers' call for an integrated approach, while Spitzack & Hansen (2010) and Lee et al. (2015) emphasize the essential nature of genuine stakeholder involvement in cluster initiatives. Together, these insights provide a comprehensive perspective on the pivotal role of stakeholder collaboration in cluster policies, acknowledging the complexities involved and emphasizing the need for strategic approaches.

### 5.3.3. Government Role and Initiatives

Stakeholders' responses underline the crucial government role, emphasizing the need for leveraging Oman's strategic assets, providing stability during financial uncertainties, and fostering collaboration. Respondents highlight the government's instrumental position in maximizing strategic location, tapping into export opportunities, and maintaining beneficial relationships with neighboring nations.

Respondent 7 claims that: *“The government of Oman should take advantage of this location of Oman for exporting the goods. Oman has an excellent relationship with the neighboring countries and Omani products are well accepted by the consumers of those countries. If it is an Omani product they blindly say it is equivalent to any international product so it has got more value-added as far as because the standard of Oman is much higher”.*

*“The government has a big role. The Ministry of Commerce should take the initiative and start raising the flag and communicating with those entities so that we can create a proper and clear communication channel, and collaboration among all these entities whatever initiative is coming from the private sector, unless the government... they are ready to take that initiative and escalate it,...”.* (Respondent 17)

These statements are consistent with the findings of Yu et al.'s (2014) study on local government policies in China shaping pharmaceutical clusters and Warwick's (2013) emphasis on systematic structures in industrial policy. The study mirrors the complexities of collaboration discussed by O'leary and Vij (2012), emphasizing the nuanced nature of "collaboration". Together, these insights emphasize the government's crucial role in guiding collaborations, addressing challenges, and optimizing regional strengths in cluster-based policies.

### 5.3.4. Lack of Trust and Shared Interests

Stakeholders identify barriers to collaboration, including reluctance to share knowledge, conflicting interests, geographical distance, and lack of awareness about cluster benefits. Interviewees highlight these challenges, reiterating Porter's (1998) emphasis on trust-building and shared vision to overcome such barriers. Respondents explain this as;

*“Okay, for collaboration between companies and Sohar, some of the companies do not like to share their systems with other companies. They have their safety system, they have their quality system, they have their operation system. They are hesitating to share that because it's like it's unique for them and they like to keep it for themselves”.* (Respondent 13)

*“Companies rely on their resources; we tell them to focus on business and let Madayn do the work for them. For example, now we are working to help them use the iCloud that is available and can access any device that is in the factory, the office, or the head office and it will save energy consumption and the investment in the servers and the networks. This is one of the types of interconnections that we are doing now”.* (Respondent 25)

Benea-Popușoi and Rusu's (2021) study on the apparel cluster in Moldova reinforces these challenges, attributing hesitancy to a lack of relational capital. Kasabov and Sundaram (2013) align with our findings, emphasizing the

complexities of harmonizing diverse stakeholder interests. Foray's (2014) concept of "Smart Specialisation" aligns with our research focus on understanding cluster benefits. Bommert's (2010) advocacy for collaborative innovation resonates with our emphasis on broader collaboration.

In summary, trust, shared objectives, and robust relational capital are crucial for successful cluster collaborations, transcending geographical proximity. Recognizing and navigating these complexities are vital for nurturing effective collaborative ecosystems within clusters.

#### 5.3.5. Lack of Trust in Government Incentives

Stakeholders express their concerns about trust in government incentives during oil price fluctuations and emphasize the need for collaboration with industrial areas, port authorities, and customs for export-oriented companies. Neumark & Simpson (2015) stress the importance of infrastructure investment that aligns with the need for economic support in struggling zones. One of the experts on cluster initiatives in Oman argues that:

*“Governments cannot impose directly on companies, it's not about individuals to be honest. The market is very harsh. Individuals can create and can strive hard to create the level of required incentives, but it's collective work. ....it will need support from the cabinet”.* (Respondent 2)

Power and Lundmark (2013) highlight workplaces as hubs for knowledge exchange, supporting Participant 20 who emphasized collaboration within clusters. Warwick (2013) underscores strategic alignment and transparency, echoing concerns raised by Participant 19 about trust. Brenner and Schlump (2011) suggest tailoring policies to cluster life cycles, in line with Speaker (20)'s proactive engagement approach. These sources collectively underline the importance of trust, collaboration, and adaptability in cluster-based policies amid economic uncertainties.

