


Article

What Are the Binding Constraints for a Knowledge-Based Economy in Qatar?

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Abstract: This study aimed to investigate the binding constraints on building a knowledge-based economy (KBE) in Qatar. The research used descriptive and qualitative approaches within the new institutional economics paradigm using data from the Global Entrepreneurship Monitor. Taking cognizance that natural-resource-driven economic development may not be sustainable, the Qatar National Vision 2030 was launched with the expectation that educational expansion and reform would turn Qatar's carbon economy into a "knowledge economy". The Qatari government's National Development Strategy 2018–2022 has anchored the economic diversification agenda on building a knowledge-based economy. The findings demonstrated that per the Global Entrepreneurship Monitor analysis, compared with selected countries, Qatar scored relatively high across various dimensions of new institutional economics, including institution, governance, market, and culture. This shows that the knowledge-based economy in Qatar is developing. Several studies examined a variety of issues in building a knowledge-based economy in Qatar, but this is the first study to explore the binding constraints of building a knowledge-based economy in Qatar using the new institutional economics theory as a tool of analysis.

Keywords: knowledge-based economy; Qatar; new institutional economics; Global Entrepreneurship Monitor



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1. Introduction

The Qatar National Vision (QNV) 2030 aims to transform Qatar into an advanced country capable of sustaining its development and ensuring a high standard of living for its people and future generations. This national vision proposes the development of a diversified economy with diminishing dependence on hydrocarbons, where investment moves toward a KBE with the growing importance of the private sector [1]. The second National Development Strategy 2018–2022 has fixed the Qatari government's economic diversification agenda on establishing a KBE [1], and the determination of policymakers in building a KBE is noted by [2].

Building a KBE hinges on four pillars: human capital, digital infrastructure, an innovative environment, and an enabling regulatory environment [3]. These critical elements can progress under an institutional framework, macroeconomic and political stability, incentives for conducting business with national and foreign companies, fair competition, and regulatory policies conducive to entrepreneurship and risk-taking [3].

According to the Organization for Economic Co-operation and Development (OECD), a KBE is defined as an economy with a greater reliance on knowledge, information, and increasing human capital skills in both private and public sectors [4]. In other words, economic development and advancement will depend on scarce natural resources, introducing knowledge as a renewable resource. Achieving a KBE is very significant for both developed and developing countries; this is evident in the efforts of many nations to realize this goal [5].

Seminal work on national resources and growth by Sachs and Warner [6] has indicated that resource-abundant economies grow more slowly than less endowed economies. This

negative trend can be observed in countries such as Angola, Nigeria, Zambia, Sierra Leone, and Venezuela, in contrast to successful cases such as Norway, Canada, and Australia, where natural resources remain relevant for economic performance today [7]. This reveals that resource endowment can provide a lever for rapid economic transformation depending on how it is blended with knowledge. Qatar has experienced tremendous economic growth over the past two decades through hydrocarbon-based industries. As a host to 13% of the world's proven natural gas reserves and 25 billion barrels of proven oil reserves, Qatar and its economic and social progress have been driven by oil and gas [8]. The non-hydrocarbon sector of the Qatari economy has also seen some advancements over the years. In 1990, Qatar's non-hydrocarbon share of the total GDP was 62%; by 2010, it had decreased to 43%, increasing again to 63% in 2021 [9].

Because natural-resource-driven economic development may not be sustainable in the long term, Qatar's leadership laid out its vision of economic transformation in the QNV 2030, with the aim that educational expansion and reform will convert Qatar's carbon economy to a "post-carbon" economy, or a "knowledge economy" [1]. The objective is for educational and research institutions to train the workforce, subsequently becoming a new, knowledge-based workforce [10].

To achieve a KBE, it is important to first understand how this knowledge is created, protected, and commercialized. It is straightforward to claim that Qatar wishes to reduce its dependence on hydrocarbon industries; however, the challenge is typically in achieving the feat of creating a KBE, as diversifying away from hydrocarbons has been a difficult task for many countries [9].

The realization of this economic vision was operationalized through the establishment of the Qatar Foundation for Science, Education, and Community Development (QF), which is an initiative of the Royal Family. This has been highly advantageous in Qatar's efforts to develop a knowledge ecosystem [11]. The country has also enacted laws regarding the "Protection of Intellectual Property and Copyright", "Establishing Free Zone", and "Patents Law"; these developments amplify the intentions and determination of Qatari leadership toward knowledge-based sustainable development [11,12] and document the challenges faced by GCC countries in transitioning to a KBE, including issues with human capital and polity. It is generally accepted that Qatar is a developing country, and human capital may be one of its hurdles in transitioning toward a KBE; in addition, Qatar began this transition in 1995 (more information is provided below in Section 4.2). As such, this study investigated the constraints currently faced by some economic actors in Qatar in the quest to achieve a KBE. Additionally, this study examined the diagnostics of the problem to develop policy recommendations. To achieve this objective, the binding constraints for the growth of a KBE in Qatar were identified using the new institutional economics (NIE) framework and survey instruments. To analyze the issues deduced with the NIE framework, the Global Entrepreneurship Monitor (GEM) Global Report 2019/2020 was used as a proxy to evaluate the constructs of institution, organization, market, and culture. The remainder of the work is organized as follows: Section 2 summarizes the literature on KBEs and NIE and highlights the position of the current study as it is situated in the literature. Section 3 presents the study's methodology, and Section 4 contains a detailed analysis of current KBE indicators from the GEM database for Qatar and comparable countries. The study is concluded in Section 5.

2. Literature Review

Developing a KBE is a crucial aspect of Qatar's strategy for sustainable economic growth and diversification. Qatar's goal is to build a KBE driven by innovation, entrepreneurship, and human capital development [13]. In this context, the relationship between entrepreneurship, technology, and knowledge is of paramount importance.

Schumpeterian theory emphasizes the crucial role that entrepreneurs play in driving economic growth and development through innovation. According to Joseph Schumpeter, entrepreneurs are the driving force behind innovation and play a key role in shaping

the economic landscape through the creation of new products, services, and production processes [14]. Qatar has implemented various initiatives to support entrepreneurship, such as providing funding and incubation facilities for startups, as well as creating a supportive regulatory framework for new business formation [15]. These initiatives aim to create a supportive environment for entrepreneurs to pursue their ideas; bring new products, services, and production processes to the market; and generate economic growth and development.

Moreover, technology and knowledge development are crucial for the growth of a KBE. Qatar has made significant investments in research and development, as well as human capital development through education and training programs [16]. These investments aim to strengthen the link between technology, knowledge, and entrepreneurship, and foster the growth of a dynamic and innovative KBE. Moreover, technology and knowledge development are crucial for the growth of a KBE.

Furthermore, the Schumpeterian perspective emphasizes the importance of competition in driving innovation and economic growth. Entrepreneurs are motivated to innovate when they see the opportunity to gain a competitive advantage in the market. In this context, Qatar has implemented various initiatives to promote competition, such as creating a level playing field for new businesses, strengthening intellectual property rights, and encouraging the development of new and innovative products, services, and production processes [13].

