



## Strategic Positioning for Knowledge-Based Industry Growth: Bridging Innovation and Competitiveness Gaps

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### Abstract

This study examines the strategic positioning of knowledge-based industries (KBIs) of Bahrain to address the innovation and competitiveness gaps within the Gulf Cooperation Council (GCC) region. This study adopted Porter's Diamond model to identify critical factors that enhance the attractiveness of Bahrain as a KBI hub, which include key strengths of Bahrain's location-based advantage, regulatory efficiency, and human capital readiness. This study used a mixed-method approach that integrates both qualitative and quantitative analyses by utilizing secondary data sources from GCC comparative benchmarks, policy documents, and international databases. The findings highlight the significant strengths of Bahrain in business-friendly policy, financial ecosystem, and information and communication technology (ICT) infrastructure. This study also identifies strategic pathways to further build upon these strengths, including continued domestic market diversification, increased research and development (R&D) investment, and expanded venture capital availability, reinforcing Bahrain's promising growth trajectory. Recommendations for actionable policy are proposed to expand fintech and artificial intelligence (AI) ecosystems and foster university-industry linkages. Thus, this study advocates for enhanced cross-GCC cluster collaboration to support the Bahrain Vision 2030 by applying and extending the competitive framework to KBI and contributing research to theoretical discussions on knowledge-driven economies. Overall, this study offers practical strategies for industry stakeholders and policymakers to strengthen the innovation ecosystem of Bahrain.

### Keywords:

Knowledge-Based Industries;  
Bahrain; GCC;  
Porter's Diamond Model;  
Innovation; Competitiveness;  
Economic Diversification;  
Cluster Development.

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## 1- Introduction

In recent times, due to rapid advancements in technology, knowledge industries have gained immense importance due to their intensive use of human capital and technology [1]. The growth of knowledge-based industries (KBIs) has become a critical factor in economic diversification and sustainable development in many nations, including Bahrain [2]. The concept of KBI has been widely adopted in policymaking and academia over the last few decades due to the increasing role of KBI in employment and value-added contributions in advanced contemporary economies [3]. While studies have examined KBIs in various global contexts, this research provides a timely and focused contribution by systematically evaluating Bahrain's strategic positioning within the GCC knowledge economy, offering valuable insights for strategic development. At the same time, KBI includes communications, health services, information technology, insurance, finance, science, consulting, and education. Furthermore, KBIs are dependent on technological innovation and knowledge to generate revenue. Thus, this study focused on the importance of KBI in strategic positioning and bridging the gaps in innovation and competitiveness.

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The Gulf Cooperation Council (GCC) is a political and economic union of six countries in the Arabian Peninsula. The GCC was established on May 25, 1981, with the signing of the GCC Charter in Abu Dhabi, United Arab Emirates. The member countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates [4, 5]. The GCC countries' importance lies in their economic prowess, regional stability efforts, geopolitical significance, investments in infrastructure, and cultural influence [5]. In addition, the GCC has played a significant role in regional diplomacy, resolving conflicts, and promoting stability in the Arabian Peninsula and the broader Middle East [6]. Among the GCC, Bahrain is known for its economic openness, cultural heritage, and rich history [7]. Further, Bahrain is a predominant regional financial hub with a growing emphasis on innovation and sustainability [8]. This study addresses an important opportunity to systematically evaluate Bahrain's KBI competitiveness using established theoretical frameworks such as Porter's Diamond (PD) Model, providing valuable comparative insights within the GCC context that can inform future strategic development. Globally, the transition of the economy towards the KBI sector has enabled Bahrain to strategically position itself as an attractive hub for innovative enterprises [9]. Thus, this study aims to investigate the factors that can enhance Bahrain's competitiveness in attracting and nurturing the KBI sector, with a focus on bridging the innovation and competitiveness gaps.

There are several studies conducted on the KBI from different economies like Portugal [10], Saudi Arabia [2], Iran [11], Norway [12], Malaysia [13], China [14–18], Europe [19], Spain [20], Bangladesh [21] and other countries who have benefited from the strategic positioning of KBI. Within the GCC, studies have examined cluster development in the UAE [22], knowledge-sharing in Saudi Arabia [23], and innovation readiness in Qatar [24]. This study addresses this opportunity by providing a systematic, theory-driven analysis of Bahrain's KBI ecosystem, integrating qualitative and quantitative data to assess competitiveness and policy alignment, thereby enriching the literature with a focused case study. Hence, the limited studies conducted to date indicate a clear research gap in Bahrain, which has not explored the strategic development and positioning of KBI within its context compared to other countries.

In dealing with the gaps found, the research presented here is making a three-fold unique contribution to prior studies that were systematically built. First, the theoretical-methodological gap in the application of the PD model to various global industries is well accepted by researchers; however, it is still very limited in the context of the GCC's knowledge economy and is almost non-existent in Bahrain's KBI studies. The present study takes on this challenge by not only applying the PDM but also modifying and expanding it to capture the specific drivers of the small, open, knowledge-based Gulf economy such as digital infrastructure, cross-border cluster integration, and regional demand dynamics factors usually not represented in traditional PDM analysis of industrial sectors, which mainly focus on the geographical aspect of the region being studied. Second, empirical-analytical gap: A significant portion of the existing knowledge on the Middle East region's KBI comes from qualitative studies done on one case or a broad policy review, and does not entirely rely on quantitative data. No comprehensive mixed-method research that combines qualitative policy analysis with quantitative benchmarking data, thus providing a complete competitiveness assessment, is available in the area. The study at hand is addressing this gap by merging secondary quantitative data from international databases (e.g., World Bank, IMF), policy document analysis, and GCC comparatives within a structured analytical framework, which offers a more rigorous and evidence-based evaluation of Bahrain's competitiveness position.

Third, the strategic-contextual gap with a substantial contribution of this research is that it delineates and maps out the relationships between Bahrain's KBI ecosystem and the strategic pathways determined by the cluster analysis. These pathways are aligned with the Kingdom's aspirations of 2030. Hence, the study is no longer limited to diagnosis and instead highlights the positioning of Bahrain, stating that it can tap into its niche advantages (like fintech and regulatory processing speed) in the GCC regional arena rather than just benchmarking against its larger neighbors. By integrating the PD model with a mixed-methods approach, this research provides a comprehensive assessment of the Bahrain KBI ecosystem, offering both theoretical extension and actionable insights aligned with Bahrain Vision 2030. This article is structured to address these gaps systematically. The remainder of this paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes the research methodology, and Section 4 presents the results and findings. Section 5 presents the discussion and implications of this study. Finally, Section 6 concludes the paper, explaining the limitations and outlining avenues for future research.

## 2- Literature Review

### 2-1- Porter's Diamond Model

This study employed the PD model [25] because this framework explains the importance of specific industries within a nation that are more internationally competitive than others. According to a study by Singh & Ghosal (2024), the PD model is utilized to assess India's green hydrogen industry strategy, policy, innovation, and global benchmarking, demonstrating how these factors contribute to its competitive advantage and align with sustainability goals [26]. In addition, Saka-Helmhout et al. (2024) noted that the PD model used to assess Indonesia's warship industry identifies the limiting factors of competitiveness and provides recommendations for stakeholders to enhance their position in the sector through improved firm strategy and stronger supporting industries [27]. Karahan & Kirval (2018) highlighted that the PD model used to measure Istanbul's maritime industry in terms of cluster-level impact on firm performance suggested using innovative methods, such as entropy analysis and fuzzy linear regression, to assess firm performance [28].

Tsai et al. (2021) revealed that the PD model used to measure Taiwan's solar photovoltaic industry highlighted government structure and firm strategy as top priorities, suggesting that these factors should be enhanced to improve competitiveness and guide vigorous development in the sector [29]. Therefore, to support the objectives of the study, the PD model provides a rigorous analytical framework to evaluate the multifaceted drivers of competitiveness in the KBI of Bahrain by systematically examining factor conditions, related industries, government policies, and firm strategies. The model enables a comprehensive assessment of Bahrain's locational advantages, regional investment attractiveness, cluster development, and innovation readiness. While the PD model has been widely applied in various countries and sectors, a notable gap remains in the literature concerning its application to KBI in the GCC, particularly in Bahrain. Thus, this study addresses the gap by applying the model to a knowledge-driven economic context, offering insights into sectoral development strategies and regional competitiveness that have been largely overlooked in current academic discourses.

The selection and application of the PD model to Bahrain's KBI context is theoretically justified by its holistic, systemic approach to competitiveness, which captures the dynamic interactions between Bahrain's strategic assets (human capital, digital infrastructure), its role within GCC demand networks, its evolving industry clusters, and its policy-driven business environment. This framework is particularly apt for analyzing small, open knowledge economies where competitive advantage derives not from scale or resource abundance, but from strategic positioning, institutional orchestration, and regional integration. Our study extends the model by foregrounding digital and knowledge-based factors within its traditional determinants, thereby adapting a classic competitiveness theory to the specificities of a Gulf knowledge economy and addressing a significant gap in its application to GCC contexts.

