

The Decline in the Global Innovation Index of Oman's Ranking in World Intellectual Property Organization

Almutasim Hamed Hilal Alkhanjari

MBA; Department of Post-Graduate Studies
Middle East College; Muscat, Oman

Dr. Maria Teresa Matriano

Assistant Professor, Department of Post-Graduate Studies
Middle East College; Muscat, Oman

ABSTRACT

One of the most important reports that evaluate the degree of innovation in countries is the Global Innovation Index (GII). Oman's score has been exceptional from 2013, with experts anticipating it to ascend to the first 40 nations in GII; nevertheless, over the previous two years, the ranking of the country has significantly dropped to 80 in 2019 and is expected to remain to decline after being 57 in 2018. The study's objective is to determine the factors that led to the Oman decline in GII, analyze the involvement of public institutions in this drop in terms of policy change or reform, and explore the societal impact of this drop. Because of a lack of data on the subject, this exploratory, descriptive research used a combination of data collection methods, involving an interview with five specialists and a circulation of 204 survey questionnaires. To achieve uniformity and relevancy, participants were chosen based on the study's themes. This research focused on identifying the factors contributing to the sudden decline in the GII compared to prior years. Additionally, it layout a framework for key stakeholders to execute the major adjustments required to enhance performance in crucial innovation indicators. Finally, it will result in increasing professional and organizational awareness of policy instrumentation in Oman and will offer avenues for future research on this topic and governmental policies that will enhance several of the GII indicators, notwithstanding Oman's drop in ranking.

Keywords: The Global Innovation Index, ranking of Oman, GII pillars, Rentier economy, GII Indicators

INTRODUCTION

According to Oxford Business Group (2017), it mentioned that Oman has a rich and diverse background, as well as a heritage of international discovery. Since 1970, Oman has undergone solid economic growth and exceptional domestic stability. Profits from the oil and gas industry have primarily fueled economic development, which drives the economic system. However, there is risk in the direction of growth; in the short term, the economic system is not creating sufficient employment for Omanis, whereas in the long-term, oil reserves will decline, and exploitation expenses will rise against a backdrop of volatile oil prices (Wahaibi 2017).

Many countries faced economic recession because of fluctuations in oil prices since they depend on an unsustainable, rentier economy. The instability of oil prices has a significant effect on people's social and economic well-being. On the other hand, other countries depend directly on innovation, research, and development to create a competitive economy. This economy is knowledge-based, and its susceptibility to global economic crises is minimal. In these countries, innovation is the financial fuel of the future (Sira et al. 2020). Since 2011, the Omani government has altered the country's growth trajectory through economic diversification, small and medium-sized businesses, and foreign investments. The Omanisation program was the most effective policy for creating job prospects, and its outcomes were promising in the short term (Mansour n.d.). However, the most long-term and sustainable alternative to Oman's sustainability issue is the drives to promote transformational and diverse progress by solid national science, technology, and innovation system and strategy. Developing an effective national innovation system will contribute to a more diversified, prosperous, and sustainable economy with higher-quality and more appealing employment (UNCTAD 2014).

Hence, Oman started to introduce an integrated and effective national science and technology system in keeping pace with the requirements of sustainable development. This system aimed to achieve and expand sustainable socio-economic well-being to ensure subsequent generations' future, which is reflected by increasing productivity, providing sustainable employment opportunities, and diversification (TRC 2019). In this context, the role of a knowledge-based economy relies on research and innovation to ensure a bright future for Oman today and for future generations and sustain Omani culture through successive generations.

Al Said and Al-Harthy (2017) stated that Oman's vision is to be one of the top 40 innovation leaders in 2020 and the top 20 innovation leaders in 2040 by participation in the Global Innovation Index. GII is an indicator established by Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO) that brings together approximately 80 indicators documenting the components of innovation (Malahim 2018, Al-Ghamdi 2014). Oman began participating in the Global Innovation Index in 2013. Oman was improving its ranking year after year. According to the Innovation Index report (2017 and 2018), Oman ranked 62 and 57, respectively, indicating that Oman was on target to accomplish its vision of becoming one of the index's top 40 leading countries in GII. However, the ranking of Oman suddenly declined to 80 in 2019, followed by another decline to 84 in the 2020 report. GII reports indicate that Oman has adequate institutional capabilities and that the country's key concern is that its economy is not adequately diverse.

AIM AND OBJECTIVES OF THE STUDY

Oman's inclusion in the Global Innovation Index is one of the aspects that some experts in this area are aware of. Furthermore, there are few local reports on Oman's status in GII. Therefore, the research aims to understand the GII point's calculation to link it with the factors that led to the sudden decline and identify any complex issue behind it. The influence of that report on the policies of Omani institutions will be analyzed to ascertain if those institutions take action. The overall objectives of this research are:

- To evaluate the possible factors that contribute to Oman's decline in GII.
- To investigate whether if there are any complex issues behind that decline.

- To analyze the consequences of this decline on policies implemented by Omani institutions linked to the indicators and the action taken in response to the sudden decline.
- To identify and evaluate the impact of this decline on public perception and their confidence level on innovation performance.
- To offer policy recommendations that target both the practitioners in charge of reporting indicators and the stakeholders who carry on the innovation practices.

RESEARCH PROBLEM

The unexpected decline in Oman's ranking in the GII has various causes and ramifications for Oman and its reputation. The problems addressed in this study are the factors contributing to the two-year decline in the index and the consequences of this decline on policies adopted by Oman institutions. Also, the actions are taken to enhance Oman's efficiency and policy modification and the effect of the decrease on public perception and confidence in innovation performance. Finally, based on the findings, the report presents policy recommendations to stakeholders and practitioners.

RESEARCH QUESTIONS

The research seeks to address the following main questions:

- What are the factors that contribute to Oman's decline in GII?
- Are there any complex issues behind the decline in GII?
- What are the consequences of this decline on policies adopted by Omani institutions that connect to the GII, and what is the action taken to reset the policies to improve Oman's performance?
- Is there any impact on public perception and confidence level due to this decline? If so, what is the impact?
- What recommendations can the researcher offer for stakeholders and practitioners in reporting Oman indicators in the GII?

LITERATURE REVIEW

Overview of National Innovation System (NIS)

Nowadays, economic development is more dependent on a system's capacity to generate advances than ever since technological advancement trends have accelerated and, consequently, its findings are becoming more critical. In certain economies, the idea of a national innovation system explains economic policy output and guides growth down a creative direction as the primary one (Kasych and Vochozka 2017). Over many years, the definition of National Innovation Systems has gained theoretical and functional cohesiveness. Initially experiencing broad acceptance by many countries, specifically developed countries, and later being the subject of intensified focus to resolve some of the more fundamental challenges confronting those countries. Economic experts and policymakers consider NIS as a basis of comprehension of the origins and main drivers of economic growth and an influential conceptual model critical of producing policies (Feinson n.d.). According to Sohn et al. (2016), NIS influences world competitiveness since innovation can boost growth. The authors proposed that innovative performance is followed by creative behavior. The innovation variables are general innovation infrastructure, cluster-specific circumstances that promote innovation, including automotive requirements, and company participation in technology and

skilled staff. Moreover, the innovation system quality, the innovation ecosystem, and the interconnections' intensity comprise the NIS.