Ref. [17] focused on the relationship between intellectual property rights and economic growth in developing countries, with a particular emphasis on the MENA region. This study shed light on the importance of protecting intellectual property rights for promoting a knowledge-based economy, which is relevant for Qatar, as it aims to develop its intellectual property rights framework. Furthermore, Ref. [18] examined the relationship between institutional quality and economic growth in the GCC countries, while Ref. [19] analyzed the impact of institutions on economic growth and development in the GCC region. These studies provide valuable insights into the importance of institutional reforms for promoting economic growth and development in the GCC region, including Qatar. Aljefri (2019) [20] highlighted the role of universities in promoting knowledge-based economies by examining the case of Saudi Arabia. Alkhater (2019) [21] analyzed the impact of institutional quality on entrepreneurship and economic growth in the GCC countries. This is relevant for Qatar as it aims to promote entrepreneurship and encourage private sector growth. Furthermore, Almutairi (2020) [22] focused on the relationship between intellectual property rights and economic growth in developing countries, with a particular emphasis on the MENA region. This study shed light on the importance of protecting intellectual property rights for promoting a knowledge-based economy, which is relevant for Qatar, as it aims to develop its intellectual property rights framework.

Ref. [23] defined knowledge workers and service workers in his book *Post-Capitalist Society*. He explained that knowledge workers manage those who possess knowledge by using it and managing its use. Service workers, in contrast, are those whose work is based on developed knowledge. Drucker concluded that the productivity of knowledge will define success and failure in competition between countries, industries, and companies. Regarding knowledge itself, no one has a “natural” advantage or disadvantage, and perhaps the degree of innovation from available knowledge will be of consequence.

Currently, there are many definitions of a KBE; however, most researchers agree that a KBE is a modern developed economy with high growth potential and a global entrepreneurial and flexible mindset, where the drivers of growth depend on the extent to which knowledge, technology, and innovation are embedded in products and services [4]. The World Bank, the OECD, and the European Union (EU) have developed various frameworks and methodologies for assessing the development of KBEs. The main drivers for a KBE include investments in all levels of education; research and development (R&D), including capacity building and collaborative research; entrepreneurship; access to finance (including seed, angel, and venture capital); science parks and business incubators; and commercialization of proven technologies [24]. A KBE essentializes intangible assets as

being as equally necessary as physical assets, and the exploitation of technologies becomes more significant than the production of raw materials [25]. In such an economy, sustainable competitive advantages are driven by creative, innovative, and sophisticated knowledge and intellectual assets [26]. Innovation increases the competitiveness of firms, industries, and nations and brings disruptive change into the markets and production process, disrupting both the economic determinism of the neoclassical approach and the potential resource curse described in the literature.

Ref. [27] studied the growth strategy of a KBE and found that technological innovation alone cannot provide or stimulate growth in perpetuity. Their research concluded that technological innovation should be complemented by human capital formation to alleviate potential inequalities in employment and wages. To avoid unintended consequences of technological innovation, balanced growth among various industries must be promoted with the prospects of greater improvement in productivity and scale effects.

The world's most advanced economies can be categorized as KBEs, as they thrive on knowledge and information [28]; they do so by creating, distributing, and using knowledge and related information. Ref. [23] asserted that information and knowledge comprise the primary and most productive source of wealth creation. With the emergence of the post-industrial society, the world witnessed a shift away from capital, energy, land, and labor as sources of wealth creation and toward knowledge and information [28]. Several factors can accelerate or hinder the establishment of a KBE. Ref. [28] concluded that institutional quality has a significant impact on whether a nation will attain a KBE. For the quality of institutions in a KBE to drive entrepreneurship, the institutional framework should address the efficiency and effectiveness of the legal system, regulations, competition, labor market, and marketplace [28].

A strand of literature on KBEs examined the impact of institutional quality on KBEs, including how countries can capitalize on the potential of a KBE to achieve a desired level of development. The transaction cost theory within the NIE framework provides the foundation for the concept of institutional quality [29]. Institutional reforms toward improving the quality of institutions precipitate the development of a KBE [29]. For knowledge-based structures to emerge, [30] theorized that “four critical generative elements: socialized agency, differentiated expertise, defensible turf, and organizational support” must be combined in specific pathways. Ref. [31] argued that to fully benefit from a KBE, the creative industry must also play a role as the synergy of the two creates conditions for a strong and sustainable creative economy and KBE. Thus, it is necessary to remove barriers in science and research and ensure proper intellectual property protection.

The importance of a KBE in building an entrepreneurial economy was noted by [32], who proposed the knowledge-based entrepreneurship model, which emphasizes the relationship between a KBE and entrepreneurship in achieving competitive advantages. This synergy, according to them, can foster high efficiency, optimization of knowledge and human capital, and the establishment of entrepreneurial organizations. This model conceptualizes the use of knowledge, ICT, and human capital dynamism as a foundational tool for transferring the benefits of a KBE to an entrepreneurial society.

Further studies identified the policy and economic reforms necessary for the transition to a KBE in less developed regions of the EU. The policy of transition to a KBE in this region was based on policies of innovation and the ability of institutions to provide a vehicle for the consistent implementation of innovation policies [33]. As shown by [28,29,32], human capital, institutions, quality of life, education, and economic reforms were targets of reform in the development of a KBE. The supply of qualified personnel was also crucial for employment growth in new industries and R&D, leading to further growth in urban centers and an increase in regional GDP per capita.

Regarding KBE activities in Qatar, previous studies examined various aspects of development, including the educational sector, the strengths and weaknesses involved in achieving a KBE in Qatar, the ICT and innovation ecosystem, the entrepreneurship ecosystem, and the education hub [2,34–37].

Ref. [35] investigated the transformational efforts of engineering colleges in both Texas and Qatar to support their states' visions toward an innovative and knowledge-based economy. Hofstede's cultural dimension framework was used to address the cultural impact of the two states on the leader–follower relationship, finding that leaders in both colleges possessed a transformational leadership style, even when exhibited to a lesser degree than the norm. They specifically concluded that in high-power-distance cultural contexts, such as Qatar, the “idealized image of the leader contributed positively toward higher satisfaction of the followers with their leaders and current governance systems”, whereas “acknowledgment and rewards were the sources of satisfaction in low power-distance societies”, such as Texas [35]. This implies that leadership is critical for driving the KBE in Qatar, and expanding the state's institutional capacity will provide a vital pillar to support this leadership.

Ref. [2] concluded that the Qatari government's diversification agenda has provided a strong incentive for attaining a KBE, as diversification strategies aim to achieve a robust entrepreneurial ecosystem. According to [38], Qatar's main weaknesses remain human capital and a lack of entrepreneurial mindset, which can also be observed in Saudi Arabia, as reported by [39]. The advancement of an entrepreneurial mindset in Qatar is constrained by the economic model of the country [2]. The rentier economy is characterized by citizens' sense of entitlement toward their hydrocarbon revenues, and the role of the state is to spend resources directly on citizens through high salaries in the public sector and other economic benefits. This situation makes entrepreneurship a less explored venture for many citizens [38].