Other frameworks, such as Resource-Based View (RBV), PESTEL, and SWOT, exist, but the PD model was chosen because it was uniquely the most suitable model for the Bahraini KBI context. The PD model would enable one to assess Bahrain's position within the GCC ecosystem through dynamic interactions, unlike other models, which either focus on internal firm resources (RBV) or broad environmental scanning (PESTEL). The systematic analysis of national competitive advantage, which is the core strength of the PD model, is precisely what is needed for Bahrain's situation within the GCC ecosystem to be diagnosed. One can evaluate the factor conditions (Bahrain's human capital and digital infrastructure), the demand conditions (regional GCC market access), the related/supporting industries (financial and ICT clusters), and the firm strategy/rivalry (business-friendly policies), and also how government and chance influence these interactions. Such a comprehensive analysis is necessary for a small, open economy like Bahrain, where competitive advantage is not simply a matter of isolated strengths but rather the result of strategic orchestration of location, policy, and regional integration. The other frameworks do not possess this holistic, interactive, and nation-industry-specific diagnostic power, therefore, making the PD model the most appropriate lens for this study.

## ***2-2-Location-Based Advantages for KBI***

There is a close connection between location-based advantage and the competitiveness of KBI, including robust infrastructure, skilled labor pools, and proximity to research institutes that enhance operational efficiency, collaboration, and innovation, leading to growth in competitive markets [30]. As highlighted by Al Shehab & Hamdan (2021), Bahrain's strategic geographic position, combined with supportive government policies, an advanced regulatory environment, and the rapid adoption of fintech and artificial intelligence (AI), will create an ecosystem for KBI that aligns with Vision 2030 [31]. Additionally, Wang & Churchill (2025) noted that regulatory and geographic contexts encompass the Melbourne policy environment, traffic conditions, and urban infrastructure, suggesting that support systems shape and location-specific risks influence worker strategies in KBI [32]. Teng et al. (2025) noted that localized industrial clustering benefits from urban amenities, including public services and essential infrastructure, thereby confirming the location-based advantage for KBI [33]. Hence, the location-based advantages, such as proximity to innovation hubs, skilled talent, regulatory support, and infrastructure, play a pivotal role in enhancing KBI's strategic goals and competitiveness, particularly in Bahrain, where policy and development goals align with long-term visions, including Vision 2030. Nevertheless, Bahrain's application is distinguishable from those of bigger economies such as Melbourne; it should not only use its geographic centrality and regulatory agility for domestic growth but also for being a gateway for cross-GCC knowledge flows, thus making regional integration a core location advantage.

## ***2-3-Success Factors for KBI***

According to Erbey et al. (2025), digitalization capacity enhances innovation performance, which supports the knowledge-based capabilities underscoring the strategic importance of digital transformation [34]. Additionally, Mekonen & Eshetu (2024) noted that the knowledge-based industry in Ethiopia faces challenges, including limited market access, inadequate resources, and unsafe working conditions, necessitating targeted policy support and skill development [35]. Moreover, Chen et al. (2024) indicated that the advanced spherical fuzzy method identifies manufacturers facing the highest barriers, suggesting that policymakers prioritize investments in this segment to accelerate digital transformation [36]. Rehman et al. (2024) highlighted that socio-economic component, as measured by the national intellectual capital index, emphasize that information and human capital are the strongest contributors to economic growth, thereby fostering KBI in the Industry 5.0 era [37]. Notably, Chantes et al. (2023) revealed that the knowledge-based business model from Thailand identifies ecosystem sustainability, financial and knowledge support, and technology transfer to promote competitiveness and innovation [38]. Thus, the success factor of KBI highlights the

critical need for sustainable ecosystem development to drive innovation and competitiveness in KBI, particularly in Bahrain, as well as targeted investments and strategic policy support in the context of ongoing digital transformation. Bahrain is part of the global manufacturing sector, where one of the challenges being faced is the overcoming of digital transformation barriers. Bahrain recognizes that it must get along with technology and support policies that are designed explicitly for fintech and AI instead of relying on policies that are used for a general industry wide application. This is significant as Bahrain has these two sectors in relatively developed clusters.

#### ***2-4-Innovation Readiness for KBI***

As highlighted by Hashimi et al. (2021), educational backgrounds also influence the foundation of tech startups in Bahrain; innovation-focused education, which emphasizes teamwork and creativity, plays a critical role in technopreneurial growth [39]. Likewise, Alghatam (2022) mentioned that public value is negotiated and co-created among digital entrepreneurs in Bahrain startups, the private sector, and the government, with evolving perceptions and collaborative dynamics of public value in the national digital entrepreneurial ecosystem [40]. Similarly, Villegas-Mateos (2023) noted that cross-sector collaboration, crisis resilience, and innovation are crucial for Qatar's entrepreneurial ecosystem, providing insights to support broader GCC policy development and Qatar's National Vision 2030 [24]. Meanwhile, Zhao & Zhu (2025) found that firms with strong innovation capabilities tend to pursue earlier initial public offerings, while competitive pressure and disclosure costs may delay the process [41]. Correspondingly, Leung et al. (2025) noted that intersectionality influences participation, cultural capital, and social connections, thereby enhancing support systems and incentives to foster inclusivity in entrepreneurship programs [42]. Hence, the innovation readiness for KBI underscores the multifaceted influences shaping entrepreneurial ecosystems, from innovation and education to policy and inclusivity, particularly in Bahrain, guiding future strategic interventions. Bahrain's image of being foreigner-friendly and having high standards of living can be used in a smart and strategic way to draw in technopreneurs. This is a unique benefit that Bahrain enjoys compared to neighbouring countries that are still developing in their infrastructure and livability sectors.

#### ***2-5-Investment Criteria in the GCC***

A study by Alkhalifa (2024) revealed the role of environmental, social, and governance factors in enhancing resilience, promoting sustainable practices, and attracting responsible investment in the GCC region, with recommendations to address data challenges and regulatory barriers [43]. As Shilbayeh & Grassa (2024) suggested, key predictors of bank creditworthiness in GCC Islamic banks, as identified through machine learning, such as ownership structure and loan-to-deposit ratio, can provide data-driven insights that are useful for regulators and investors in decision-making and financial stability [44]. At the same time, Biygautane (2023) highlighted the decline in oil revenue and the need to shift towards public-private partnerships, which require a conducive investment climate, institutional support, and regulatory reforms to attract foreign and private investors in infrastructure and knowledge-driven projects [45]. Meanwhile, Cieřlik & Hamza (2023) identified key determinants of institutional quality, including the rule of law, political stability, and government effectiveness, as essential for attracting foreign direct investment and improving institutional conditions for knowledge-driven economic development [46]. Likewise, Alshubiri (2022) explained that political stability and real interest rates significantly influence the inflow of foreign direct investment in the GCC, which ensures sustainable financial development that supports knowledge-driven long-term growth [47]. The investment criteria in the GCC emphasize the importance of financial indicators, sustainable governance, and institutional quality in fostering knowledge-driven growth and attracting investment, thereby facilitating strategic development and policy reforms in the region. In the case of Bahrain, to gain the other part of its KBI investment flows of institutional trust, it must enhance access to venture capital. This is a noted gap and at the same time, Bahrain must maintain its strong political stability and transparency, its known assets.

#### ***2-6-Cluster Initiatives and KBI***

According to Rattle & Taylor (2025), proposed decarbonization initiatives, such as dispersed sites, classic clusters, dispersed clusters, and forerunner clusters, provide a better understanding of industrial clusters and indicate the support needed for a low-carbon industrial transition and targeted policymaking [48]. As Kichko et al. (2024) confirmed, low commuting costs, skilled labor, and localized knowledge are essential economic conditions for the natural emergence of a technology cluster, along with communication and infrastructure for cluster fragmentation [49]. Additionally, Paliwal et al. (2024) emphasized the strategic role of knowledge management in gaining a competitive advantage and driving innovation in Industry 4.0, within the context of the knowledge-based view, sustainability, and technology [50]. Acheampong et al. (2024) identified key barriers, including cultural, educational, organizational, and regulatory, which can be addressed through design for safety to enhance safety practices in the clusters [51]. Likewise, Zakaryan (2023) noted that the decomposability in the firm's knowledge network affects exploratory invention and external knowledge sourcing, with knowledge creation being most effective in supporting innovation through balanced knowledge recombination [52]. Therefore, cluster initiators must integrate infrastructure support, knowledge management, and economic conditions to foster innovation. Thus, addressing the barriers through balanced knowledge recombination and strategic design is crucial. This enables KBI to thrive sustainably in a low-carbon ecosystem. The limited size of Bahrain leads to the consideration of dispersed cluster models (which are already practiced in some niche European contexts) instead of large agglomerations and thereby puts more emphasis on connectivity and knowledge networks rather than physical mass.