Furthermore, NIS is a mechanism characterized as the relationship of SMEs, academics, and major corporations. These connections can include technological, economic, regulatory, cultural, and economic dimensions, contributing to technological advancements and innovation in general. Eggink (2012) referred to innovative success as determined by the members or actors, their behaviors and interactions, and the socio-economic context in which these actors or members work collectively.

- Freeman: the NIS refers to a network of the organizations of operations and interactions introduce, import, alter, and disseminate emerging technology
- Lundvall: NIS is defined as the components and relations that interact in the creation, dissemination, and utilizing latest and economically valuable information and are either located or embedded within the boundaries of a nation-state.
- Nelson: NIS describes as a collection of organizations whose interactions decide national firms' innovative results.
- Patel and Pavitt: NIS has come to be used to refer to domestic organizations, motivation mechanisms, and qualifications that decide the pace and control of technological education (or the size and structure of change-generating operations) in a state
- Metcalfe: NIS defines as the collection of differentiated organizations that, locally and globally, contribute to the production and dissemination of innovative technologies, as well as the structure through which governments formulate and enact policies to impact the innovation process. It is a network of organizations that collaborate to develop, preserve, and transfer the information, talents, and objects that characterize emerging technologies (Haghi et al. 2011).

As mentioned earlier, Sohn et al. (2016) study can conclude that the national innovation system field solely focused on GII and national innovation capability. The study was generally restricted to a limited comparison of national innovation systems, emphasizing the input and output aspects of GII. Eggink (2012), on the other hand, employed a qualitative research technique and provided a complete review of the national innovation system concept, measures of innovation, and inputs and outputs of innovation. The study is supported by several prior investigations that provided the researcher with a depth of information regarding NIS.

Another significant aspect of NIS is the level of NIS. For example, Seild et al. (2013) highlighted that thirty predictors significantly impact the national innovation system. These predictors represent a different feature of the innovation mechanism, and it has three categories

- The micro-level reflects on the company's internal resources and the connections that influence one or several companies and explores their knowledge relations with other companies and non-market entities in the innovation system to find unsatisfying value chain links. This research is most applicable to target companies and typically performed by consultancies; however, it may often help policymakers recognize whether its results are sufficiently linked to broader concerns.
- The meso-level investigates information ties between companies with similar characteristics employing three key grouping strategies sectorial, Regional, and functional. Providers, education and innovation institutions, industries, logistics, specialized government departments, and banking are all part of a sector. Regional

group analysis emphasizes the domestic factors underlying intensely competitive geographic conglomerations with knowledge-intensive practices. The functional group employs statistical methods to classify clusters of companies that possess such characteristics, for example, a particular innovation approach or a particular type of product.

- The macro-level employs two methods. Macro-clustering: The economy is a system of connected sectorial groups through macro-clustering. According to functional review, functional review of the flow of information: The economy is a system of organizations with information connections mapped within and among them.

National Innovation System – Oman and Global Perspectives

From the global perspective, by including inventive foreign actors, NIS's are becoming increasingly open; however, they remain constrained by national and institutional boundaries, with diverse characteristics regarding the various functions of foreign-based research groups. At the same time, the globalization of research and development (R&D) highlights the NIS' regional and sectorial roots: in a national economy where foreign enterprises actively participate in the NIS, regional innovation systems (RIS), and sectorial innovation systems (SIS) emerge. The conflict between global R&D and NIS does not mean that institutional frameworks and national specifics of technological innovation converge, so the NIS's are not weakened or disappeared. However, it will strengthen the regional and sectorial specialization in technological innovation of a productive system in the long term. Multinational companies implement innovation capabilities and competency at a worldwide level through their R&D globalization. They contribute to some extent to technological innovation in the host country. Foreign enterprises and their research centers based in the nations concerned cannot become the subject of NISs anymore. These centers help muddle national lines and limitations between private and public and build international knowledge and technology broadcasting channels. These channels open up the NISs more and more. This aperture is considered by three configurations (Casadella 2017).

The first step in opening up NIS's is integrating multinational corporations into the local innovation system. As it would benefit national growth if there were no limits on international businesses' capacity to work in the country, the government must ensure that multinational corporations build R&D centers and connect with domestic innovators. In the second step, NIS's are no longer self-sufficient since they continuously communicate with global innovation networks and worldwide research systems. NIS's have become much more accessible as they use a hybrid method to connect with other national or regional innovation systems. Multinational firms' connecting nodes are typically developed or managed by multinational firms' R&D activities. Eventually, the emergence of a knowledge-based economy and ICT growth has too quickly shifted in dominating technologies and the global innovation market. The integration of international innovators and links to global innovation networks needs NIS's to respond and adapt to changing environments to provide favorable circumstances for innovation. If its environment determines an open system, NIS's are highly open to adjusting to global variations in the innovation environment (Carvalho et al. 2015).

From the Omani perspective, the endeavoring for innovation and creativity became a top target for many cultures worldwide. This practice is no longer limited to nations, individuals, or organizations but has evolved into a widely recognized and ever-expanding community

(Nicolaidis 2014). Oman has aimed to determine an ambitious national innovation system that meets successful social and economic progress expectations. Moreover, the system is in line with international developments as evidenced by real targets such as developing a competitive environment for innovation, creating employment for youths, committing to diversification in income sources, and committing to boosting the National Innovation Strategy five-year plans, programs, and projects (TRC 2019). On the one hand, UNCTAD (2014) reported that since innovation is the key driver of the economy, such an economy must be under a national system for innovation, which we do not see in Oman.

On the other hand, the country's weak performance in the Global Innovation Index suggests that policy change processes must be accelerated shortly. To promote policymaking, research, and development, as well as indicators, are necessary. Oman needs to build an efficient innovation system, including improved innovation infrastructure and environment. It also needs to commit to boosting the National Innovation Strategy five-year plans, programs, and projects. (WIPO 2013).

Despite significant public reporting on Oman's NIS, not much research has been published that addresses in detail the realities of the NIS other than the TRC reports. The TRC report addresses more thoroughly the national innovation strategy, its aims, and ambitions. The WIPO report offered an assessment of the Sultanate's strengths and weaknesses. Also, the National Competitiveness Office aims to improve Oman's ranking in global indicators listed in Vision2040 through monitoring and analysis, validation of the report's sources, discussing them with the relevant authorities, and creating partnerships to improve the Sultanate's performance in these reports.