Investment in education has increased in Qatar over the years with the view that transitioning to a KBE will require an educated population. Toward the development of an education hub, an assemblage of renowned universities from foreign countries have opened branches in Qatar [37]. Ref. [34]'s study of education hubs in Qatar and the UAE concluded that education zones function as anchors for circulation and containment, providing the tools to harness globally circulating people and institutions for building a KBE without compromising on social and political fiber. This has also prompted the establishment of research and industrial institutions, such as the Qatar Science and Technology Park (QSTP), Qatar Environment and Energy Research (QEER), Qatar Computer Research Institute (QCRI), Qatar National Research Fund (QNRF), and Qatar Research Development Innovation (QRDI). The position of these knowledge-intensive institutions within the QF provides them with opportunities for collaboration to advance knowledge in Qatar [11].

The status of entrepreneurship education and training in Qatar and its contribution toward creating a KBE has also been investigated. Results indicate that due to numerous efforts in diversifying the economy, Qatar's Knowledge Economy Index ranking has seen some improvement [36]. The literature on NIE has addressed both theoretical and empirical domains of the subject. Generally, institutions are groups based on moral beliefs that organize power [40]. Ayers observed that institutions typically share the feature of their designating authority, generally in the form of a hierarchical system. The authority embedded in institutions is not manifested through force but through customs or traditions [40]. Scott [41] also added that institutions consist of “cognitive, normative and regulative structures and activities that provide stability and meaning in social behavior” and “are transported by various carriers—cultures, structures, and routines—and they operate at multiple levels of jurisdiction”.

NIE highlights the role of institutions in shaping the relationship between entrepreneurship, technology, and knowledge. According to this perspective, institutions such as laws, regulations, and cultural norms play a crucial role in shaping economic behavior and outcomes [14]. In Qatar, the institutional framework was designed to support the development of a KBE by creating a supportive business environment, improving access to financing for start-ups, and strengthening intellectual property rights protection. These institutional changes aim to create a supportive environment for entrepreneurs to pursue

their ideas; bring new products, services, and production processes to the market; and generate economic growth and development.

Ref. [42] distinguished between institutions and organizations: institutions establish the rules and define how the game is performed, while organizations represent the players. Organizations are vehicles for human interaction; they include political bodies (political parties, government at various levels), economic bodies (firms and cooperatives), social bodies (mosques or churches and clubs), and educational bodies (schools and universities) [42]. The state of Qatar provides an interesting case study of a knowledge-based economy influenced by NIE. NIE highlights the importance of institutions and regulations that drive the flow of knowledge and innovation in the economy.

Qatar has implemented several institutional reforms aimed at promoting the flow of knowledge and innovation in the economy [43]. One notable example is the establishment of the Qatar Science and Technology Park (QSTP), which aims to create a hub for research and development, innovation, and entrepreneurship. The QSTP provides a supportive environment for startups and businesses to develop and commercialize new technologies [43]. Another important input is the implementation of a robust intellectual property rights regime, which provides legal protection for innovative ideas and products. This helps to encourage firms and individuals to invest in research and development and to share their knowledge with others.

The institutional reforms implemented by Qatar have had a significant impact on the flow of knowledge and innovation in the economy. The QSTP provides a supportive environment for startups and businesses to develop and commercialize new technologies, which helps to drive economic growth and development [43]. Additionally, the protection of intellectual property rights provides an incentive for firms and individuals to invest in research and development, which promotes the creation of new knowledge and innovation.

The outputs of these institutional reforms include the creation of a pool of highly-skilled workers and the facilitation of the transfer of knowledge and innovation within the economy. Qatar has invested heavily in education and human capital development, with a focus on science, technology, engineering, and mathematics (STEM) fields [44]. This has helped to create a pool of highly skilled workers and has facilitated the transfer of knowledge and innovation within the economy.

In a study published in the journal *Sustainability*, Ref. [45] found that Qatar's efforts to promote a knowledge-based economy were successful in terms of creating a supportive environment for innovation and entrepreneurship. Additionally, a study published in the journal *Knowledge and Management of Intellectual Capital* by [45] found that the protection of intellectual property rights and the establishment of institutions such as the QSTP were key drivers of economic growth and development in Qatar.

This literature review documents the role of institutions in achieving a KBE. Several studies also reported the factors that may foster or impede Qatar's transition to a KBE. The concentration of research on KBEs and institutions in developed countries, and a limited number of developing countries, highlights a vital research gap. More importantly, no studies have thus far investigated the binding constraints faced by Qatar in building a KBE from the NIE perspective. This study aimed to fill this gap by assessing whether there are binding constraints in achieving a KBE in Qatar.

3. Methodology

Oliver Williamson [46] theorized four levels of social analysis within the NIE paradigm: level 1 is embeddedness (informal institutions, culture, religion, tradition, and norms), level 2 is the formal institutional environment (formal "rules of the game", polity, judiciary, and bureaucracy), level 3 is governance ("play of the game", primarily contract enforcement and aligning governance structure with transactions), and level 4 is resource allocation and employment. The hierarchy of the levels is such that the preceding level acts as a binding constraint on the following level. The NIE theory provides a theoretical framework that was applied to conceptualize this study. The research utilized descriptive data to answer the

research question regarding binding constraints in achieving a KBE in Qatar. The methodology of this study comprised 3 stages. Stage one considered the concept of a KBE and data from the GEM Global Report on KBE in comparable countries. This enhanced the understanding of the level of KBE development across these countries, identified possible drivers therein, and compared them with Qatar. In stage two, the drivers of a KBE in Qatar were considered through the lens of NIE (culture, institution, governance, and market). Various proxies for each construct were used to observe their evolution over time. Stage three examined the perceived challenges faced by various stakeholders within Qatar's KBE ecosystem, which were conceptualized as binding constraints according to NIE theory. The diagnostics phase was designed to reflect the culture, institution, governance, and market elements. Entrepreneurs (both incubators and incubatees) were addressed for firsthand information on the difficulties encountered during entrepreneurship endeavors in Qatar. Because entrepreneurship is a knowledge-driven venture, any constraints faced by actors within the entrepreneurship ecosystem will affect the transition to a KBE (see Figure 1).

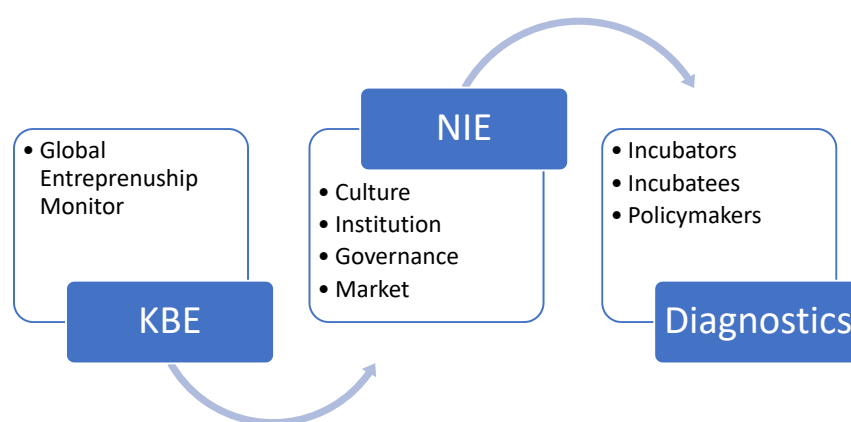


Figure 1. Research framework.