### **2-7- GCC Cluster Success Factors to KBI**

A study in Dubai highlighted that a world-class information and communication technology infrastructure supporting go-with media services, information technology, and e-commerce, by focusing on e-government leadership, free zones, and infrastructure, fosters a strong knowledge economy by strengthening innovation networks and addressing skilled labor shortages [22]. A study by Xu et al. (2024) suggests that companies lacking proactive capital, capacity, and knowledge can address this shortfall by leveraging innovation capabilities and high-quality talent, thereby strengthening their competitiveness and organizational resilience [53]. Additionally, Taqi et al. (2023) noted that human behavioral factors influencing the adoption of Industry 4.0, such as resistance, training, and communication, are critical elements that can be addressed using the rough DEMATEL and Delphi methods, enabling knowledge-based cluster development and enhancing industrial competitiveness [54]. Also, Shome et al. (2024) found that corporate governance and intellectual capital enhance stability, risk mitigation, and banking efficiency in the GCC region [55]. Zafer et al. (2020) noted that Saudi Arabia's challenges in knowledge sharing can be addressed through policy support and actor proximity, thereby fostering competitiveness and innovation in cluster development within the evolving knowledge economy in the GCC [23]. Therefore, it is necessary to have governance, human factors, innovation capabilities, and robust infrastructure to advance knowledge economies. Thus, these challenges can be addressed through collaborative networks, talent development, and targeted policies that foster growth and resilience within the dynamic GCC economic and industrial landscape. In that case, Bahrain will have to intentionally connect its strong network partnerships to financial and talent pipelines in order to avoid being overly dependent on relational capital without market depth, which is a particular danger in its developing ecosystem.

### **3- Research Methodology**

This study employed a mixed-methods approach by integrating both qualitative and quantitative analyses to assess the investment readiness, success factors, and competitiveness of KBI in Bahrain and the GCC region. The data collection through secondary data from strategic plans and government reports (GCC vision reports) [56]; international databases from UNCTAD [57], IMF [58] and World Bank [59]; policy documents, investment reports, and industry publications [60]; location-specific variables (research and development, education, subsidies, and infrastructure) [61]; investment factors (labor regulations, tax incentives, and political stability) [62]; cluster initiatives (sector-specific hubs, innovation zones, and tech parks) [5]. It is well acknowledged that the use of official reports and international databases provides a significant level of comparability and consistency with public policies; however, the presence of certain biases is also recognized, e.g., vision documents sometimes have optimistic projections, and regional databases experience reporting lags. The concern was alleviated by the process of cross-verifying data among various sources such as IMF, World Bank, UNCTAD, and PwC industry reports plus triangulating it with recent policy evaluations to guarantee that it indicates contemporary relevance. Comparative country analyses from GCC countries are compared using uniform criteria, including infrastructure quality, sectoral specialization, business climate, and policy environment.

Additionally, an analytical framework incorporating a competitiveness matrix is used, which evaluates key variables such as health, safety, and environmental policies, labor availability, and geographic access, all rated on a scale (0 = none, + = moderate, ++ = strong). A gap analysis is conducted using success criteria for KBI, such as the startup ecosystem and innovation output. Investment criteria prioritization using a quantitative ranking assigned to investment drivers (low corporate taxes and regulatory efficiency) [62]. Cluster mapping and case studies with a representative sample of selected KBI initiatives in Bahrain (fintech accelerators and technology parks) [63] were analyzed for alignment with key success factors. Cluster ecosystem mapping through GCC cluster programs is aligned with knowledge sectors such as clean energy, advanced manufacturing, and artificial intelligence [62]. Comparative insights were drawn on scope, scale, and institutional support.

Synthesis and validation are conducted through triangulation, which involves cross-verification of findings using multiple data points, quantitative scores (such as political stability indices) [64], and qualitative assessments (including news reports and expert commentary). Stakeholder inputs are incorporated through the perceptions from investors, policy experts, and business leaders. Synthesized insights and visual tools are presented through summary tables, matrices, and diagrams, as well as a comparative dashboard that shows Bahrain's competitive stance across various indicators. Strategy and policy recommendations, incorporating actionable steps, are proposed to enhance the KBI ecosystem in Bahrain. The methodological approach combines case-based insights, benchmarking, and structured data analysis to critically assess Bahrain's position in the regional knowledge economy. It highlights the strategic advantages of Bahrain, including its robust infrastructure, policy clarity, and targeted reforms aimed at closing gaps in sectoral competitiveness, talent development, and innovation capacity.

Through systematic triangulation and a joint-display analytical framework, the qualitative and the quantitative insights were integrated. In the first stage, quantitative data such as World Bank governance scores and infrastructure indices were mapped directly onto qualitative themes from policy documents and case studies to perform data triangulation. In the second stage, pattern-matching logic was applied, with low venture capital availability scores being among the quantitative trends witnessed, validated and explained through qualitative evidence (expert commentary on

regulatory barriers). In the last stage, findings were synthesized using comparative matrices where qualitative success factors from Bahrain’s cluster case studies were ranked against quantitative GCC benchmarks. This structured interplay ensured the validity of the results, prevented the data types from being kept separate, and produced a cohesive, multi-layered assessment of Bahrain’s KBI competitiveness.

Figure 1 illustrates the five key steps. Step 1 involves familiarization, where the context is understood, and emerging themes are identified. Step 2 consists of building a framework to create a structure for analysis. Step 3 involves indexing code and tag data systematically. Step 4 involves charting to organize data for visualization. Step 5 consists of interpreting data to synthesize insights and develop recommendations.

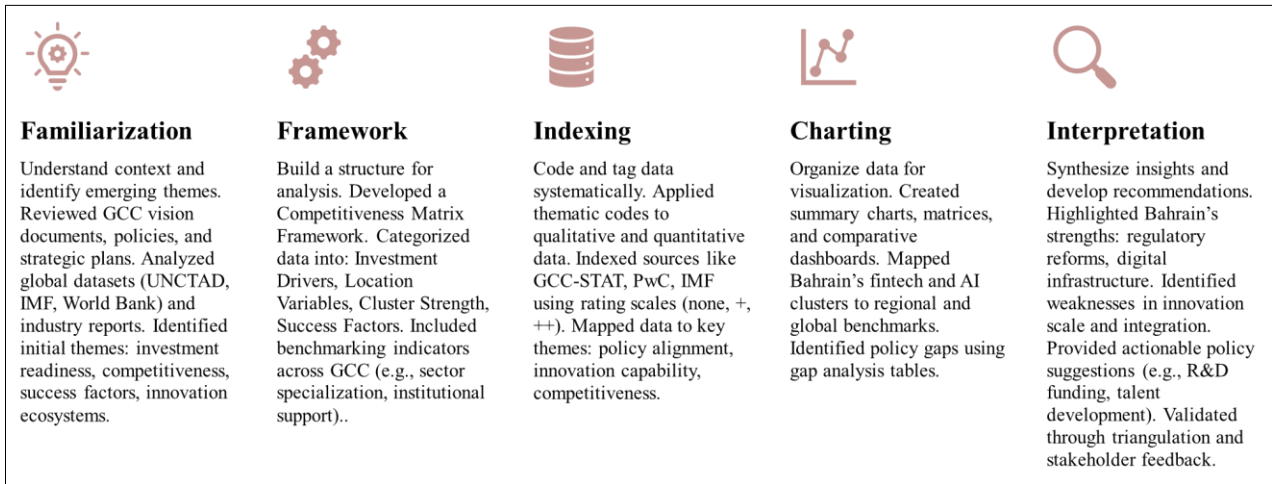


Figure 1. Five key steps of framework analysis

## 4- Results

### 4-1- Bahrain's Location-Based Advantages for Enhancing KBI Competitiveness

Bahrain offers several location-based advantages that enhance KBI's competitiveness in the GCC region. The key benefits can be categorized based on strategic geographic position, an open economy with free market access, an advantage in information and communication technology infrastructure, a business-friendly regulatory environment, human capital availability, cost competitiveness, access to financial services and fintech ecosystems, and cultural openness and global connectivity.