National Innovation Strategy

According to TRC (2019), the Sultanate, represented by the Research Council, agreed that it was necessary to establish a national innovation strategy in the same way that many other countries around the world had done before. Moreover, these countries worked to equip themselves with national innovation systems to encourage the knowledge economy in general and the innovative economy in particular. This change focused on countries' economic, social, cultural, technological, political, and security growth, implementing strategies for national innovation systems. Moreover, this has demonstrated to the world that innovation systems can create, expand, and control the economic system in a managed and successful direction to attain sustainable development and a prestigious position among the world's countries. However, their acceptance is the modern state's essential component and the backbone of its existence to enable and encourage. Therefore, one of the Sultanate's policy initiatives for sustainability progress is developing the National Innovation Strategy.

The report on the national innovation strategy highlighted the process used to prepare the strategy, the Sultanate's present position in the GII, and the strategy's vision and objectives. The workshop on the national innovation strategy and a specialized workshop on economic diversification and trends in empowering the Sultanate in the GII and solving obstacles are some TRC initiatives to enable the innovation illustrated in the report. One of the most notable workshops is Empowering the Sultanate's Trends in the Global Innovation Index. The specialists analyzed the Global Innovation Index report, clarified how to invest national strengths, and solve existing difficulties in pursuit of the national innovation system's strategic

objectives. The complete vision and accurate metrics on global innovation indicators connected to national policies and laws and how to utilize them economically were also clarified, as were the challenges associated with data collecting and timely updating. Furthermore, increasing the Sultanate's innovation outputs in the GII guarantee that international metrics represent the Sultanate's actual reality. Nevertheless, the participation of decision-makers and Omani society in discussing the national and international significance of the GII report, as well as the relationship between national trends toward building an economy based on innovation, research, and development, and its relationship to the Global Competitiveness Index and the indicators of the Sustainable Development Goals.

UNCTAD (2014) report included an extensive overview and assessment of Sultanate Science, Technology, and Innovation performers, systems, interactions, organizations, abilities, legislation, and general environment, that will include meetings with all Science, Technology, and Innovation stakeholders, a diagnosis, and possible alternatives developed and presented to Science, Technology, and Innovation stakeholders. The findings, diagnosis, and regulation alternatives development processes are recorded in the report, which included an implementation strategy for the Government Of Oman to adopt. The report suggested that the strategy relies on integrating and enabling all national policies in an integrated and coherent manner, with four central pillars:

- Institutional and societal integration focuses on achieving successful communication and cooperation among relevant authorities to accomplish lateral and vertical harmony among policymakers and decision-makers on the one hand and productive, supportive, and benefactor institutions of innovation on the other.
 - Human capital is concerned explicitly with empowering people at all levels and in all fields by designing programs and policies for public education, higher education, research and development, and the labor market.
 - Intellectual property and knowledge marketing aim to improve the knowledge-based economy by implementing an efficient framework for securing intellectual property rights and stimulating innovative ideas, products, and services.
 - Economic diversification through innovation to develop employment, expand technology, strengthen small and medium enterprises, and attract foreign direct investment in all sectors of the Omani economy.

Countries Innovation Competitiveness

Over the last two decades, competitiveness has emerged as a significant subject in economic and market research. In the 1980s, company insight was the subject of research on innovation and competitiveness. As a result, the emphasis shifted to exploring the position of broader societies, as the community's innovation success is critical. The discovery and study of players participating in the execution of innovation are vital to progress, necessitating examination at several levels. In addition to the company's innovation capability, the national and regional innovation capacity is significant. Successful businesses have a detailed understanding of innovations (continuous and progressive innovations at the same time), which offers them a strategic edge. Innovation links to creating new value, resulting in a critical strategic advantage for an institution's, regions, or even the local economy's competitiveness. However, there is a concern: how can innovation be measured in competitiveness growth (Balaton and Varga

2017). Countries are constantly under pressure to innovate because of globalization. R&D, tech, architecture, manufacturing, learning, promotion, and administration play progressively essential roles in producing products and services.

Furthermore, global markets and multinational supply chains are dominated by the creation of international norms. Subsequently, a country's competitiveness determines by its innovativeness and its orientation toward technology and knowledge. Innovation is the fundamental principle in tackling societal issues such as pollution, health, crime, and unemployment (WIPO 2015). Considerate the relation surrounding competitiveness and innovation is becoming a significant focus of academic research in recent years (EIB 2016 and Atkinson 2013). Competitiveness progresses when there is a desirable market for innovation. It is a collection of processes, policies, and variables that dictate the degree of economic productivity (Martin et al., 2015). Therefore, improving a country's national innovative capacity can result in increased competitiveness. As both an economic and political unit, any country's capability to generate and commercialize a flow of innovative technology across the long term describe as innovative national capacity. In the last century, innovation has proven to be a global productivity force. An international game today promotes economic development and increases people's standard of life. Various players can promote the development of the economy and its competitiveness, including academic and academic organizations, multinational and transnational companies, and SMEs, fuel innovation (WEF 2014).

There were many reasons for the competitiveness of innovation. First, both developed and growing economies need innovation to drive economic growth and competitiveness. Second, many policymakers are emphasizing innovation as a critical component of their development strategies. Third, the innovation concept has widened—it is no longer limited to R&D labs and written research articles. Innovation should be broader and horizontal, encompassing both social and business model developments and technological ones (GII 2016). Fourth, the definition of competitiveness has multiple dimensions and can explore through various perspectives. For example, Aiginger et al. (2013) examined price competitiveness (for example, prices, efficiency), performance competitiveness (such as innovation, exports, education), and result from competitiveness (example, life expectancy, Gross domestic product) in a different perspective. Therefore, it can examine at different levels: macro, meso, and micro.

Global Competitiveness Index (GCI)

According to Petrarca and Terzi (2017), the World Economic Forum illustrated the CGI developed to evaluate countries' capacity to provide their people with high well-being standards. It tests the collection of organizations, policies, and variables that create sustained economic growth at present and in the medium to long term. In addition, CGI aims to offer an overview of national competitiveness, a trend that cannot be caught without a doubt with a single predictor (Necadova 2020). WEF analysts believe that the increase in productivity enables countries to use resources more productive and is the critical catalyst for growth. Since the productivity level often defines the rates of return produced by economic investment, which are the essential factors of the growing level of the economy (Schwab 2015).

Petryle (2016) illustrated the 12 competitions of GCI, and he mentioned that it divided into three groups:

- For economies, essential criteria are the most significant at a factor-driven level of growth, the first phase in development, typical in Low Countries income. Competitiveness relies on low-cost labor and natural resources. These considerations include efficient organizations, vital infrastructure, healthy macro-economic circumstances, healthcare, and education level.
- Investment-driven growth, the second phase is popular in middle-income countries, is the most critical of countries with an increase in performance. Competitiveness is dependent on infrastructure, FDI, and advanced technology. Variables include high training commodities and labor market efficiency, established financial markets, technical preparation, and market size.
- For economies in the phase of innovation-driven growth is the third phase of development typical in elevated countries, innovation and complexity are the most significant. Competitiveness is dependent on R&D and a well-educated workforce. Company complexity and creativity are two of these variables.