In summary, this study applied both descriptive and qualitative approaches within the NIE paradigm to achieve the research objectives.

To better understand the problems and constraints in transitioning to a KBE and achieving economic targets, the diagnostic tree presented in Figure 2 will be utilized to help policymakers mitigate these limitations and advance toward real economic development using the NIE approach.

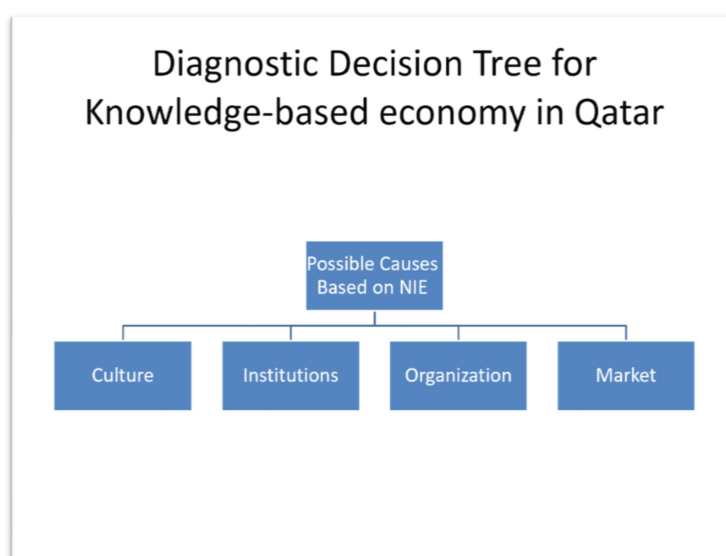


Figure 2. Diagnostic decision tree for KBE in Qatar, which is based on NIE theory [46].

The diagnostic decision tree was constructed beyond the neoclassical perspective on economics and more toward the NIE framework developed by Oliver Williamson over 25 years of research [46]. NIE aims to expand the study of economics by focusing on the social and legal norms and rules (i.e., institutions) that underlie economic activities. In other words, instead of concentrating on the effect of the invisible hand, NIE observes the visible hand's impact on the market [47]. NIE analyzes this phenomenon at four levels: institutions, organizations, markets/transactions, and culture. Hence, each element of the diagnostic decision tree is clearly defined throughout this paper.

The first stage of this research relied on data from the GEM Global Report 2020/2021, specifically Qatar's score compared with neighboring countries and leading countries. These scores were then analyzed in the Qatari context. Thirteen countries were selected based on the latest available data and represented all income classes (low, middle, and high income), as well as nearly all geographical regions. The selected countries were Brazil, Egypt, Germany, India, Luxembourg, Norway, Qatar, Saudi Arabia, South Korea, Turkey, UAE, the UK, and the USA.

4. Binding Constraints on Achieving a KBE

Major decision makers across the Gulf region have clearly stated their aim to transform their economies into "knowledge economies" [12]. Among other virtues, these transformations are expected to increase levels of knowledge and entrepreneurship in their national populations to effectively tap into foreign knowledge, adapt, and subsequently create new knowledge for their countries' own specific needs. Ref. [12]'s analysis of the Arab Knowledge Report for 2010, 2011, and 2015 revealed a host of structural problems in the educational system that "minimizes research outputs, lowers the quality of teaching, and lessens the quality use of the provided education to society". The educational system is thus identified as one considerable constraint for achieving a KBE. Other problems include low levels of funding for research, a general lack of research focus at the universities in the region (allocation of high teaching loads and minimal research time for university faculty compared with Western universities), a lack of emphasis on social-science-based research, and a lack of academic freedom [12].

The most significant institutional attribute necessary for utilizing the potential of a KBE, as defined by [48,49], is one that results in a lower level of transaction costs in the economy, increased competitive intensity in national markets, and support for national entrepreneurship [50]. This development supports the relevance of NIE as presented by [51]. The Qatari government has introduced policies to promote entrepreneurship and build a KBE over the years. The GEM report shows that Qatar performed well with regard to policies that foster entrepreneurship, as the country's ranking in entrepreneurial policy is higher than the average of all the selected countries and even higher than innovation-driven economies, such as the US, the UK, and Germany in 2021, as presented in Figure 3. However, Qatar's score was lower than the neighboring UAE and Saudi Arabia. Policies toward government procurement, business license acquisition, bureaucracy, and tax burdens have all improved in recent years in Qatar. Despite these improvements, areas such as office rent requirements, constraints on shareholding with a Qatari partner, internal market openness, and access to finance provide further opportunities for improvement through policy actions [52].

4.1. Institutions

Institutions stipulate the rules of the game, i.e., the human-devised constraints that structure human interaction. They are made up of "formal constraints (such as rules, laws, constitutions), informal constraints (such as norms of behavior, conventions, self-imposed codes of conduct), and their enforcement characteristics" [42]. In this research, these constraints were treated as the laws and regulations that govern the protection of intellectual property since this is the formal binding constraint of a KBE.

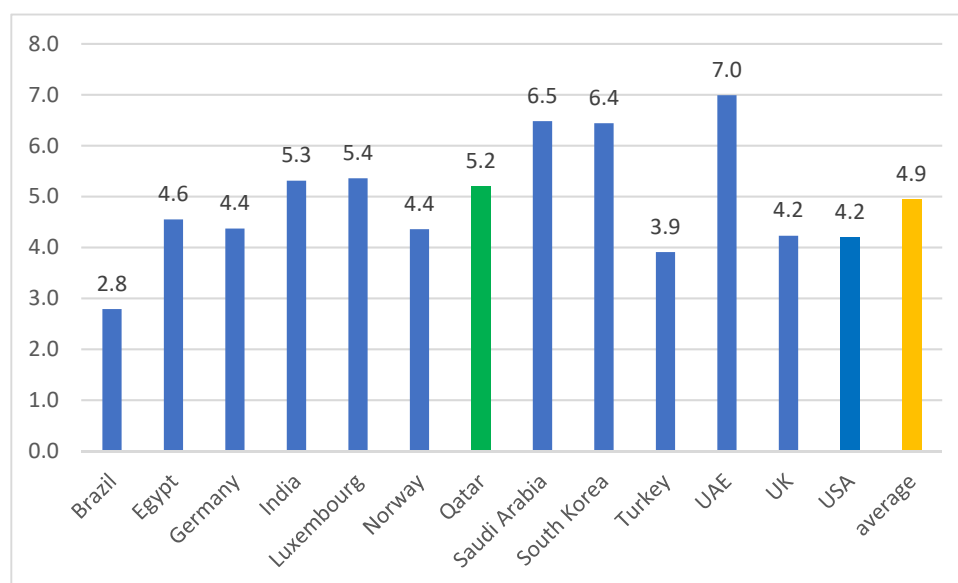


Figure 3. Government support and policies based on GEM data (2021).