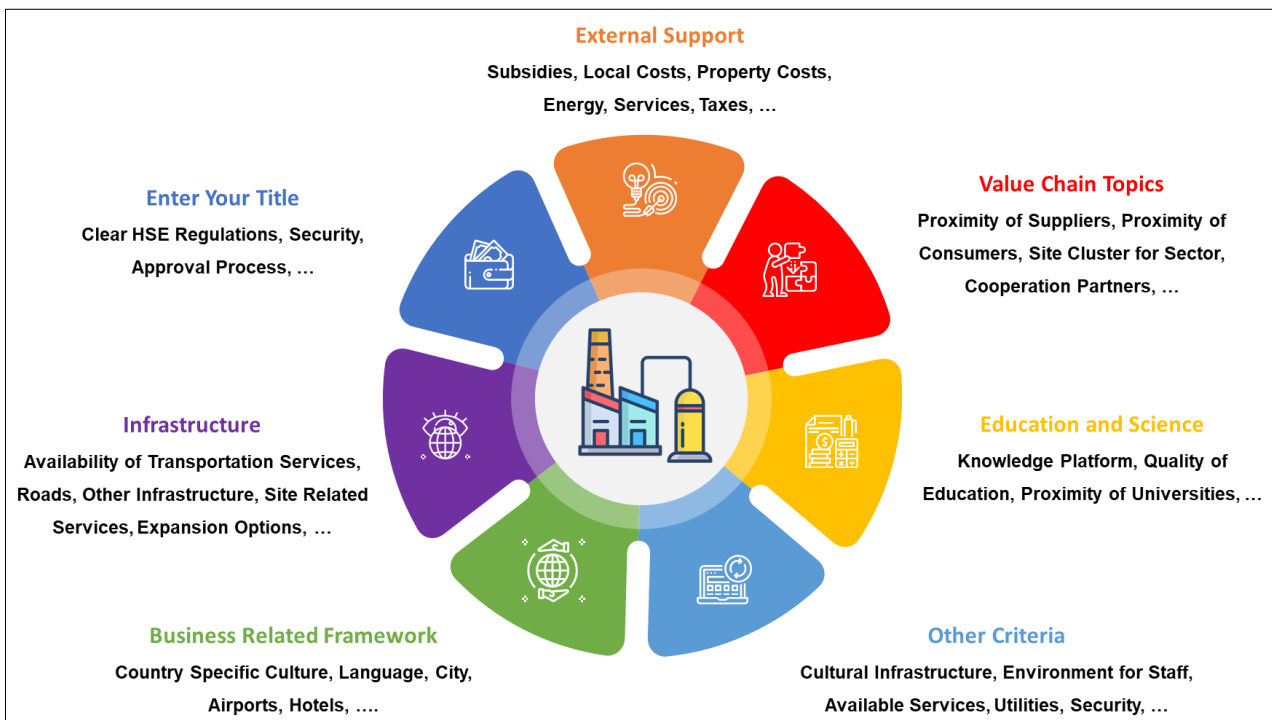


Figure 2. Location as a key lever for competitiveness

Figure 2 illustrates the comprehensive framework of location selection criteria for industrial investment or KBI, highlighting the interconnected factors that influence a company’s decision to select a business location. First, external support factors such as property costs, local costs, energy, services, subsidies, and other expenses are the governmental and financial aspects that influence cost efficiency. Thus, the availability of efficient services, favorable tax policies, affordable energy, and property prices is critical for business viability. Second, the value chain encompasses cooperation partners, site clusters within the sector, proximity to suppliers, and proximity to customers. The efficiency of the value chain is enhanced by familiarity with key stakeholders, including industry clusters, customers, and suppliers. The clustered industries can foster supply chain collaborations and innovation.

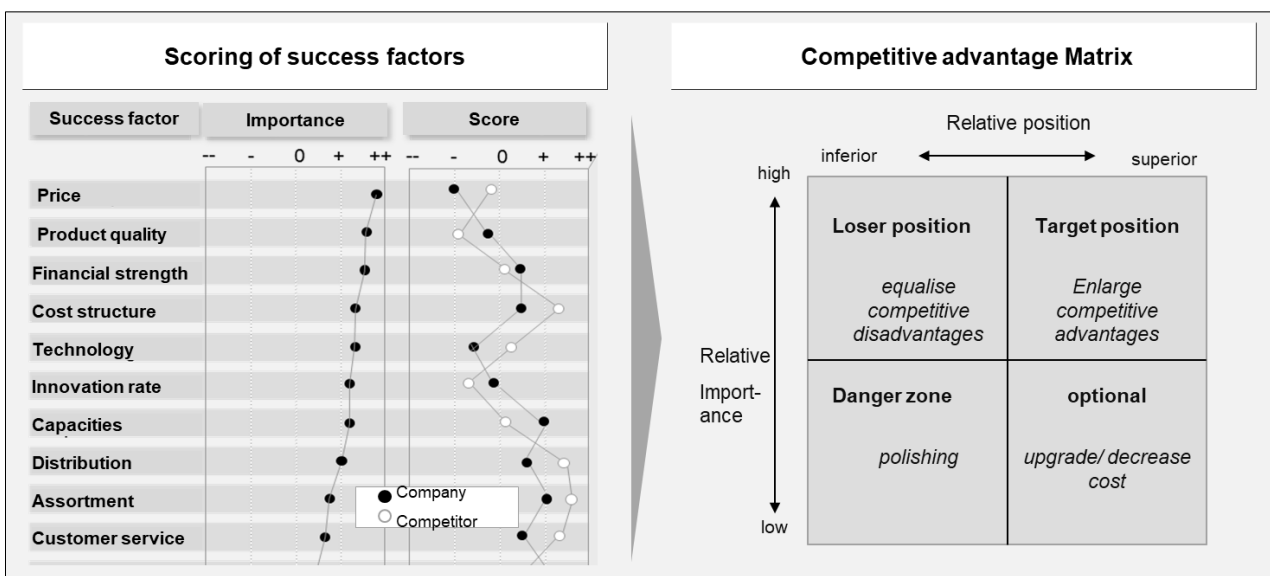
Third, education and science, including proximity to universities, the quality of education, and access to knowledge platforms and skilled talent, are vital for innovation-driven industries. Good educational infrastructure supports continuous innovation and recruitment. Fourth, business-related frameworks, such as those in hotels, country-specific culture, language, airports, and cities, which facilitate business operations, depend on available facilities, business culture, communication, and international connectivity. A favourable business environment supports external business relations and daily operations. Fifth, infrastructure such as expansion options, site-related services, transportation services, and road connections, which includes the physical infrastructure, is essential for potential growth, transportation, and logistics. Hence, expansion capabilities and adequate site services provide flexibility for future scaling.

Sixth, health, safety, and environment (HSE) practices, with streamlined approval processes, transparent regulatory frameworks, and a secure environment, reduce business risks. Therefore, HSE compliance certainly supports smooth operations. Then, other criteria, such as security, utilities, cultural infrastructure, staff environment, and available services, are soft factors related to the quality of life, standard of living, and well-being of employees. A safe and conducive environment for staff is essential for attracting and retaining top talent. All these factors collectively influence location attractiveness, implying that a balanced approach, considering business, social, educational, infrastructure, financial, and regulatory aspects, is essential for selecting an optimal business location.

These findings reveal that Bahrain's location advantages are most substantial in its regulatory efficiency and business frameworks, which strategically position it to serve as a knowledge conduit and innovation gateway within the broader GCC regional market. The interconnected nature of these factors, where financial services, ICT infrastructure, and human capital create a synergistic ecosystem, aligns with the PD model's emphasis on interrelated determinants. Particularly significant is Bahrain's leverage of its geographic centrality as a knowledge conduit rather than merely a logistics hub, enabling cross-GCC collaboration that extends its effective market reach. This strategic positioning addresses the Demand Conditions limitation in the PD model framework by creating regional, rather than purely domestic, market access pathways for KBI firms.

**4-2-Success Factors for KBIs in Bahrain and Identify Gaps**

The benefits of Bahrain's KBI include an educated and skilled workforce aligned with market needs, as well as robust digital connectivity and ICT infrastructure that support KBI's innovation and operations. Government initiatives promote investment and economic diversification in the knowledge sector, leveraging a strategic geographic location to enhance access to global partnerships and regional markets.



**Figure 3. Project example for KBI in Bahrain**

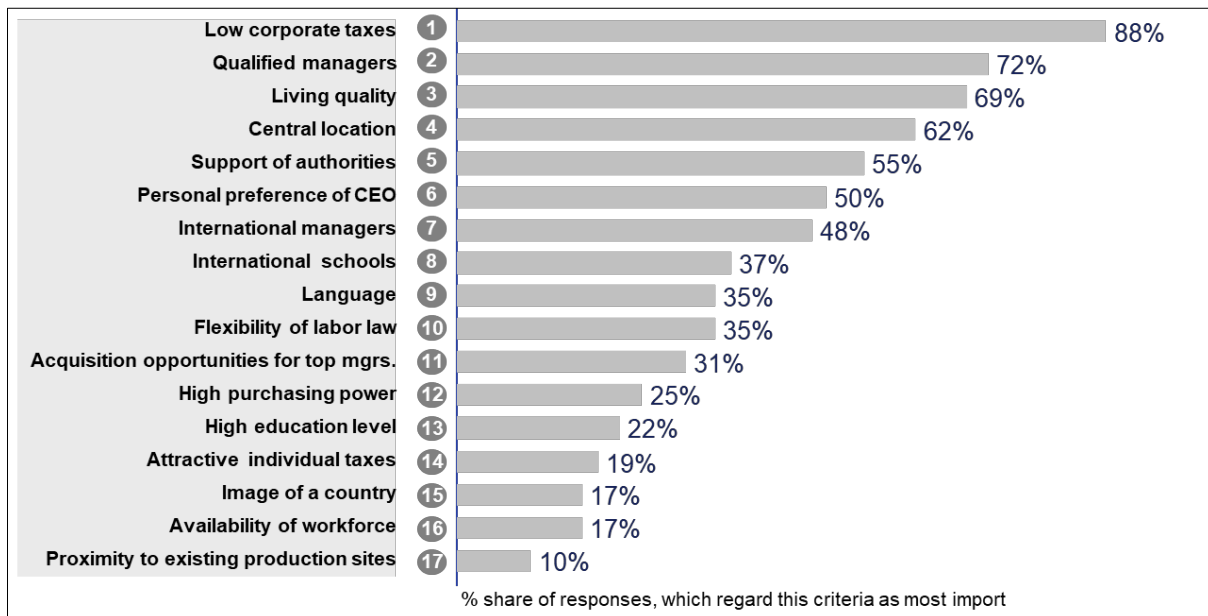
Figure 3 illustrates the dual analysis, incorporating key success factors (KSF) scoring, which is crucial for performance comparison and ranking of the company, as well as a competitive advantage matrix for strategic positioning based on the scoring insights. Highly important KSFs identified include innovation rate, technology, cost structure, financial strength, product quality, and price, which enable the company to outperform its competitors in terms of innovation rate, financial strength, cost structure, and price. These factors fall within the quadrant of target position, suggesting that they are in strategic strengths that can be further reinforced and leveraged.