Global Innovation Index

According to Samir et al. (2017), The report critically evaluated innovation characteristics in Arab countries. It also went into great length on the GII and the aspects of innovation in the Arab countries. Furthermore, the performance of Arab countries in the Global Innovation Index is analyzed by reviewing the GII pillars. The report mentioned that there are several initiatives available for evaluating the components of the national innovation system. For instance, STIP Review by UNCTAD, GII by WIPO, and the Organization for Economic Cooperation and Development have created models that countries can foster national innovation. However, these systems vary in the primary driver of the innovation mechanism is dependent on either the productive industries or the government. Between the above programs and indexes, the GII stands out from the others in recognition of how it represents the essence of the components of innovative intangible properties, as WIPO is a member (WIPO 2013). Because of this aspect, the index is a pioneering guide for innovative intellectual asset-related innovation for academics, corporate leaders, and stakeholders.

The Global Innovation Index (GII), which is published annually, has become a significant resource in innovation indices and a valuable measuring instrument for governments, business leaders, and other stakeholders interested in understanding the status of innovation around the world. The Index is a report jointly published by Coronel University, the European Institute of Business Administration (INSEAD), and the World Intellectual Property Organization (WIPO). Innovation is a crucial engine of economic development and competitiveness. The index aims to increase the measurement and understanding of innovation. It acknowledges the need for mature and developing economies to apply a strong viewpoint on innovation. As such, it provides metrics that go beyond conventional indices of innovation, such as the extent of research and growth. As a result, the Global Innovation Index has become a powerful benchmark instrument that promotes dialogue among the public and private sectors and allows governments, industry leaders, and other stakeholders to measure success continuously over the past few years (Farhan 2017; AL-Maliki and Abdul-Aziz 2016; Cui et al. 2020). The GII currently used the information envelopment approach to evaluate national innovative capability rates, including specific input and output steps. However, the possible structural

relations between the inputs and outputs were overlooked. According to several reports, the degree of national innovation capability is more complicated than the GII model proposed, and structural relations between the elements of national innovation capability may exist (TRC 2020).

It can be concluded that Cui et al. (2020) acknowledged that the global Innovation Index report is a systematic review and appraisal of a country's innovation performance in several areas. However, the country evolves and develops quickly because of societal trends and technological growth, making data gathering for GII report a challenging task. Each year, there are several missed values in the survey, which affects the score. AL-Maliki study (2016) is viewed as good; however, it is limited to the Gulf countries, and the researchers' analysis was not highly critical. It should be emphasized that the researchers did not collect primary data and did not utilize any of the research instruments (questionnaires or interviews). The report of Samir et al. (2017) was more comprehensive and had many drawings; however, one of the report's weaknesses was that the critical analysis was brief, even though it contained all seven pillars of the GII. Farhan (2017) provided research that discussed the GII for Gulf countries, although it focused more on economic analysis.

GII Input and Output

According to the GII framework, innovation has multiple facets, uses, or skills encountered with various input factors and output results. The GII has two broad categories: inputs and outputs, which assess the ability of innovation and the outcomes. It is necessary to calculate the critical metrics of a country's innovation system to examine it. These metrics have two groups: input and output indicators. The input indicators are R&D personnel, research & development, education, R&D expenses, science publications, technology exchange, and patents. The performance metrics are scientific publications, technology trade, and patents. R&D spending is one of the essential input metrics for assessing and evaluating the achievements of research and technology in various nations and regions. Second, R&D measures innovation capability and competitiveness. Besides that, human capital plays an integral part in technological and innovative research endeavors. Output indices, on the other hand, are divided into various groups. The percentage of hi-tech exports continues as a practical means of appraisal in overall export statistics. The learning experience is a primary benefit mentioned by engineers and scientists, and it is represented by participation in R&D practices. To measure a nation's accumulated expertise, the stock of hi-tech knowledge must be listed. Patents and patent applications are the most often used metrics in this respect (Usman and Liu 2015).

Conceptual Framework

Five major fields track input innovation, which determines environmental impacts conducive to innovation, and two specific areas track output innovation. The GII then divides the vast fields into two sub-indices: Input and Output. The Innovation Efficiency Ratio, the proportion of Innovation Input and Output sub-indices, is then estimated. Eventually, the average value of the sub-indices measures the GII. The GII and its sub-indices are numerical indicators ranging from zero to 100; the higher the ranking, the more evolved the innovation ecosystem (Reis et al. 2021). Almaliki and Abdulaziz (2016) mentioned that benchmarks to measure innovation and policy success in this area is needed to promote the global innovation debate, policy recommendations, and best practices. GII fosters an environment in which creativity considerations, such as the following, are constantly evaluated:

1. 128 country-specific data descriptions, including strengths and weaknesses, based on 81 sub-indicators
2. 81 sub-indicators for measures derived from more than 30 international public and private reports, including 58 accurate results, 19 mixed indicators, five survey questions, and a straightforward and repeatable measurement process with a confidence interval of up to 90% for each ranking indicator.

Evaluating innovation results and impacts becomes challenging; therefore, the countries strongly focus on assessing the environment and infrastructure for innovation and evaluating relevant outcomes. While the outcome takes the form of various rankings, the GII is much more involved with refining the journey" to properly quantify and recognize innovation, as well as finding tailored policies, best practices, and other factors that promote innovation. There is a utilization of rich indicators to track results over time and compare trends against economies in the same area or income group at the index, sub-index, or actual raw data of specific indicators level. The GII framework is constantly revised to illustrate the increased accessibility of statistics and our interpretation of innovation, relying on the experience of the GII's Knowledge Partners and its influential Advisory Board (WIPO 2016). According to the WIPO (2020), it illustrated that GII contributes to creating an ecosystem in which it evaluates the innovation factors constantly. It publishes comprehensive innovation indicators for 131 economies per year. All economies covered 93.5 percent of the global population and 97.4 percent of global GDP. The GII consist of three indices: the total GII, the Innovation Input Sub-Index, and the Innovation Output Sub-Index.

- The Innovation Input Sub-Index consists of five pillars that represent components of the country's economy that allow for innovative activities: Institutions, Human capital and research, Infrastructure, Market sophistication, and Business sophistication are all essential. It aids in enabling innovation practices in the countries under review. Each of the five pillars has several metrics and sub-indicators, totaling 54 enabling indicators within the five pillars of innovation inputs.
- The Innovation Output Sub-Index contains guidance on outputs produced by economies' innovative activities. There are two types of output: Outputs of knowledge and technology; and Outputs of innovation. Every pillar is divided into three sub-pillars, and each sub-pillar has individual measurements equal to 80 in 2020. They consider as the outcomes of the countries under consideration's innovation practices. In addition, each pillar has its collection of indicators and sub-indicators (26 sub-indicators).
- Total GII: the average of the inputs and outputs of innovation, where the inputs and outputs reflect parallel values in the entire index even though the inputs' sub-indicators are more significant than the outputs.