Although the concept of institutional quality is currently considered the core of institutional economics, it remains difficult to define and operationalize. Previous literature in the field varies from the historical analysis of the influence of different institutions on long-term development [42,51], the macro perspective on the role of bureaucratic quality, the impact of law and property rights, and the role of economic openness or level of corruption (for more, see [53]). Ref. [50] concluded that even though considering technology is essential in explaining the productive growth of developed economies, the quality of institutions plays a vital role in economic development outcomes.

According to the World Intellectual Property Organization (WIPO), intellectual property can be defined as “creations of the mind: inventions; literary and artistic works; and symbols, names, and images used in commerce”. In addition, the WIPO classifies intellectual property into two different categories: industrial property and copyright (which covers literary works). This research focused on industrial property, as it has a more direct impact on economic growth.

Industrial property includes the following:

- Patents for inventions, which illustrate how one may create the same invention and provide monopolistic rights for twenty years from initial publication.
- Trademarks, including the logo, look, and feel of a brand, which are protected perpetually as long as the registration of such a trademark is renewed.
- Industrial designs detailing the external appearance of a product, which are usually protected for six to eight years depending on the jurisdiction granted by the designer.
- Geographical indications, which are symbolic items that indicate a specific geographical origin; for example, basmati rice for India, the kangaroo for Australia, or the oryx for Qatar [54].

Intellectual property protection (IPP) consists of a set of laws, regulations, and policies created by the government to give exclusive rights to owners of intellectual property. Depending on the type of intellectual property, the author, scientist, or designer receives different types of protection. Most scholars agree that an official system for protecting intellectual property is essential for economic development [55]. Most developed countries have separate legislation to deal with this delicate field, emphasizing the importance of protection; for example, this is outlined in the United States Constitution as follows:

Article I Section 8 | Clause 8—Patent and Copyright Clause of the Constitution. [The Congress shall have power] “To promote the progress of science and useful arts, by

securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries”.

The Leahy–Smith America Invents Act (AIA) is an additional US federal statute signed into law by President Barack Obama on 16 September 2011, representing the most significant update to the US patent system since the Patent Act of 1952.

The legal system of Qatar is composed of numerous types of legislation, at times rendering laws and regulations unclear for citizens. Due to the ambiguity of current laws and regulations, researchers tend to apply for patent protection outside Qatari jurisdiction. The current laws are as follows:

1. Law No. 7 on the Protection of Copyright and Related Rights (2002);
2. Law No. 9 on Trademarks, Trade Names, Geographical Indications, and Industrial Designs (2002);
3. Law No. 5 on Protection of Secrets of Trade (2005);
4. Law No. 6 on Protection of Layout Designs of Integrated Circuits (2005);
5. Decree-Law No. 30, issuing the Patents Law (2006);
6. Emiri Decree No. 53, establishing the Center for the Protection of Intellectual Property Rights (2009).

Law No. 53 of 2009 is currently inactive; while the aforementioned center was established under the Ministry of Justice, the protection of intellectual property is in fact a responsibility of the Ministry of Commerce and Economy. In 2014, the center was closed, and a new department was formed at the Ministry of Commerce and Economy. According to the laws listed above, “The Minister of Commerce and Economy shall issue the Executive Regulations and the necessary decisions for implementing this law”. These executive regulations were issued in 2018 but not enacted until late 2019. The extract below exemplifies the institutional lapses that must be addressed:

“On December 9, 2019, the Ministry of Commerce and Industry jointly sent staff on Secondment as the Assistant Director of Intellectual Property Protection Department. During this Secondment, we found that the IPRs application submitted to the Ministry of Justice is still not processed. In other words, people have paid the fees to get the services, but the files were never examined. In addition, we found that the Ministry of Commerce and Industry accepts Industrial Designs applications as copyrighted material which are different when looked at from examination and protection period.

To mitigate this miscarriage of justice, we developed an internal task force to work and report to applicants who applied for IPRs from 2014 until 2019. This task force reviewed all the files with three possible outcomes (a) accept and issue IPRs, (b) reject, ask missing technical data, (c) ask for payment of fees to proceed, and (d) abandon if we do not hear from the applicant within six months as per the law. By June 2020, we completed this task and provided a detailed report to the State Audit Bureau and closed this issue. At the same time, we worked on a draft law to examine and issue Industrial Designs which was issued on March 2020”.

This issue must be revisited in order to develop a new set of revised laws for IPR protection, like those in the US, to make the process easier and more user-friendly for those who wish to register and protect their intellectual property. Qatar will experience slower growth of a KBE without these important pieces of legislation. There is no need to reinvent the wheel, as the US system for patent protection can be imported and fine-tuned to the specific needs of Qatari society. In addition, by importing this system, the nation will attract leading scientists to apply to register their intellectual property in Qatar.

In a positive trend, Qatar is now adopting Electronic Patent Registration according to the Patent Cooperation Treaty (e-PCT). On this electronic platform, one can apply for international protection of intellectual property in countries signatory to the e-PCT. Researchers can choose this office to investigate patent requirements and follow up with the registration process.

Although IPR laws and regulations in Qatar have received criticism, it appears that these current issues do not significantly impact the overall legal and commercial structure, as demonstrated in Figure 4. However, Germany had a noticeably better score than its competitors, meaning that its IPR laws may significantly impact its score. These findings may prompt lead researchers to investigate Germany's current laws and regulations and implement the relevant elements in Qatar's economic agenda. It can also be observed that Saudi Arabia had a slightly higher score than Qatar, which may be attributed to their establishment of a "one-stop shop" to handle all IPR matters from registration to protection and enforcement in 2018 (Saudi Authority for Intellectual Property [56]). This independent authority is referred to as the Saudi Authority for Intellectual Property (SAIP), which is mandated to promote and develop IPR policies and strategies. One of the recommendations of this research is to adopt such an initiative to better assist the development of institutions in Qatar.

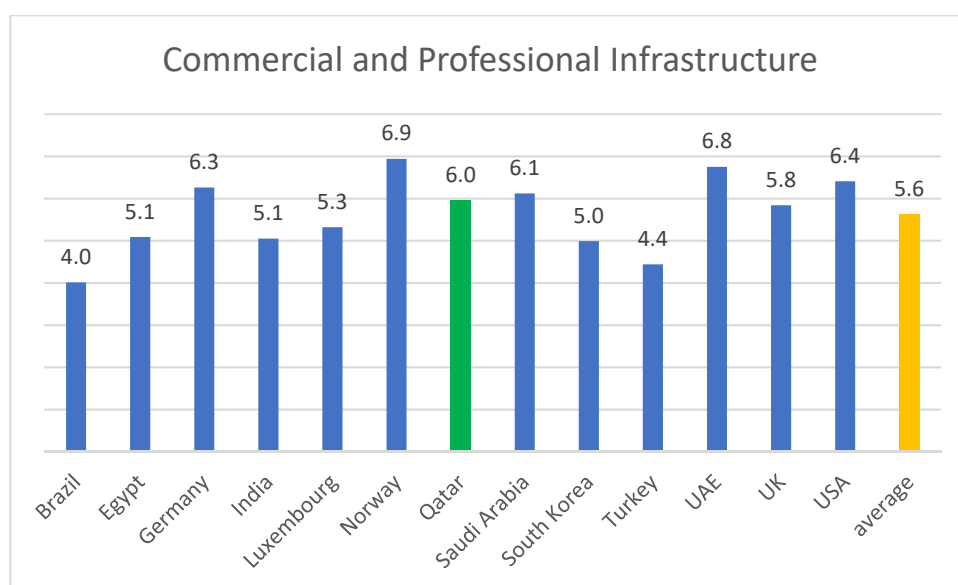


Figure 4. Commercial and professional infrastructure based on GEM data (2021).