Additionally, low-importance and weak-performance factors, such as customer service and assortment, score low in both performance and importance for both the competitor and the company. Hence, these factors, located in the danger zone quadrant, indicate a limited strategic value, suggesting minor improvements to mitigate risks. Furthermore, moderate importance factors with slight or parity advantages, such as distribution, capacities, and technology, exhibit a balanced performance, which may require selective investments based on future market needs. In the quadrant of a loser position, the company enjoys a favourable position in key success areas with minimal exposure. It is recommended to focus on managing resources efficiently for lower-priority factors, sustaining and enhancing advantages in prior regions.

The competitive matrix analysis reveals strategic priorities for Bahrain's KBI ecosystem development. While demonstrating strength in innovation rate and financial capabilities, there are opportunities to further enhance customer-centric approaches and product diversification to align with evolving market expectations. Continued investment in distribution networks and capacity expansion presents an opportunity to optimize the scaling potential of successful KBI ventures.

**4-3-Readiness of Bahrain to Meet the Criteria for Innovative Companies**

Bahrain boasts an excellent regulatory environment and digital infrastructure favourable to innovation, along with government initiatives such as Tamkeen and Bahrain FinTech, which actively support innovation and startup enterprises. Bahrain benefits from a tech-savvy, young workforce and strategic access to regional and global markets, aligning with the policies of Economic Vision 2030, which promotes knowledge-based growth and entrepreneurship.



**Figure 4. Criteria for locations of company headquarters**

Figure 4 illustrates the list of factors influencing corporate location decisions, as ranked by executives and decision-makers, indicating the proportion of respondents who identify each factor as significant. Top factors which highly influence corporate location decisions includes low corporate taxes (88%) highlighting the importance of financial incentives, qualified managers (72%) access to skilled leadership, living quality (69%) a high quality of life for employees, central location (62%) proximity to markets, suppliers or logistics hubs, support of authorities (55%) government banking or favorable policies, and personal preference of CEO (50%) executive bias can influence decisions. Mid-tier factors that are moderately influential include international managers (48%), importance for globalized firms, international schools (37%), expatriate-friendly environments, language (35%) compatibility matters for multinational operations, flexibility of labor law (35%), ease of labor regulations, and acquisition opportunities for top managers (31%), retention incentives like equity.

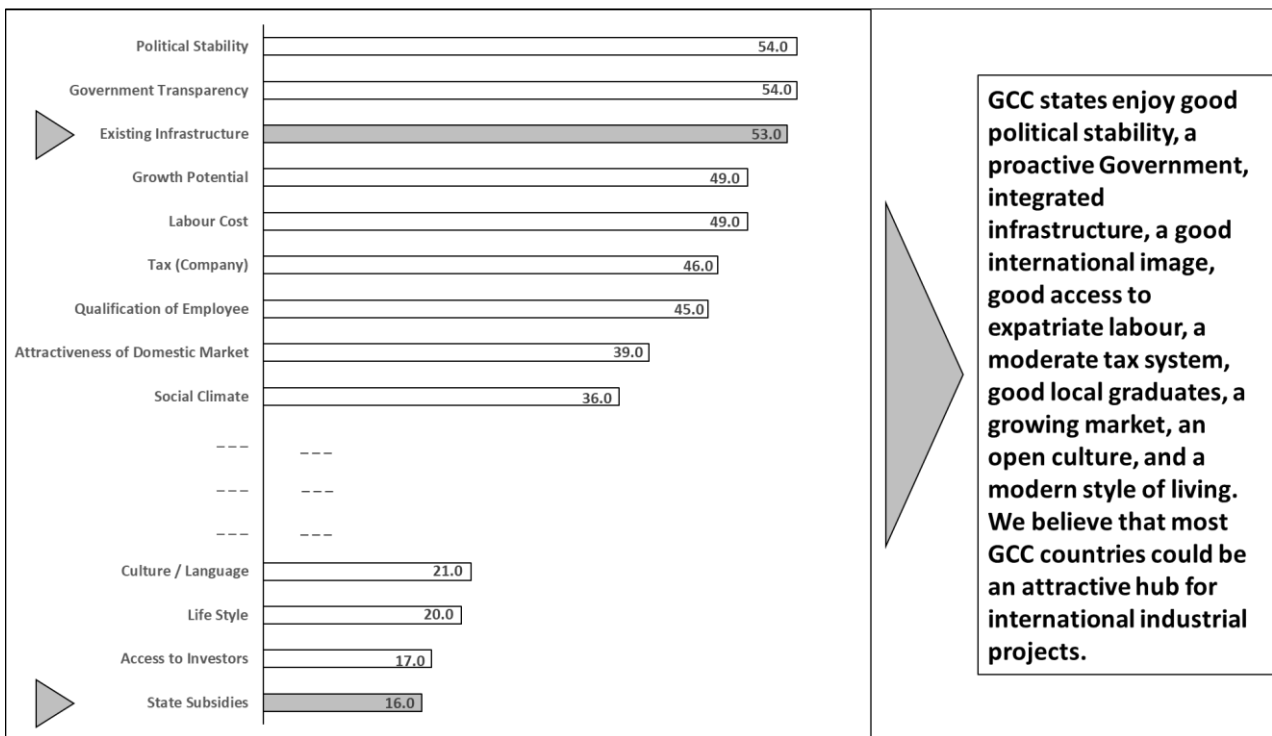
Less influential lower-priority factors include high purchasing power (25%) consumer market strength, high education level (22%) importance of knowledge, attractive individual taxes (19%) personal tax rates for employees,

image of a country (17%) national reputation, availability of workforce (17%) baseline expectation, and proximity to existing production sites (10%) new facility, operation, or business activity. Implications related to operational and financial priorities, including logistics, talent, and corporate taxes, dominate, aligning with the ease of operations and cost efficiency. Additionally, human-centric factors, including international amenities and living quality, reflect the growing emphasis on employee satisfaction in location decisions. Less focus on macro factors, such as workforce availability or country image, suggests that firms prioritize immediate business needs over broader socio-economic conditions. Therefore, quality of life, leadership talent, and financial incentives are the dominant factors of corporate location choice, while broader or softer factors are less significant.

The executive prioritization of low corporate taxes (88%) alongside high value placed on living quality (69%) and qualified managers (72%) present Bahrain with strategic advantages that can be leveraged for sustainable ecosystem development. This combination of financial attractiveness and quality-of-life factors positions Bahrain uniquely for long-term KBI growth. This finding has particular significance for Bahrain's KBI strategy: while its competitive tax regime effectively attracts initial investment, the relative neglect of talent ecosystem indicators suggests that retention and scaling may require different policy instruments than attraction. The high ranking of 'living quality' (69%) and 'qualified managers' (72%) indicates Bahrain's comparative advantage in quality-of-life factors, an often-overlooked dimension of factor conditions that could be leveraged more deliberately in KBI promotion strategies to compensate for other limitations.

**4-4- Investment Criteria in the GCC, Focusing on Infrastructure**

The investment criteria of GCC prioritizes modern and robust infrastructure as a key enabler for private sector growth and economic diversification. The government emphasizes projects in smart cities, digital infrastructure, logistics, energy, and transportation to attract both local and foreign investors. Additionally, crucial factors such as public-private partnerships, regulatory reforms, and political stability are aligned with the national vision, which highlights long-term strategic infrastructural goals.



**Figure 5. Investment criteria in the GCC**

Figure 5 illustrates the comprehensive evaluation of the attractiveness of international industrial projects in the GCC region. In the left panel, the assessment of location attractiveness factors influencing a region for industrial investment is measured on a scale from 0 to 60, scored based on perceived availability and importance in the GCC region. First, the top-ranked factors include political stability (54%), indicating a secure and predictable political environment; governmental transparency (54%), suggesting low corruption and good governance practices; and existing infrastructure (53%), which supports well-developed industrial operations. Second, mid-ranked factors include growth potential (49%) and labour cost (49%), which signify emerging markets with cost-competitive labour, tax (company) (46%) replicates a supportive corporate tax environment, and qualification of employees (45%) specifies a moderately skilled workforce.