The innovation Efficiency Ratio is the ratio of output sub-index to input sub-index. It demonstrates how much innovation output a given country receives in exchange for its inputs.

RESEARCH METHODOLOGY

Research Design

According to Grey (2014), the research design is the overall approach for linking research problems with relevant and attainable scientific investigations. Boru (2018) described research design as three types: exploratory, descriptive, and explanatory. His designation is based on the study area's intent since each architecture has a particular ultimate objective. For example, the

descriptive research design describes a circumstance, person, or occurrence or demonstrates how they are connected and generally happen. On the other hand, descriptive research cannot clarify why an incident occurred and are best suited for a comparatively recent or undiscovered research field. As a result, where there is an abundance of descriptive data, alternative study designs, including explanatory or exploratory approaches, are recommended (Loab et al. 2017). Exploratory research is carried out with little knowledge about a phenomenon or a topic that has not been well identified. The research's key objective is to investigate and explain the fall of Oman's ranking in GII. To do this, it draws statistical, quantitative findings and attempts to provide explanations for the existing association with qualitative research. As a result, the relevant research design is explanatory-descriptive, responding to the how and why aspects of the fundamental research problem, questions, and objectives.

Data Collection Process

Collecting the data is described as the process of gathering, acquiring, and analyzing information on factors of relevance in a defined structured procedure that allows one to answer inquiries, formulate questions, and assess outputs (Kabir 2016). Collecting data approaches start with defining the aim of the research and choosing the type of data to be collected. The data collection includes primary data using quantitative method (survey questionnaire instrument) and qualitative method (interview); and the secondary data using books, websites, and journals. Next, the researcher will plan to collect information using the approaches above by identifying the questionnaire's sample size, conducting the interviews, and collecting published reports for review.

Primary and Secondary Data

There are several techniques for gathering data for research studies, which comprise primary and secondary data. Primary data are information collected from direct personal experience (Kabir 2016). Researchers will acquire the information directly from primary sources using interviews and survey questionnaires. This study will perform interviews to collect data, ask questions related to the research problem, and distribute survey questionnaires for primary data collection.

Secondary data refers to information that has been acquired and collected by someone other than the users for a reason unrelated to the present study's challenges. It is a commonly accessible kind of data gathered from various resources such as censuses, publications, organization's internal documents, studies, books, research papers, and web pages (Ajayi 2017). Due to the difficulty of accessing the college library during the current period of the Corona pandemic, all of the resources that the researcher will use will be electronic. Therefore, the researcher will take advantage of MEC E-library (Masader and ProQuest E-book Central) and Academia and Research Gate.

Research Instruments

Several qualitative and quantitative research instruments are available; the instruments used in this study are consistent with the study's objectives. The quantitative tool - survey questionnaire and qualitative tool - interview- are two commonly employed research tools (Trigueros et al. 2017 and Canals 2017).

Interview

Individual, face-to-face, and group interviews are all are types of interviewing, however owing to the spread of the Coronavirus, the discussion was facilitated via MS Teams (through video call). As planned, the researcher conducted online interviews with five knowledgeable specialists about Oman's decline in the GII ranking. The interview was straightforward and organized. This online interview has benefits over other data gathering techniques on aspects of cost and time saving because there is no need to drive and meet the interviewee face-to-face, and the requirement to plan appointment timings is easy and quick. Furthermore, communication is quicker. The interviewees provided detailed responses to the following research questions:

- What are the factors that contributed to Oman's decline in GII?
- Are there any complex issues behind the decline in GII?
- What are the consequences of this decline on policies adopted by Omani institutions that connect to the GII, and what is the action taken to reset the policies to improve Oman's performance?
- Is there any impact on public perception and confidence level due to this decline? If so, what is the impact?

Questionnaire

The study's sample size is 204 respondents, based on a total population of 430. The survey was created with Google Forms and sent using WhatsApp and e-mails. It consists of 17 questions. The questionnaire includes questions regarding demographic profiles. In addition, there are Yes/No questions, multiple-choice questions, a Likert scale, and one open-ended question. The respondents were chosen based on judgmental technique, and they were from the public, private, and academic sectors, including those who attended the Oman National Innovation Strategy workshop. Also, public sector employees are assigned to the National Competitiveness office (NCO). The questions are related to the research's objectives one and four. The first question is about the demographic profile of the respondents.

Furthermore, the remaining questions covered the GII's seven pillars and the level of confidence in Oman's performance. Finally, the questionnaire concludes with a series of open-ended questions concerning the factors contributing to the decline. The benefits of using a survey questionnaire are that this requires no money to float to respondents and would bring significant participation. Besides, with fast and flexible answers, participants' responses are saved immediately, and analysis and findings are generated automatically.

Sample Size

The sample size is a subset of a larger population. Moreover, it shares the same characteristics as the overall population. Therefore, the analysis and results drawn from the sample data are applied to the entire population (Oribhabor and Anyanwu 2019). According to the databases of participants in the National Strategy for Innovation and the National Strategy for Research and Education 2040 (NSRE 2040) workshops, and the number of employees assigned to work in the National Competitiveness Office (NCO) to analyze the Sultanate's indicators in the Global Innovation Index, the population will be 430 people of both genders (Academic, government employees, and private sector employees). To calculate the sample size, the study's confidence level is 95 percent, and the actual value is within 5% plus or minus of the surveyed value. The

margin of error is 5%, and the population proportion is 50%. So, the sample size equals 204 respondents.

Sampling Technique

There are two types of sampling techniques: probability and non-probability sampling. The probability sampling technique like simple random, systematic, stratified, cluster, and multistage begin with a complete sampling frame of all eligible individuals from which the researcher selected the sample. Non- probability sampling techniques like volunteer, convenient, judgmental (purposive), quota, snowball, and matched do not begin with full sample size; therefore, some people have no opportunity to be selected (Taherdoost 2016 and Sanjoy 2018). The researcher utilized a judgmental sampling technique. The researcher selected the sample members based on their knowledge and judgment. Moreover, the obtained result is likely to be very reliable with less error. The researcher chose this sampling technique because there are only a small number of persons in a population who possess the characteristics that the researcher seeks from the target audience. Furthermore, the researcher believes that other techniques will take time and that they are confident in their ability to choose a sample for research purposes. These approach target participants are educated and knowledgeable about the topic, and any other sampling technique cannot select them.

DATA ANALYSIS

Presentation and Analysis of Qualitative Data

The interview presented a significant summary of Oman's engagement in GII. The respondents exhibited a deep understanding of the GII subject and gained much more about the subject. The interview questions are summarized into four questions, as mentioned earlier, to give precise answers to four stated research questions. The questions were open-ended, and the results are described herein.

First Question: What are the factors that contributed to Oman's decline in GII?

The factors contributing to the decline of Oman's ranking in the GII are addressed in the table below.

Table 1. Responses of first interview question.