4.2. Organizations

According to Douglas North, the definition of an organization is simple: organizations are the players who act according to the rules of the game. In greater detail, an organization is as follows:

“A group of individuals bound by some common purpose to achieve objectives. Organizations include political bodies (political parties, regulatory agencies), economic bodies (firms, trade unions), social bodies (churches, clubs), and educational bodies”.

For the purpose of this research, the investments made by Qatar in R&D were considered a proxy for building the organizational ecosystem of a KBE. In addition, this study also examined the physical infrastructure as an enabling environment for a KBE. Qatar began to prioritize R&D in 1995 when Father Amir Hamad Bin Khalifa Al-Thani (Former Amir of the State of Qatar) founded the QF. The QF has since played a vital role in national policies, changes, and the gradual market shift toward the diversification of the economy as knowledge-based. The Education City under the QF began with pre-university education and grew to partner with leading universities in the fields of arts, medicine, computing, and engineering since 2010. Hamad Bin Khalifa University (HBKU) was founded as a university under the QF; to introduce such a new organization as one of the most prominent institutional players under the QF umbrella was historical for Qatar. In addition, HBKU houses research institutes in computing, biomedical science, environmental science, and

energy. Qatar University, the College of the North Atlantic, and the Community College of Qatar have made further contributions to the nation's educational ecosystem.

According to Figure 5, R&D transfer in Qatar was high compared with the average of all the selected countries. Qatar scored 5.2 in R&D transfer, which was higher than all other countries in the sample, with the exceptions of Norway (5.7), Saudi Arabia (5.4), and the UAE (6.2). It can be argued that the Qatari government's score was high in relative terms, which is unsurprising when observing the level of investment allocated to Qatar's R&D sector. For instance, in 2008, Qatar introduced a new piece of legislation granting 2.8% of the national GDP toward R&D [57]. This provides evidence of the government's commitment to achieving the National Vision 2030 through advancements in R&D.

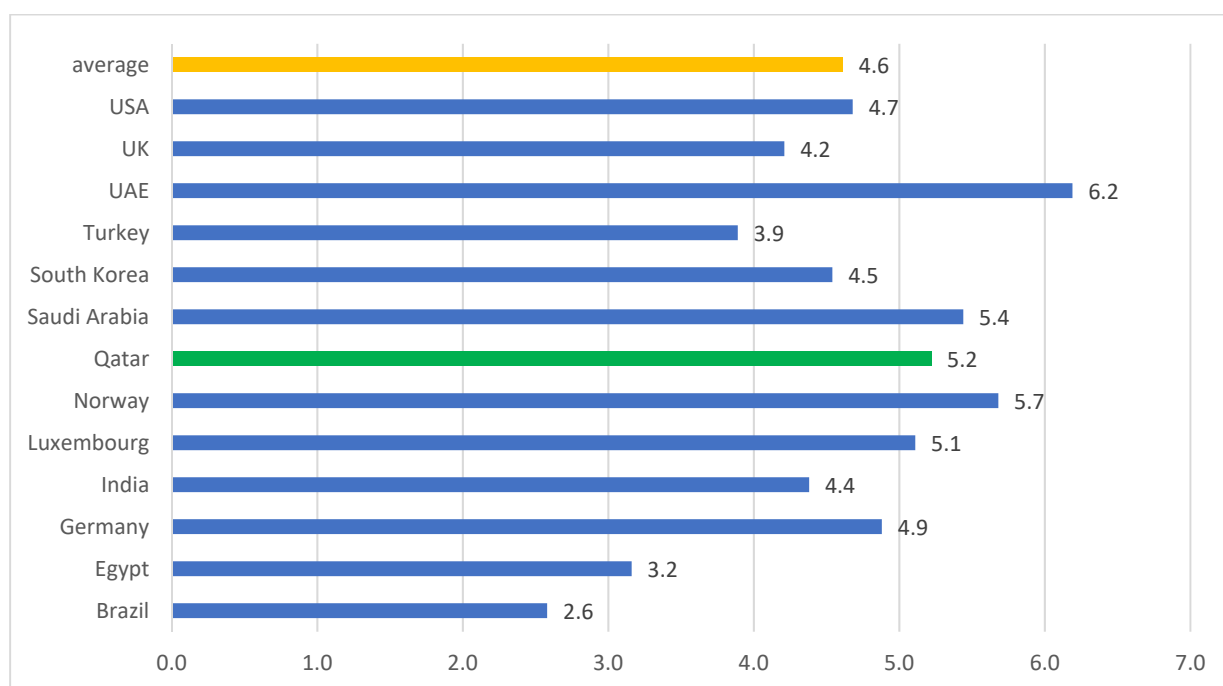


Figure 5. R&D transfer based on GEM data (2021).

From Figure 6, it can be concluded that Qatar's physical and service infrastructure was slightly above average within the sample. It performed well compared with the UK, Germany, Turkey, India, and Brazil, but scored lower than the other sample countries. The establishment of various research institutes under the QF has helped to increase the number of organizations that enable Qatar's R&D ecosystem to drive innovation.

4.3. Market

The market is known as the place where organizations, or "players", play per the rules of an institution's "game" to perform transactions. According to [58], "a transaction occurs when a good or service is transferred across a technologically separable interface". The following will examine Qatari market dynamics and whether they constrain the development of a KBE.

Qatar's economy is very dynamic, exhibiting sturdy growth over time; although the blockade of 2017 slowed down the economy, it quickly recovered and has since demonstrated resilience. Therefore, its score (5.5) remained close to the average (5.7) of comparable countries, though it was slightly lower than some others (see Figure 7). It must be noted that despite Qatar's significant economic changes, the KBE may not be the primary cause. Hydrocarbon-based industries have driven the marked growth of the economy, as mentioned in the introduction. While hydrocarbon contributions as a percentage of GDP have decreased from over 57% in 2000 to less than 43% in 2019, hydrocarbons still accounted for

nearly 90% of export revenue in 2019 [59]. Thus, there is a need to more closely examine the internal dynamics of Qatari markets, especially the diversification of the economy, which can contribute to the development of a KBE. The barriers to entry for businesses in the Qatari economy improved with several reforms. This resulted in the improvement of internal market openness, with Qatar scoring slightly higher (5.1) than the average (4.9) of all other countries in the sample (see Figure 8).