Third, lower-ranked factors include attractiveness of domestic market and social climate (38%) represents social integration and domestic demand may be less developed, culture/language (21%) and lifestyle (20%) which act as barriers for foreign investors and expatriates, and access to investors (17%) and state subsidies (16%) specify limited government financial support or access to investment networks.

Then, the analytical summary synthesizes the data and highlights the region’s strategic advantages, indicating that GCC states enjoy good political stability, a proactive government, integrated infrastructure, a good international image, good access to expatriate labor, a moderate tax system, a good supply of local graduates, a growing market, an open culture, and a modern style of living. Thus, the key implications include infrastructure, stability, and strong governance highly appealing for foreign direct investment, moderate corporate taxes and access to skilled expatriate labor enhance industrial productivity, emerging market with growth potential make GCC a strategic base for international industrial projects, and softer factors like state subsidies, lifestyle adaptation, and social climate are relatively weaker and may need policy enhancement.

The overwhelming emphasis on political stability (54%) and government transparency (54%) over cultural factors (21%) indicates that institutional trust mechanisms outweigh cultural compatibility for industrial investors in the GCC, a finding that challenges conventional assumptions about regional business preferences. For Bahrain specifically, its strong performance on transparency metrics within the GCC context positions it favorably on the Government dimension of the PD model. However, the notably low score on 'access to investors' (17%) reveals a critical bottleneck in venture capital networks, suggesting that financial ecosystem development requires as much strategic attention as physical infrastructure in KBI development. This gap between institutional quality and financial accessibility represents a key area for targeted policy intervention.

**4-5- Cluster Initiatives of Bahrain and Support for KBIs**

Promoting clusters in high-tech sectors, such as renewable energy, pharmaceuticals, and semiconductors, under the industrial sector strategy with innovative factory initiatives aims to transform Industry 4.0-enabled units. Programs that enhance local value creation and SME participation, while also supporting KBIs through digital upskilling, innovation grants, and wage subsidy programs, are also important.

GCC Member States		Cluster Programs					
1	Bahrain (Vision 2030)	Metal (aluminum)	Logistics	High value-added manufacturing	Healthcare provision and products	Information communication technology	Alternative energy
2	Qatar (Vision 2030)	Energy City	Education City	others			
3	Kuwait (Vision 2035)	Financial Services	Downstream Industries	Logistics and Transport	Tourism and Entertainment		
4	Oman (Vision 2040)	Petrochemicals	Machinery / Manufacturing	Logistics	Healthcare		
5	Saudi Arabia (Vision 2030)	King Abdullah Economic City	Automotive	Construction	Metals processing	Plastic packaging	Consumer appliances
6	UAE ▪ Abu Dhabi (Plan 2030) ▪ Ajman ▪ Dubai ▪ Fujairah ▪ Ras Al Khaima ▪ Sharjah ▪ Umm al-Qaiwain	Transport & Equipment	Base Metal	Minerals	Food & Beverage	Machinery	Chemicals
		Dubai Internet City	Dubai Education City	Dubai Media City	Dubai Industrial City	others	
Abu Dhabi set up 30 clusters > Industrial, services, logistic hub							

**Figure 6. Cluster programmes in the GCC**

Figure 6 presents a comparison of GCC cluster programs across member states, linking national development vision with targeted economic cluster initiatives. First, the Bahrain Vision 2030 cluster programs include metal (aluminium), logistics, high-value-added manufacturing, healthcare provision and products, information and communication technology, and alternative energy. Bahrain's approach is to diversify from the traditional sector towards services, logistics, and advanced manufacturing, aligning with innovation and sustainability. Second, Qatar Vision 2030 cluster

programs include energy city, education city, and others (such as the tourism sector, sports, and financial services). Hence, Qatar utilizes its hydrocarbon wealth to establish an education-driven and knowledge-based cluster, thereby maintaining its energy dominance.

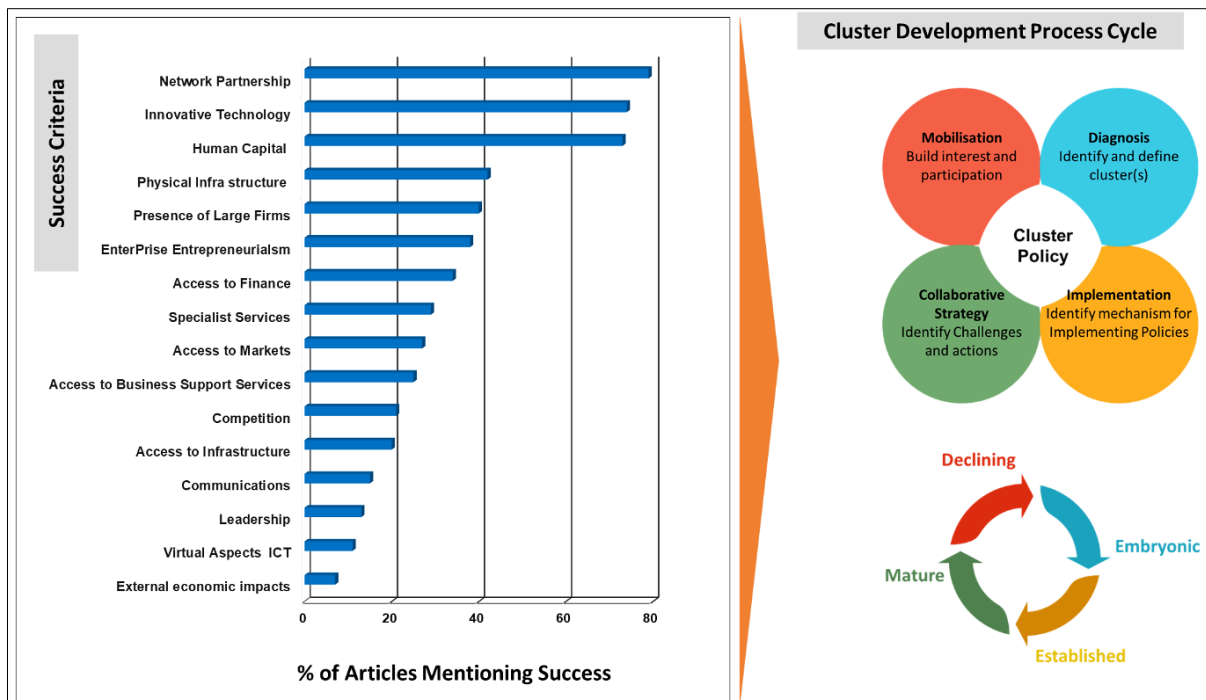
Third, Kuwait Vision 2035 cluster programs include financial services, downstream industries, logistics and transportation, and tourism and entertainment. Therefore, Kuwait utilized education, innovation, knowledge, and ICT in public-private partnerships, regulatory reforms, labor market localization, government, and infrastructure investments. Fourth, Oman Vision 2040 cluster programs include petrochemicals, machinery, manufacturing, logistics, and healthcare. Thus, Oman's focus is on building integrated resource-based industries, complemented by service sectors such as healthcare and logistics, to diversify its economy. Fifth, Saudi Arabia Vision 2030 cluster programs include economic city, automotive, construction, metals processing, plastic packaging, and consumer appliances. Hence, the vision of Saudi Arabia emphasizes a large-scale industrial cluster with a broad spectrum from heavy industries to consumer goods, aiming for economic transformation beyond oil.

Finally, the UAE Vision includes different emirates, such as Abu Dhabi (2030) (transportation, equipment, base metals, minerals, goods, beverages, machinery, and chemicals), Ajman, Dubai (internet city, education city, media city, industrial city, finance, tourism, and renewable energy), Fujairah, Ras Al Khaimah, Sharjah, and Umm al-Qaiwain. The UAE exhibits the most diversified and advanced cluster development strategy among the GCC countries. At the same time, Dubai focuses on services, ICT, and knowledge, and Abu Dhabi emphasizes industrial sectors with a focus on global integration. Inclusively, there is a strategic shift in the GCC from knowledge economy development, industrial clustering, and economic diversification, which strengthens and develops the country's vision. The UAE and Saudi Arabia demonstrate the most comprehensive cluster ecosystems, while Bahrain and Qatar focus on niche areas.

Bahrain's cluster strategy demonstrates a strategic specialization approach that leverages its unique advantages within the GCC ecosystem. This focused strategy positions Bahrain to develop high-value niche sectors while offering opportunities for complementary integration with broader regional value chains. This specialization aligns with the PD model's emphasis on strategic positioning through unique combinations of local advantages. The comparison further highlights Bahrain's potential role as a complementary rather than competing node within the GCC innovation ecosystem, with its fintech and ICT clusters potentially integrating with Saudi Arabia's industrial scale and the UAE's logistics networks to create regional value chains.

**4-6-Success Factors for GCC Clusters to Meet KBI Investment Needs**

Clusters of GCC prioritise building robust infrastructure to support innovation and advanced technology in line with regulatory frameworks and government policies, which are designed to facilitate and attract KBI investments. Collaboration among industry, academia, and government strengthens innovation ecosystems within clusters, providing access to international and regional markets and enabling KBIs to scale and expand effectively.