Interviewee 1	The steep decline in oil prices, which directly impacted the Omani economy and the spread of the Coronavirus, resulted in a reduction in Oman's ranking in several indicators.
Interviewee 2	• The consequence of the economic crisis and its interaction with oil prices. • Covid-19 effects. • R & D spending. • The spending of companies, particularly international ones, on R & D within the Sultanate of Oman. • The relevant authorities did not provide data on many sub-indicators. • There are many indicators whose data has not been updated, implying that many institutions do not place significance on delivering accurate data on time or do not update this data in international institutions. • The Sultanate's performance has suffered due to the state's sluggish implementation of procedures and laws.
Interviewee 3	Intense competition among more than 130 countries to rise to the top of the ranking by implementing faster and bolder policies to boost their innovation system, while the Sultanate's implementation is still lagging. The inaccuracy of relevant data and the failure to update their databases in international organizations regularly.
Interviewee 4	The spread of the Coronavirus is the primary factor of the decrease. Furthermore, the Sultanate's reliance on a rentier economy primarily relies on oil and gas and is not built on a knowledge base and has a significant effect. This economy is readily affected by any economic crisis. The Sultanate's budget cuts impacted several sectors, including education, research, and innovation. There are more than 80 indicators, and statistics for all of them are not available, and government institutions do not keep these data up-to-date.
Interviewee 5	• Several policies and practices must be preserved or reformatted, and the process of reforming and maintaining is still lengthy (Decision making is slow). • There must be accessibility to technology outputs. • Appreciate government funding on innovation but R & D expenditure was a bit low. • The availability of data and the data gathering method may be incorrect, or the data may need to be updated.

The above table shows the interviewee's responses to questioning one, which is about the factors contributing to the decline of Oman's ranking in the GII. It should be emphasized that various reasons contributed to the sudden decline in Oman's level, including the fluctuation of oil prices. Oman is one of the countries whose economy depends on oil, the spread of Coronavirus, and the availability of necessary data. Moreover, it should also be noted that it was agreed that data availability is a crucial factor in this decline and government financial support for innovation. Also, legislation and government policies must keep pace with the world's rapid development since many countries worldwide are rushing to enhance their systems and policies to improve their ranking. Unfortunately, Oman's performance in terms of improving policy and implementing reforms is behind.

Second Question: Are there any complex issues behind the decline in GII?

According to one of the interviewees, she stated that "The most complex issue is the availability of data, which is a significant factor, as well as the lack of updates. Furthermore, the slowness

of procedures, the sluggish implementation of associated decisions and policies, and the low expenditure on R & D are among the complex issues. In addition, there is a lack of awareness (weak promotion and marketing of the Sultanate) among some private sector institutions about the Sultanate's procedures and policies in this field, which affects the data provided by these companies through perception-related data collected by international institutions through surveys".

From other interviewees, it was revealed that "there seem to be two complicated issues to take into account: availability of database for government institution and government policies." Oman policies must be implemented as soon as possible to prevent any inefficiencies from harming Oman's performance. For example, bankruptcy legislation did not result in the Sultanate's advancement in this indication. As Oman ranked 88 in GII, and the concern expanded to most of Oman's laws, policies, and procedures which are not permitted, along with enforcing and motivating laws so that internal and overseas investors will invest in the country with more confidence, boosting Oman economic competence." Also, one of the interviewees reported that many government institutions are still unaware of the relevance of international reporting in establishing Oman's reputation. This is evident in these institutions' inability to provide data relevant to these international organizations and their lack of updating. As a result, when it comes to providing data for these global indexes, it is either partial or out of date, and these organizations rely on what is available. If the data is not updated, Oman's ranking in most international reports will fall, as it has in the Global Innovation Index during the last two years. "There is a gap in attaining integration between the institutions associated to innovation and the lack of accurate data on the various activities of Oman that reflect the actual performance of the NIS of the Sultanate", one of the participants said. Another interviewee contends the need to constantly monitor authorities and institutions to offer accurate and valid data and review all data in databases maintained by affiliated international organizations that reflect Oman's performance. When interacting with government organizations, there were issues of employees being unfamiliar with the necessary data by NCSI (National Center for Statistics and Information). Numerous institutions delayed submitting the required information, and some employees provided outdated data.

Third Question: What are the consequences of this decline on policies adopted by Omani institutions that connect to the GII, and what is the action taken to reset the policies to improve Oman's performance?

Two of the participants mentioned that the Sultanate's ranking decrease affects the Sultanate's position on the world map of innovation, which affects the Sultanate's competitiveness and negatively affects the attraction of foreign direct investment, which affects the national economy. In addition, the decline in innovation indicators, particularly those connected to research and development, impacts policies aimed at fostering a knowledge-based economy. However, in terms of improvements, the TRC has already taken significant initiatives.

- Including the implementation of scientific and other specialized areas of law.
- Workshops on the relevance of a national strategy for innovation, which discussed the GII.
- Specialized workshops and the approval of the NSRE2040, which included a discussion of GII.
- A team of employees was sent to the NCO to evaluate the Sultanate's ranking in GII.

Numerous research and innovation policies are modified as the TRC has been one of the participants in providing data since 2013, following a UNCTAD visit. The TRC received a complete document outlining all of the strengths and weaknesses of the Oman NIS.

Other participants stated a vast plan to stimulate research in the Sultanate, which expect to take some time to reflect positively on the Sultanate's ranking in the index. The current decrease will help to motivate government agencies to make more efforts to implement and work on this plan. Also, one of the participants said that the policy outcomes were the consequence of specialists in various institutions attempting to alter their policies, and the influence of the TRC may have been most prominent in modifying these policies and the outcomes of these amendments.

The following are a summary of the actions taken by some government institution:

1. Approval of the NCO (NCSI) as a government authority in following up on international indicators to avoid duplication of effort and minimize cost in human and financial resources, which will improve the Sultanate's place in global reports, as well as in contributing to the formulation of informed and evidence-based national policies.
2. Adopting a unified methodology for monitoring the performance and efficiency of various state institutions by using standardized performance indicators linked to five-year plans in alignment with the Oman 2040 National Vision and the NIS 2040, both of which use international report indicators.
3. Obliging the relevant institutions to provide valid and reliable data to the Center promptly to demonstrate the actual reality of the Sultanate's position in international reports and to improve its position in international competitiveness and innovation reports.

Fourth Question: Is there any impact on public perception and confidence level due to this decline? If so, what is the impact?

All five interviewees agreed that these reports have an impact, both internally and externally. Additionally, it affected the society since the Sultanate is going through one of the problematic transitional phases. With the spread of the Coronavirus, society has been more conscious of these reports and their evaluations. If the results are negative, they will negatively influence the community; the impact will be positive if they are positive. As a result, society's confidence in the government's performance is dependent on these international reports. One of the participants noted the influence link to the outcomes of these reports. If it is negative, society will complain.

Furthermore, if the results are positive, the community will be optimistic. Also, another interviewee mentioned that the public must be involved to overcome the obstacles that the Sultanate faces in such reports because the community is one of the primary pillars that encourage complete development. Nevertheless, on the other hand, if the results are negative or positive, the public will be affected. Therefore, it is preferable to involve them in creating national initiatives and awareness initiatives, from which the community can be a promoter and marketer of the Sultanate internally and externally, helping to raise some of the sub-indicators in the report.