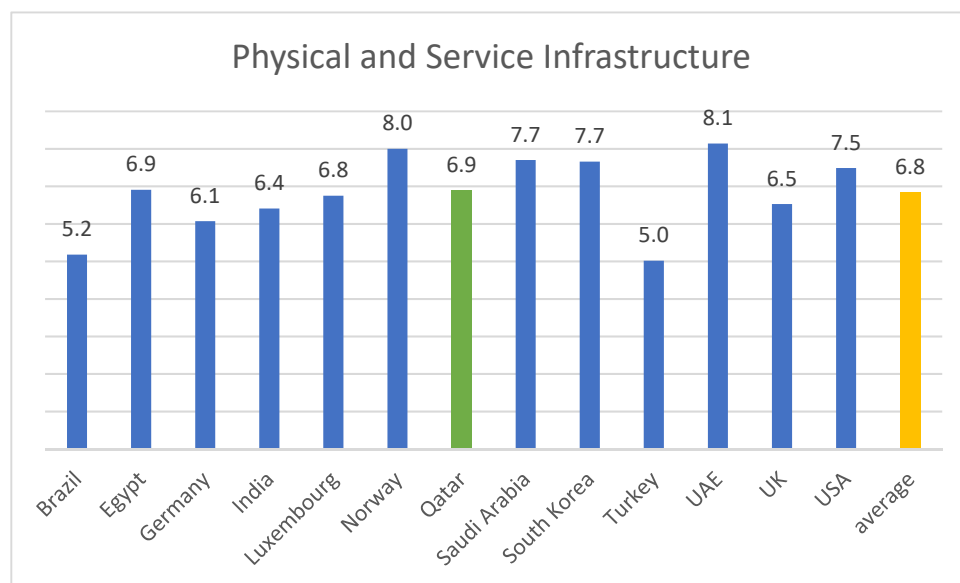


Figure 6. Physical and service infrastructure based on GEM data (2021).

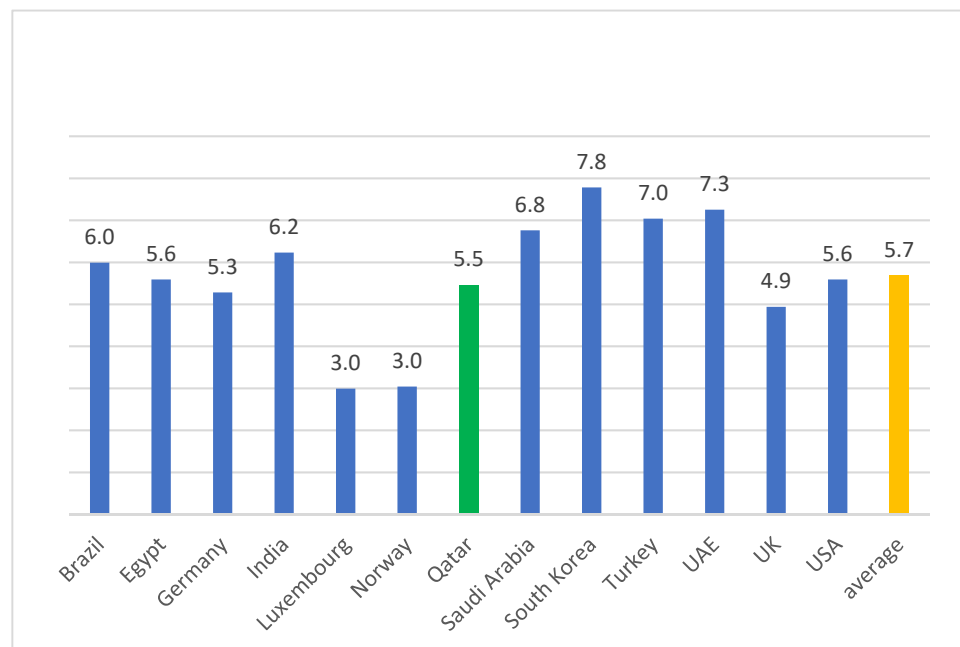


Figure 7. Internal market dynamics based on GEM data (2021).

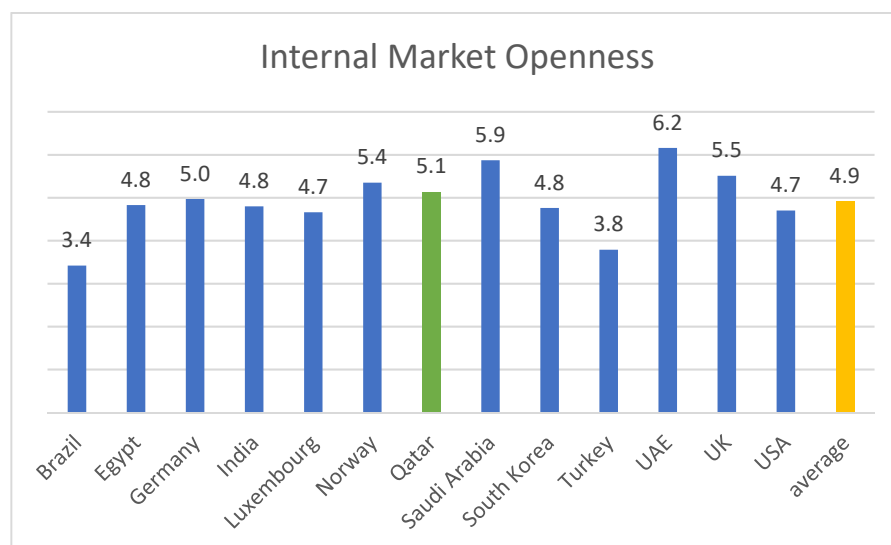


Figure 8. Internal market burdens or entry regulations based on GEM data (2021).

4.4. Culture

Culture is defined as shared values, beliefs, and expected behaviors [60,61]. Informal norms are “part of the heritage that we call culture” [51]. Ref. [42] further explained that culture comprises informal constraints, such as norms of behavior, self-imposed codes of conduct and conventions, and accompanying enforcement regimes.

Shared values are embedded and unconscious, shaping institutions of governance, such as political institutions, as well as social and technical systems and institutions; institutions reinforce society’s beliefs and values in turn [60]. This demonstrates the interdependence between culture and institution, and [62] emphasizes the feedback effect between the two. They argue that both institutions and culture co-evolve, thus generating multiple stable equilibria and reinforcing one another.

Cultural values influence institutions and motivate society’s pursuit of its vision, including entrepreneurship. For instance, a culture that values risk-taking and independent thinking may be a favorable environment for entrepreneurship, but one that reinforces uniformity, group interests, and control over the future is not likely to exemplify risk-taking or entrepreneurial activity [60,61].

According to Hofstede, culture manifests in “Patterns of thinking, feeling and acting—software of the mind” and “collective programming of the mind distinguishing the members of one group or category of people from others” [63]. As Ref. [64] argued:

“When there were differences in culture or economic and political systems, conventional theories could not explain observed effects and behaviors, particularly if interaction with the environment was required. In closed systems, protected from external forces, transferability of concepts and theories was more successful”.

This means that culture has a significant role in determining the future of a KBE in any given society. In the informal institutional environment, social norms, culture, and cognitive dimensions reduce the uncertainty of individual and group decisions [65].