**Figure 7. Securing a reliable environment for investments**

Figure 7 provides a comprehensive overview of the cluster success criteria and the cluster development process cycle, utilizing empirical data and conceptual models. Top success factors include network partnership (78%), emphasizing the role of collaboration among stakeholders, institutions, and firms within a cluster, innovative technology (75%), which highlights the role for research and development and leading technology as drivers of competitiveness, and human capital (72%) pointed out that the importance of skilled workforce availability for cluster performance. Mid-tier success factors (30% to 50%) include physical infrastructure, the presence of large firms, and enterprise entrepreneurialism, which moderately emphasize the importance of business dynamics and foundational resources. Access to finance and specialized services supports operational growth and startups, while access to market and business support systems enables scaling and international competitiveness. Low-tier success factors (less than 25%) include competition, access to infrastructure, communications, leadership, virtual aspects (ICT), and external economic impacts, which hold contextual importance depending on the industry or region. There is a multidimensional success in cluster development, with a strong emphasis on human resources, innovation, and networking. Infrastructure and financial support act as enablers, while digital integration and strategic leadership are underexplored areas in the literature.

The cluster development process cycle outlines the key elements and phases involved in formulating and executing cluster policy, including diagnosis (identify and define potential clusters), collaborative strategy (engage stakeholders and prioritize development challenges), implementation (develop mechanisms to execute policy recommendations), and mobilization (build interest, participation, and ongoing stakeholder commitment). The successful development of a cluster depends not only on recognizing key success criteria but also on executing a systematic policy cycle that involves stakeholders at every step. Cluster lifecycle stages include embryonic (formation phase with foundational initiatives), established (clear identity, stable collaborations, and growth), mature (optimized operational, potential for innovation plateaus), and declining (loss of competitiveness or relevance unless revitalized). Strategic interventions and evolution are necessary at each stage to either sustain growth or manage decline, where a cluster's position in the cycle is vital for tailoring policy and investment decisions. So, it would be valuable in research, strategic planning, and policy formulation for industrial clustering, innovation hubs, and regional economic development.

The cluster success factor analysis highlights Bahrain's exceptional strength in network partnerships (78%), while identifying opportunities to further develop financial ecosystem components. Building upon its excellent collaborative foundations, strategic focus on enhancing access to finance and investment mechanisms presents a valuable pathway to support accelerated growth trajectories and market-driven cluster development. The lifecycle analysis further suggests that Bahrain's clusters are primarily in the established phase with some embryonic initiatives, requiring deliberate maturation strategies to avoid stagnation. The relatively low emphasis on digital integration and strategic leadership factors points to underexplored dimensions that could differentiate Bahrain's clusters in the regional landscape.

## 5- Discussion

This study presents the results in light of strategic implications for Bahrain in leveraging its policy landscape, innovation readiness, infrastructure, and location to enhance the competitiveness of its KBIs. The findings are organized into six focal areas, identified in the research objectives, and reflect key theoretical insights, particularly those related to innovation ecosystem framework cluster development theories, and the PD model. First, when it comes to Bahrain's location-based advantages and regional positioning, the country's geographical location provides strategic access to the GCC regional market, thereby enhancing its demand for KBI. Additionally, a free-market orientation and favourable regulatory frameworks enhance KBI growth [30, 31]. The findings align with Shehab & Hamdan (2021), who identified Bahrain's strategic geographic position and supportive government policies as key KBI enablers, but extend their work by demonstrating how these advantages specifically compensate for domestic market limitations through cross-GCC collaboration [31]. This contrasts with Wang & Churchill's (2025) findings in Melbourne, where infrastructure and regulatory contexts shaped worker strategies differently due to larger domestic markets, highlighting how small economies like Bahrain must leverage regional integration differently [32]. Investment in education and advanced ICT infrastructure also contributes to Bahrain's talent development and readiness for innovation. The analysis is informed by the PD model [25], which considers factor conditions (Bahrain's substantial human capital and infrastructure), firm rivalry and strategy (a business-friendly and competitive regulatory landscape), and supporting and related industries (a strong presence of academic institutions and fintech ecosystems). Bahrain's strategic positioning offers significant opportunities to leverage regional GCC collaboration, enabling KBI firms to access expanded market testing and demand conditions beyond domestic boundaries. There is a strong alignment between Bahrain's regulatory ecosystem and urban connectivity, which enables innovation [32, 33]. Therefore, to strengthen its position, Bahrain should promote domestic R&D consumption and enhance demand-side policies to create a more robust innovation environment.

Second, the key success factors for KBIs and strategic planning are that Bahrain possesses strong internal capabilities in areas such as financial robustness, technology adoption, and innovation, which are crucial for KBI's performance [34, 37]. Based on the competitive advantage matrix, Bahraini firms score well in terms of price, cost structure, and innovation rate. The identification of Bahrain's innovation-capital misalignment resonates with Chen et al. (2024) findings in manufacturing sectors, where digital transformation barriers were highest in similar transitional economies.

However, while Mekonen & Eshetu (2024) found market access to be a primary challenge in Ethiopia's knowledge industries, our results suggest Bahrain's regional integration mitigates this particular constraint, though it creates different challenges in market responsiveness and customer service, a finding more aligned with Chantes et al. (2023) Thai business model analysis, where ecosystem sustainability proved critical [35, 38]. Still, they underperform in product assortment and customer service, which are often key factors in service-driven differentiation in high-tech industries. Moreover, the success models of KBIs emphasize not only innovation output but also ecosystem support and customer-centricity as essential drivers of global competitiveness [14, 15]. The opportunities for Bahrain lie in expanding the scope of KBI offerings and enhancing customer engagement strategies through diversification and product customization. Policymakers may consider adopting agile methodologies and incentivizing a design-thinking approach to foster market responsiveness.

Building upon Bahrain's business-friendly environment and strong regulatory foundations, several strategic opportunities emerge to further enhance the innovation ecosystem. First, continued development of intellectual property (IP) frameworks presents an opportunity to attract even higher-value R&D activities. Second, fostering deeper collaboration between public research institutions and private KBIs could further amplify research impact and commercialization outcomes. Third, developing specialized intermediaries for technology transfer and commercialization would create valuable pathways for early-stage technologies to reach market implementation. These strategic enhancements would build upon Bahrain's existing strengths to create a more integrated and dynamic innovation system.

Third, the innovation readiness and talent attraction studies confirmed that executives need to consider living standards in corporate decision-making, leadership qualities, and prioritize tax advantages that are well-supported by innovation ecosystems [39, 42]. The emphasis on living quality in executive decision-making supports Hashimi et al.'s (2021) findings about Bahrain's technopreneurial ecosystem [39]. However, this study reveals this factor's surprising dominance over workforce availability, a departure from Villegas-Mateos' (2023) Qatari study, where crisis resilience and cross-sector collaboration were more prominent. This suggests Bahrain's KBI attraction strategy may be more quality-of-life dependent than regional peers, potentially reflecting its more extended history as an expatriate hub [24]. The tax regime in Bahrain, including corporate and individual taxes, is favorable. The country's international orientation, with expatriate-friendly services, English-language proficiency, and adherence to global standards, also meets these criteria. The findings also highlight an opportunity to further enhance the strategic visibility and branding of Bahrain's skilled workforce and educational achievements to align with executive decision-making priorities.

Fourth, the investment climate and institutional competence in the GCC indicate that infrastructure quality, governmental transparency, and political stability are key factors in attracting foreign investors to the GCC [43, 46]. Our finding that political stability and transparency outweigh cultural factors for GCC investors confirms Cieslik & Hamza's (2023) institutional quality thesis but challenges assumptions in earlier Gulf business literature that emphasized cultural compatibility [46]. The identified venture capital gap extends Alkhalifa's (2024) ESG integration findings by revealing how even strong governance frameworks may not translate to financial market depth, a nuance not fully captured in Shilbayeh & Grassa's (2024) creditworthiness models or Biygautane's (2023) public-private partnership analysis [43–45]. Bahrain's score is strong in these categories, positioning it well to attract high-value investment in KBI. The analysis identifies strategic opportunities to further enhance access to investors and develop innovative funding mechanisms, which would complement Bahrain's already strong institutional foundations. Expanding financial market integration and developing robust investment networks present promising pathways to accelerate early-stage innovation ecosystem growth [45, 47]. Hence, promoting Bahrain as a startup-friendly financial center, streamlining investment approvals, and enhancing public-private co-investment schemes could help overcome these drawbacks.