#### 5.3.6. Lack of Shared Vision

Speakers (28) and (29) emphasize the importance of fostering a shared vision, addressing cluster ecosystem gaps, and prioritizing collaboration over competition. The findings underscore the need for transparent communication channels and well-defined government initiatives in cluster-based policies, aligning with Warwick's (2013) emphasis on the government's coordinating role. Dominique Foray's (2014) "Smart Specialisation" highlights regional teamwork, akin to the research's focus on stakeholder collaboration. The following quote reflects the perspective of a representative from Madayn regarding the perception of cluster facilitators on the development of a cluster initiative within an IT park in Oman:

*“Companies collaborate. First of all, it comes by default. It's like an inherited relationship. We've seen a lot of companies coming here because they're doing business together. So once you have one, a middle tier company, then some small SMEs also start coming...”* (Respondent 29).

Edquist's (2010) "systems of innovation" approach aligns with the research's call for supportive policy structures. Van der Have and Rubalcaba's (2016) Social Innovation (SI) stresses community-based collaboration, resonating with the research's emphasis on local development. Parrilli et al.'s (2016) integrated approach aligns with the research's global collaborative strategy. Johnson et al. (2018) and Leonidou et al.'s (2020) insights underline stakeholder management's importance.

Kasabov and Sundaram's (2013) focus on stakeholder management is in line with our research findings, emphasizing stakeholder understanding. Spitzack & Hansen (2010) and Laur's (2015) insights underscore the importance of effective communication channels in successful cluster-based policies, supporting our findings on stakeholder collaboration and shared vision. Together, these sources enrich our research findings, emphasizing the significance of these elements for successful cluster initiatives.

## 6. Conclusion

The main findings of the research have highlighted the significance of cluster-based policies, and stakeholder involvement in cluster development. The research has provided insights into the current state of cluster development, the impact of cluster-based policies on economic growth and competitiveness, and the role of stakeholders in policy implementation. The findings emphasize the importance of stakeholder collaboration, government support, and tailored policies in leveraging cluster-based policies to drive economic growth and create a conducive environment for cluster development.

To encapsulate, our research into the challenges of cluster-based policy implementation in the Sohar Industrial Area illuminates significant hurdles that stakeholders encounter, including economic barriers, infrastructure inadequacies, regulatory concerns, and cultural factors. These insights dovetail with existing academic literature, with works such as Wilson (2019), Burfitt & MacNeill (2008), Eigenhüller et al. (2015), Leonidou et al. (2020), Laur (2015), Kasabov & Sundaram (2013), Johnson et al. (2018), Veleva (2021), Russell & Smorodinskaya (2018), Wolfe and Gertler (2013), Uyarra et al. (2017), Tripl et al. (2015), and Galvin (2019) pinpointing common challenges in cluster development worldwide. Yet, the unique socio-economic dynamics of Oman, like its oil dependence and the implications of the COVID-19 pandemic, further contextualize these challenges. Findings arising from our study and echoed in the scholarly domain highlight the critical role of stakeholder engagement, agile regulatory environments, and a proactive, investment-centric mindset. Contemporary research from diverse regions, such as the insights from Karvonen et al. (2022), corroborates these findings, emphasizing the universal importance of collaboration, multilayered governance, and strategic direction. In essence, the successful advancement of cluster-based policies in the Sohar Industrial Area requires a harmonized approach informed by both stakeholder insights and broader academic discourse.

## 7. Limitations and Future Research

The scarcity of literature on cluster-based policy in Oman presents a significant challenge for this research study. The existing development-related works on Oman reviewed here show a lack of both qualitative and quantitative research on the issue in Oman, and further research is needed to fill this gap. Enright (2003) notes that the absence of a consistent, cross-national statistical base is a particular shortcoming for the cluster research domain. While this study is limited by the focus on Oman and the lack of detailed technical aspects of policy formulation and implementation, it is not unique in having limitations.

Firstly, the findings of this study are only applicable to Oman and other states or regions with similar contextual factors, cultural, economic, political, and social characteristics similar to Arabian Peninsula neighboring countries, or geographically specific areas that include clusters within different regions in Oman. Moreover, the study only covers major industries and omits numerous smaller but still important industries, as well as supporting and related industries within the cluster. Secondly, the sample used in this study did not represent the overall industry.

To address these limitations, future studies could broaden the focus to cluster-based policies in general within oil-based economies and conduct more quantitative research to identify spontaneous clusters in Oman. Additionally, future research could approach politicians and economists to better understand cluster-based policies and practices in oil-based economies. It would also be interesting to study the influence of cluster-based policy on Sohar and the surrounding areas and examine cooperation and collaboration efforts across county and state lines, such as those taking place between various cluster actors and stakeholders with the support of both state governments.