Presentation and Analysis of Quantitative Data

The purpose of this questionnaire is to identify the factors that contributed to Oman's sudden drop in GII ranking, to illustrate the effect of that drop on public perception and confidence level in the performance of the Sultanate of Oman, and to determine the extent of the government policies initiative in increasing the indicators in the GII. The researcher used Google Form to design the questionnaire, then distributed it to 204 respondents. This questionnaire had 197 responses from both genders and achieved a 96.6 percent response rate. The questionnaire has 17 demographic profile questions, multiple-choice, Likert scale, and open-ended questions.

1. What is your gender?

Table 2. Gender Distribution

	Frequency		Percentage
Male	114	0.579	57.9%
Female	83	0.421	42.1%
Total	197		100%

The above table illustrates the gender distribution of the respondents. According to the table, most of the respondents (114 in total) were male, representing 57.9 percent of the total respondents, as indicated in figure 5.1. In comparison, 84 women have participated in the survey, which is equivalent to 43 percent of the total number of respondents. As can be observed, the number of males outnumbers the number of females as the majority who attended both workshops are male (around 296). Furthermore, since there are more males in the study's population, and thus the number of their responses appears to be higher.

2. What is your level of education?

Table 3. Level of Education of the Respondents

Educational level	Frequency		Percentage
Diploma	1	0.01	0.51%
Bachelor's degree	68	0.35	34.52%
Master's degree	71	0.36	36.04%
PhD degree	57	0.29	28.93%
Total	197		100%

The above table shows the level of education of each respondent. As clearly illustrated, the minority of respondents have diploma certificates representing a percentage of 0.51 from total responses. On the other hand, most respondents have a master's degree (71 respondents), equivalent to 36%. Furthermore, 68 respondents, or 34.5 % of the respondents, have bachelor's degrees, and the respondents who have Ph.D. degrees represent 28.9% of the total respondents. Thus, it is apparent that the educational level of the respondents varies, and it is clear that the respondents have high educational levels since this researcher linked the study sample to those who attended the national innovation strategy and the NSRE 2040 workshops. Furthermore, the majority of respondents are academics, researchers, and others engaged in research and innovation.

3. What is the profession's sector?

Table 4. Profession's Sector

	Frequency		Percentage
Private sector	18	0.09	9.1%
Government sector	76	0.39	38.6%
Academic	101	0.51	51.3%
Retired	2	0.01	1.0%
Total	197		100%

The above table represents the respondents' professional sector. Academics account for the majority of respondents (101 in total), accounted for 51.3 percent. On the other hand, 18 respondents (9.1% of the sample size) work with the private sector. The remaining participants are from the government sector (76 respondents) and two retired respondents. As previously stated, the number of academics is the highest in this study. The reason for this is that academics and researchers have a stronger connection to research and innovation. Furthermore, the majority of respondents were from the public sector, colleges, and universities, which explains why most respondents in our poll came from these two sectors. Among the participants in the National Strategy for Innovation workshop are the 70 experts and specialists Omani representing many government institutions, private, academic, and civil and who contributed to developing a national strategy for innovation since May 2015 (TRC 2019).

4. Have you attended the workshop on the National Innovation Strategy or the NSRE 2040?

Table 5. The number of National Innovation Strategy or NSRE 2040 workshops attendances

	Frequency		Percentage
Yes	188	0.954	95.4%
No	9	0.0456	4.6%
Total	197		100%

The table above indicates the number of people who attended the National Innovation Strategy or NSRE 2040 workshops. As evident, the workshops attendees are represented by blue color, and 188 participants attended one of the workshops or both. Furthermore, they account for 95.4 percent of all responses. In contrast, 4.6 percent of those surveyed did not attend the workshops. The researcher selected these two workshops as they explored the empowerment of the Sultanate's indicators in the GII, how to invest national strengths, and how to handle existing challenges in pursuit of the NIS's strategic objectives. The workshops aim to provide a comprehensive vision and accurate performance measures about global innovation indicators related to national policies and legislation and how to employ them economically. Moreover, to address the barriers confronting data collection and timely updating and maximize the Sultanate's innovation outputs in the innovation index to ensure that international cooperation is maintained (TRC 2019). It was concluded that the researcher chose a sample from a database registered with specialists in TRC, and those who said no were experts in the National Competitiveness Office.

5. Have you ever heard of the GII released annually?

Table 6. The number of respondents who heard about GII

	Frequency		Percentage
Yes	196	0.995	99.5%
No	1	0.005	0.5%
Total	197		100%

The table indicates how many people heard about GII. As can be shown, the vast majority of respondents had heard of the GII (196 respondents). They accounted for 99.5 percent of all responses, with one respondent having never heard of GII. As earlier mentioned, the respondents had either attended one of the two workshops or worked in the NCO. As a result, participant knowledge about the GII was obtained through the two workshops or access to these reports, especially the researchers and academics interested in innovation. In addition, it is worth noting that the national workshop organized by the Research Council in cooperation with the World Intellectual Property Organization (WIPO) and Cornell University of America discussed the mechanisms of enabling the Sultanate's indicators in the Global Innovation Index, how to invest in national strengths, and address current challenges in pursuit of the strategic objectives of the national innovation system (TRC 2019). Therefore, it was inferred that the questionnaire respondents are familiar with GII, as TRC highlighted the challenges confronting the Sultanate in the report, the Sultanate's ranking, and the proposed action plan in both workshops. Furthermore, an overview of the GII report was given to all participants at the beginning of the workshop.

6. Did you know that Oman's ranking in this index has declined dramatically over the last two years?

Table 7. The number of respondents who know about the decline of Oman's ranking in the last two years

	Frequency		Percentage
Yes	187	0.949	94.9%
No	10	0.051	5.1 %
Total	197		100%

The above table illustrates the number of respondents aware of Oman's decline in ranking during the previous two years. As indicated, almost 95% of those respondents know that Oman's GII ranking has dropped in the last two years. Only 10 of the 197 people who participated in the survey were unaware of the significant decrease in Oman's ranking in the GII, accounting for 5.1 percent of the total responses. As stated previously, the two workshops held in 2019 covered the GII; thus, respondents' understanding of the drop in 2019 was discussed at the workshops, and several respondents' lack of awareness of the decline in 2020 is due to their lack of ongoing checking of this report. According to TRC (2019), The TRC Secretary-General stated in a welcoming speech to the attendees that the national innovation plan is progressing toward its objective of the Sultanate being among the top 20 innovation leaders in 2040. Moreover, since the national innovation strategy relies on the GII, the report offers realistic and holistic measurements of the success of NIS throughout the world as a "working tool" for policymakers. The workshop highlighted the Sultanate's challenges, which resulted in the Sultanate's drop in 2019. It infers that it was discussed in workshops about the

GII and the decline of Oman's ranking. Those who replied no most likely did not notice the 2020 report on the Sultanate's indicators.