Fifth, the cluster programs and KBI development in Bahrain demonstrated the cluster programs across the GCC, centered on alternative energy, high-value manufacturing, ICT, and logistics. Bahrain's niche cluster specialization diverges from Keivani et al. (2003) Dubai ICT cluster model, which emphasized scale and e-government leadership, but aligns more with Rattle & Taylor (2025) 'dispersed cluster' typology, where targeted, specialized initiatives prove effective in smaller ecosystems. This contrasts with Zafer et al. (2020) Saudi cluster findings, where proximity and policy support drove knowledge sharing differently, suggesting cluster success factors may be scale-dependent within GCC contexts [22, 23, 48]. Additionally, Bahrain's focus should be on broad-based industrialization, similar to Saudi Arabia and the UAE, rather than a service-driven approach. This can be achieved by targeting a strategy that leverages its openness to foreign participation, logistics, and financial strengths [7]. The success of a cluster not only depends on its scale but also on synergy and specialization [48, 49]. Bahrain's challenge is to integrate the synergy of clusters, academic-industry partnerships, innovation transfer mechanisms, and knowledge spillovers. Therefore, this requires more robust metrics for transparent monitoring mechanisms, better stakeholder engagement, and cluster performance. So, policymakers may also consider establishing cross-border cluster collaborations with Saudi Arabia and the UAE to access shared knowledge resources.

Sixth, the cluster success factors and lifecycle implications, based on top-ranked success factors such as human capital, innovation technology, and network partnerships, require co-creation and open innovation [22, 53]. The network

partnership strength but financial weakness pattern in Bahrain's clusters differs from Xu et al. (2024) findings, where innovation capability compensated for capital deficiencies, suggesting different mediating mechanisms in GCC contexts [53]. This aligns partially with Zakaryan's (2023) knowledge network analysis, but reveals how institutional coordination in Bahrain may create relationship dependencies that differ from the balanced knowledge recombination recommended for optimal innovation [52]. Bahrain, with its dense network of international organizations, educational institutions, and SMEs, is well-positioned to facilitate these partnerships. However, mid-tier and low-tier factors, such as communication, leadership, and ICT, remain underutilized [23], increasing the risk of cluster stagnation in the absence of strategic communication, digital transformation, and visionary leadership. Moreover, the lifecycle analysis reveals that the Bahrain clusters are in the established phase, characterized by stability and moderate growth, with the infusion of innovation and stakeholder re-engagement to avoid decline or premature maturity. Bahrain needs to evolve from traditional industrial clustering to knowledge-based innovation hubs that integrate cross-border networks, incubators, and technology parks, with a sophisticated feedback loop, innovation metrics, and performance dashboards, as seen in Finland and Singapore.

## 6- Conclusion and Implications

This study highlighted the KBI competitiveness of Bahrain by identifying cluster strategies, policy frameworks, and location advantages that position it as an emerging knowledge economy. The key findings of the study include the strategic location, financial ecosystem, and regulatory efficiency of Bahrain, making it attractive for high-value manufacturing, ICT, and fintech. To further accelerate growth and align with regional leaders such as Saudi Arabia and the UAE, continued focus on venture capital funding, local talent development, and R&D investments presents a powerful opportunity. Cluster-based developments like Bahrain International Investment Park, Bahrain Economic Development Board, Bahrain Logistics Zone, Bahrain Investment Wharf, Bahrain FinTech Bay, Bahrain TechnoPark, Bahrain Science Centre for SDGs, StartUp Bahrain Ecosystem, and Tamkeen Support Programs align with Vision 2030; there is a need for cross-GCC collaboration to accelerate the growth of Bahrain.

### 6-1- Theoretical Implications

PD model has been extended to the context of KBI, which emphasizes the role of intangible assets. These assets include innovation ecosystems, digital infrastructure, and human capital alongside traditional factor conditions to reflect the unique competitiveness drivers of KBIs in innovation-led economies. Additionally, this study integrated strategic cluster theory and economic geography, highlighting the importance of location-specific attributes, including innovation networks, access to finance, institutional support, and regulatory quality. Moreover, it highlights the theoretical significance of localized knowledge spillovers and geographic proximity to talent in the formation and growth of KBI. This study provides comparative insights into GCC cluster development models, which explain how the framing of national strategies within a common regional framework affects the competitiveness of KBI. Therefore, advancing the knowledge-based economic transformation of Bahrain requires a broader regional initiative by introducing a framework for evaluating the effectiveness of ecosystem orchestration, sector prioritization, and policy alignment.

### 6-2- Practical Implications

On the practical side, to attract and retain global knowledge-based firms, Bahrain needs to maintain and enhance its business-friendly regulatory environment, along with strategic investments in digital infrastructure, such as AI hubs, 5G networks, and logistics connectivity, to reinforce Bahrain as a regional innovation hub. Stronger university-industry linkage and targeted STEM education to upskill local talent for building a sustainable knowledge workforce, along with venture capital incentives and R&D grants by expanding access to innovation finance, will support technology commercialization and startup growth. Bahrain has strategic opportunities to enhance its innovation ecosystem through continued refinement of IP frameworks, development of incentives for private sector R&D, and establishment of technology transfer mechanisms that connect research institutions with industry partners. International best practices, combined with industry-specific support systems, accelerator programs, and specialized zones, should be integrated into existing cluster initiatives. Regional collaboration with neighboring GCC countries, facilitated through shared R&D infrastructure and joint innovation funds, can help amplify innovation capacity.

Enhancing non-infrastructural factors, such as ease of doing business, regulatory transparency, and political stability, will improve investor confidence in the long run and increase the flow of foreign direct investment. Bahrain's KBIs need to be integrated with the Bahrain financial services sector, including AI-driven platforms, insurtech, and fintech, which can drive new value creation and ecosystem synergies. This integration should also align firms with national development priorities to secure incentives and government support. To improve R&D performance and talent development, a partnership with research institutions and local universities needs to be built and strengthened. At the same time, companies must prioritize digital transformation, cost efficiency, and innovation to remain competitive within the regional knowledge economy.

### ***6-3-Limitations and Future Research***

This study offers valuable insights into the competitiveness of KBIs in Bahrain, utilizing a robust analysis of secondary sources and policy documents. To build upon this foundation and explore dynamic market conditions in future work, subsequent research could incorporate surveys and interviews with KBI firms and key stakeholders in Bahrain to gather additional, ground-level perspectives. While the study utilizes comprehensive official and institutional data, future research could complement these findings with additional ground-level insights to provide a holistic view of policy implementation and ecosystem development. Future research should incorporate surveys and interviews with KBI firms and key stakeholders in Bahrain to gather in-depth, ground-level insights. A longitudinal research design is recommended to assess the long-term impact of Bahrain's KBI-related policies and track industry evolution over time. The exclusive focus on Bahrain limits the study's generalizability. Comparative research is needed to benchmark Bahrain against leading knowledge economies, such as Sweden, Switzerland, the United States, Singapore, the United Kingdom, South Korea, and Finland. Sector-specific studies, such as comparisons between the AI industries in Bahrain and the UAE, can uncover differentiated success models and best practices. The role of generative AI, Web3 technologies, and green innovations in driving KBI growth in Bahrain remains underexplored and should be a priority for future investigation. The impact of regional developments, especially economic integration between Bahrain and Saudi Arabia, should be examined for its implications on KBI competitiveness, talent flows, and market access.

Overall, this study comprehensively addresses several theoretical, practical, and contextual gaps that previously hindered a nuanced understanding of Bahrain's knowledge-based industry (KBI) potential. Theoretically, it extends the PD model, which was previously applied to traditional industries, by adapting it to the KBI context in Bahrain. This adaptation incorporates elements such as human capital, infrastructure, demand conditions, and firm strategy. It also fills the research void on Bahrain's KBI ecosystem, which, unlike in countries like China or Saudi Arabia, has remained underexplored. On the practical front, the study responds to policy implementation challenges highlighted in Bahrain's Vision 2030 by recommending strengthened university-industry linkages, enhanced public-private partnerships, and expanded fintech and AI ecosystems.

It proposes solutions to investment and infrastructure deficiencies by advocating for improved financial incentives, streamlined approval processes, and the development of specialized economic zones. Contextually, the study addresses Bahrain's lag in regional competitiveness compared to the UAE and Saudi Arabia by benchmarking against GCC peers and suggesting cross-border cluster collaborations. It also tackles the domestic demand-side limitations by promoting local R&D consumption and customer-centric innovation strategies. The study makes a multifaceted contribution by extending theoretical frameworks, proposing actionable policies, and contextualizing Bahrain's position within the GCC, thereby providing a robust roadmap for transitioning into a knowledge-driven economy aligned with Vision 2030.

## **7- Declarations**

### ***7-1-Author Contributions***

Conceptualization, H.A.Q. and J.P.S.; methodology, H.A.Q.; validation, H.A.Q. and J.P.S.; formal analysis, H.A.Q.; investigation, H.A.Q.; data curation, H.A.Q.; writing—original draft preparation, H.A.Q. and J.P.S.; writing—review and editing, H.A.Q. and J.P.S. All authors have read and agreed to the published version of the manuscript.

### ***7-2-Data Availability Statement***

The data presented in this study are available on request from the corresponding author.

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### ***7-5-Institutional Review Board Statement***

Ethical approval for this study was obtained from the Ethics Committee of the Research Center at the University of Technology Bahrain.

### ***7-6-Informed Consent Statement***

Not applicable.

### ***7-7-Conflicts of Interest***

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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