Figure 9 shows that Qatar scored relatively high regarding the non-inhibitive nature of culture and norms in driving innovation. Its score (6.1) was higher than the average score (5.6) of all countries in the sample. Compared with individual countries, its score was higher than those of all other sample countries except Saudi Arabia (6.8), the UAE (7.7), and the USA (7.0). Similarly, [38] reported that the prevalent model of an entrepreneur in Qatar is the “passive entrepreneur”. In this style of entrepreneurship, the agent typically works full-time in the public sector and has their own business to earn additional money. This can be partly explained by the cultural aversion to risk-taking and fear of failure, which may cause some potential entrepreneurs to avoid starting a business or fully investing their time and

resources [38]. The findings of Hassen (2020) [38] may contradict Qatar's GEM rank in this category, but investigating the methodologies of both studies may provide deeper insight.

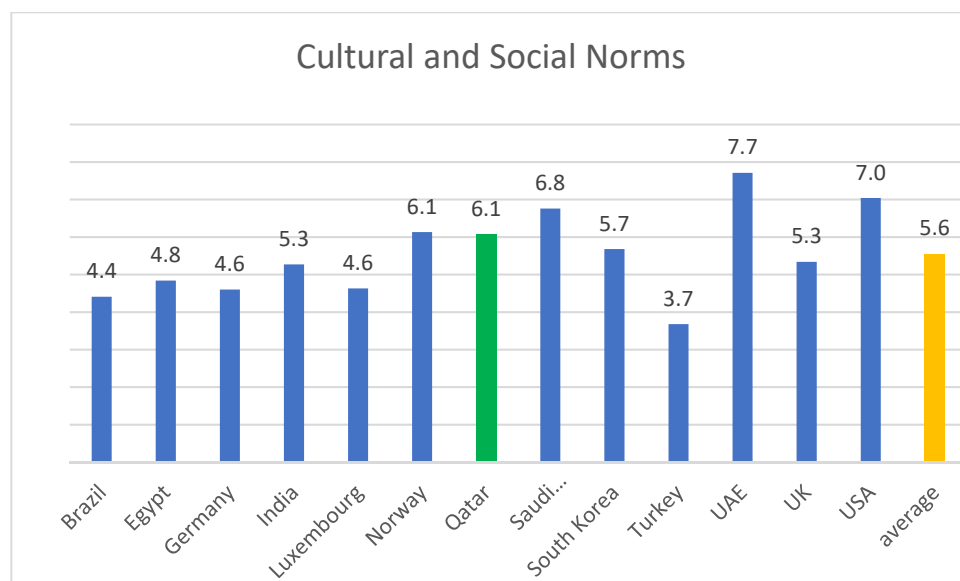


Figure 9. Cultural and social norms based on GEM data (2021).

5. Limiting Factors for Building a KBE through Entrepreneurship: The Stakeholders' Perspective

This section continues to highlight the notion that creating a stimulating environment for entrepreneurship can substantially boost most dimensions of a KBE, following the work of other scholars [32,66].

From the institutional point of view, the major factor limiting the full realization of the QBIC mandate is a shortage of staff, specifically the “lack of adequate staff”. This phenomenon may stem from a lack of understanding of the QBIC philosophy regarding the “lean startup concept” of “build, measure and learn” [51]. Ref. [67] posited that individuals from different backgrounds may interpret evidence differently, leading to unpredictable behavior in decision-making. While the QBIC pursues its mandate according to its philosophy, some economic actors view their approach as denying them needed resources. Values must be aligned through improved communication where the QBIC explains its approach to business incubation to stakeholders. Another concern is the delay in releasing funds for some incubatees for several months. Although the COVID-19 pandemic may have played a role in this hold, the concept of contract enforcement should have taken precedence. Ref. [46] noted that contract enforcement contributes significantly to institutional reputation and endurance.

Additionally, threats to the transfer of knowledge and institutional mandates were identified as germane issues that challenge the entrepreneurial ecosystem. Lack of disbursement of funds affects the operations of incubatees and may send the wrong signal of institutional inertia interfering with contract enforcement. Ref. [68] contended that from the NIE perspective, firms are viewed as government structures instead of unitary profit-maximizing entities. He stated that firms are a complex combination of legal, economic, and social constructs that rely on a diverse set of contractual arrangements coordinated by a hierarchy [68]. Competition and incentives were two areas of concern regarding the market structure of the entrepreneurial ecosystem, specifically in business incubation. Issues are faced regarding competition, particularly the pool of incubatees involved in different programs by various government entities, including the QBIC, the Qatar Science and Technology Park (QSTP), and the Ministry of Commerce and Industry. Competition should not be a limiting factor, especially if it is organized efficiently; there is a well-established link between competition and the efficiency of the market. The lack of incentives for certain

classes of startups also signals the need to incentivize based on the needs of economic agents. Incentives play a crucial role in generating activity in the market stage within the NIE framework [46]. This concurs with the GEM rankings on culture, where Qatar scored higher than average. This demonstrates that the cultural norms of Qatar do not stifle innovation, and the educational reforms and investment in research may have contributed to this success.

6. Conclusions

This research aimed to investigate the binding constraints on the development of a KBE in Qatar by applying NIE theory as a methodology. The findings demonstrated that per the GEM analysis of thirteen selected countries, Qatar scored relatively high across the different dimensions of NIE, namely, institution, governance, market, and culture. This shows that while a KBE in Qatar is developing, diversifying the economy away from hydrocarbons remains a crucial element that demands improvement in the internal market dynamic to achieve a KBE and sustainable development. Other challenges regarding the market and governance were also identified, with little concern for culture. While culture is theorized as a binding constraint across institutions, governance, and markets, these findings showed that culture is not an impediment to entrepreneurial activity in Qatar. This may be because the challenges in institutions, the market, and governance may be subject to a cultural influence that is not directly observable. This phenomenon may be investigated in future research.

Based on the findings of this study, it is recommended that policymakers undertake further institutional reforms toward improving the quality of institutions to drive the transition to a KBE, as institutional arrangement appears to be a binding constraint in achieving a KBE. It is also recommended that a “one-stop shop” is established to handle all IPR matters, including registration, protection, and enforcement. Further, the entrepreneurial ecosystem of Qatar should be thoroughly reviewed to address institutional, governance, and market issues. Policymakers may consider reviewing the various organizations that comprise the ecosystem to align their mandates properly with their operational philosophies (for example, business incubators and incubatees should understand the implications of a “lean startup”). There is a need for improved governance for organizations in fulfilling contractual agreements to increase confidence in the startup incubation system. Finally, it is recommended that an “assessment of human resource needs” is performed to ascertain whether additional programs and policies are needed to support the QBIC’s work to promote entrepreneurship in Qatar.

We wanted to conduct the linear structure model approach to understand the impact of these institutional reforms on a KBE. It demonstrates that institutional reforms play a crucial role in promoting the flow of knowledge and innovation within the economy, leading to the creation of a pool of highly skilled workers and the growth of a knowledge-based economy. Furthermore, it highlights the importance of institutions and regulations in promoting the flow of knowledge and innovation in the economy, demonstrating their significance as key drivers of economic growth and development. The absence of this approach is a limitation of our study and can be used for future research.

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