The present study has outlined several avenues for future research and has shed light on potential gaps and constraints in the existing knowledge. These implications encompass a variety of areas, such as delving deeper into the hurdles and obstacles faced by stakeholders engaged in cluster development. This exploration would specifically focus on challenges related to coordination, infrastructure development, and engaging stakeholders effectively. Additionally, there is a need for research into the long-term viability and expansibility of cluster initiatives, taking into account the ever-changing market dynamics and the evolving needs of the industries they encompass.

Furthermore, a thorough examination of the impact of digital technologies and innovation on cluster development is warranted. This analysis should include an exploration of integrating Industry 4.0 technologies and understanding how they influence the competitiveness of clusters. Evaluating the effectiveness of policies rooted in cluster development is also crucial, with a focus on promoting inclusive and sustainable economic growth. This evaluation should encompass not only economic factors but also social and environmental dimensions.

Drawing from these implications and identified gaps, specific recommendations for future research have been formulated. Firstly, conducting in-depth case studies of successful cluster initiatives across diverse industries and regions can provide valuable insights into the critical factors that contribute to their success and best practices that can be replicated elsewhere. Additionally, investigating the role of social networks and collaboration platforms in facilitating stakeholder engagement and knowledge sharing within clusters can offer new perspectives on effective communication and cooperation within these setups.

Moreover, there is a need to explore how cluster-based policies impact job creation, skills development, and the overall well-being of local communities. This comprehensive analysis would provide a holistic understanding of the societal implications of cluster initiatives. Furthermore, examining different governance models, including associative governance, and their support in cluster development and policy implementation is vital. Lastly, exploring the role of cluster initiatives in promoting sustainable development, including the integration of circular economy principles and green technologies, can offer valuable insights into environmentally friendly practices within clusters. These specific research recommendations aim to bridge the gaps in our current understanding of cluster development and pave the way for more informed and effective policies in the future.

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**APPENDIX: Profile of the Interviewees**

<b><u>Role Category</u></b>	<b><u>Respondent Number</u></b>	<b><u>Organization</u></b>	<b><u>Experience Profile</u></b>
Policy Maker	1.	MoCIIP	Oman 2040 Manufacturing Policy preparation Team Member
	2.	MoCIIP	Member of Nazdhir Program
	3.	MoCIIP	Oman 2040 Manufacturing Policy Preparation Team Member
	4.	MoCIIP	Oman 2040 Manufacturing Policy Preparation Team Member
Research Institution	5.	Advance Business Consultant	Advisor to Several Government Cluster Initiatives
	6.	Innovation Academy	Active team Member to several cluster initiatives committees
	7.	Sohar University	Member of Intaj Sohar Initiative in collaboration with several public and private entities
Collaboration Institutions	8.	Oman manufacturing Association OMFA	OMFA Executive Committee Member
	9.	OCCI Oman	Represent OCCI in several committees
	10.	OCCI Sohar	Responsible for sorting out several challenges facing industrial companies in Sohar
	11.	OCCI Sohar	Representative for OCCI Sohar branch
Cluster Initiatives	12.	Ladayn Plastic Cluster	Ladayn Plastic Cluster Supervisor at OQ
	13.	Ladayn Plastic Cluster	Ladayn Plastic Cluster Team Member
	14.	Ladayn Plastic Cluster	Ladayn Plastic Cluster Member
	15.	Shuwaymiyah Mineral Cluster	Member of Mineral Cluster initiative Member of Jsoor Social Responsibility fund that represents an initiative for the collaborative fund for several major industrial organizations in Sohar
Regulator - Facilitator	16.	OPAZ	Member for OPAZ strategic team
	17.	Sohar Port Free Zone Co.	Member of Sohar Port strategic team
	18.	Sohar Industrial City	Madayn Representative to Cluster initiative
	19.	Madayn	Madayn Representative to Cluster initiative
	20.	Madayn	Senior Management Level
Civic Entrepreneur	21.	Madayn	Representative to Cluster initiative
	22.	Bin Salman Group	One of OMFA Founders
	23.	Overseas Consultancy	Worked for Madayn at the senior Level
	24.	Project Manager	Researcher on Oman SMEs Collaboration, Worked for Madayn Worked for Sohar Port Company
Participant Firms	25.	Business Developer	Worked for Madayn at the senior Level
	26.	Food Industry firm in Sohar	

	27.	Shumookh Investment and Services	Investment Arm for Madayn with other Pension funds focusing on Services within Industrial Cities.
	28.	Firm in Sohar	HR Manager
	29.	Firm in Sohar	Owner of Manufacturing Firm
	30.	Firm in Sohar	Manager Assistant
	31.	Firm in Sohar	External Affairs Manager
	32.	Firm in Sohar	External Affairs Manager
	33.	Firm in Sohar	Owner of Manufacturing Firm