7. In your opinion, does this decline have an impact on the public?

Table 8. The impact of the decline in the public

	Frequency		Percentage
Yes	193	0.980	98.0%
No	4	0.020	2.0%
Total	197		100%

The table above indicates the percentage of respondents who believe the decline impacts the public; and those who say there is no impact. As shown, 193 respondents feel that Oman's ranking in the GII has impacted the public, representing 98 percent of all replies. On the other side, 4 of 197 respondents feel that the decline has no impact on the public. Thus, according to the responses, the majority of respondents feel there is an impact on society. Moreover, what happened in the National Innovation Strategy workshop involved decision-makers and individuals from the Omani society to participate and introduce the importance of the GII report nationally and internationally. Additionally, there is a correlation of developments towards building an economy led by innovation and R&D and its relationship to GCI and sustainable development Indicators (TRC 2019). Consider the engagement of the TRC for various segments of society for them to be partners in data collection, and they must be aware of the challenges experienced by professionals. These indicators, it may be concluded, are linked to public perception of society. The society also plays a part in data collecting for these indicators through questionnaires distributed to society to collect information for inclusion in national reports within GII. Distributing questionnaires is one of the methods through which WIPO obtains data in addition to international organizations and universities. Thus, it is evident how vital society's understanding of the relevance of this statistic is and society's ability to assist government institutions in raising the Sultanate's rank in these indicators.

8. What is your confidence level in the innovation performance of the Omani institutions?

Table 9. confidence level on the innovation performance of the Omani institutions

	Frequency		Percentage
High	96	0.49	48.7%
Average	75	0.38	38.1%
Low	26	0.13	13.2%
Total	197		100%

The table demonstrates the level of public confidence in Omani institutions' innovation performance. As can be seen, the proportion of participants (96 respondents) had a high level of confidence in the Omani institutions' innovation performance, contributing to 48.7 percent of the total responses. On the other hand, while 38.1 percent had average confidence in the Omani institutions' innovation performance, 13.2 percent had low confidence, and both represented 75 and 26 respondents, respectively. Following the launch of the Oman 2040 vision, which is concerned with three main axes, namely human and society, development and economy, and governance, and institutional performance, it can be concluded that the community's confidence increased initially. However, the corona pandemic and the reduction

of government support on some basics caused society to pause and be concerned about the country's future. However, according to international reports, the society is highly optimistic about the Sultanate's performance, which has improved substantially (Oman 2040 n.d.; TRC 2020). His Majesty the Sultan proclaimed the support for research and innovation in all areas of human and productive life to assist the growth of our country and enhance its prestige at all levels; society's confidence in government institutions' innovative performance increased slightly.

9. In your opinion, what are the factors that mainly affect the Human Capital and Research pillar?

Table 10. The factors that mainly affect the Human Capital and Research pillar

	Frequency	Percentage
Spending on education and the student	15	7.60%
Enroll in higher education	45	22.80%
The percentage of the number of international students in institutions of higher education	27	13.70%
Number of registered researchers	67	34%
Total spending on research and development	66	33.50%
Other	0	0%

The table illustrates the responses of the factors that most affect the Human Capital and Research pillar. It is notable that the majority of respondents, 34 percent and 33.5 percent, respectively, selected the number of registered researchers and total spending on research and development. The minority, on the other hand, chose to spend on education and student (15 respondents). They accounted for 7.6 percent of all respondents. This pillar is regarded as one of the most significant for Oman, as it ranks higher in this pillar than the other pillars. Although the ranking increased in 2019 to 35 worldwide from 39 in 2018, its level in this pillar has fallen to 43. This pillar has 12 sub-indicators linked to three indicators. Notably, the education indicator fell in 2020 to 24 worldwide, after rising to 10 in 2019. Furthermore, tertiary education falls to 12 in 2020, dropping from 4 in the previous two years internationally. Finally, R&D climbed to 80 in 2020, and the ranking in 2019 was the same as in 2018 (82 globally). Spending on education is one of the factors that caused the decline, as it fell considerably in 2020 to 42 after the Sultanate occupied top ranking in 2019. Some sub-indicators increased but were not addressed in the questionnaire, including government funding for pupils, pupil-teacher ratio, and tertiary inbound mobility (WIPO 2018, 2019, 2020).

Furthermore, many sub-indicators increased, like graduates in science and engineering (ranking one globally) and QS universities ranking. However, there is one sub-indicator concerning which no information was provided throughout the two years, and that is PISA scales in reading, math, and sciences. Many Arab countries top the rankings in terms of the number of graduates in science and engineering. Oman ranked first in the world, Tunisia ranked; third, Morocco ranked fourth, and Algeria ranked fifteenth. As a result, the issue is not a shortage of engineers and scientists in Arab countries, but rather a strong performance of the main engine, which is collaboration in research and production (AL-Maliki and Abdul-Aziz 2016). The components of this pillar are simple to measure and evaluate; however, many Arab countries have missing data on several sub-indicators. This is reflected in the findings for Arab countries, where several middle-income countries (such as Tunisia, Algeria, Egypt, and

Morocco) outperform higher-income ones. However, considering the countries' rankings in terms of education spending as a proportion of GDP, the results of Jordan, Lebanon, and the Sultanate of Oman on the education index are lower than predicted (Samir et al. 2017). It can be stated that education spending and school life expectancy are the most impactful factors on the pillar. Furthermore, missing data in the PISA scale in reading is seen as one of the causes contributing to the drop.

10. In your opinion, what are the factors that mainly affect the Institutional pillar?

Table 11. The factors that mainly affect the Institutional pillar

	Frequency	Percentage
Efficient government performance	61	31%
Political and operational stability	29	14.7%
Ease of starting a business	52	26.4%
The rule of law	39	19.8%
Organizational quality	45	22.8%
Other	0	0%

The table illustrates the responses of the factors that have an enormous effect on the Institutional pillar. It is worth noting that 31 percent of respondents (61 in total) feel that efficient government performance is the most important factor influencing this pillar. In comparison, 29 respondents (14.7 percent) chose political and operational stability. The pillar's score fell from 64 in 2018 to 69 and 70 in 2019 and 2020, respectively. This pillar includes seven sub-indicators connected to three indicators. Political and operational stability had declined from 27 in 2018 to 35 in 2019 and 38 in 2020. Furthermore, government efficiency had dropped from 57 in 2018 and 2019 to 59 in 2020. In 2019, most sub-indicators in this pillar had decreased, including organizational quality, ease of resolving insolvency, and ease of starting a business.

On the other hand, Oman maintained its ranking in 2020, and the ranking in the sub-indicators increased slightly. The rule of law is the only sub-indicator that increased in the last two years from 48 in 2018 to 45 and 44 in 2019 and 2020, respectively. One sub-indicator provides no information throughout the two years, and that is the cost of redundancy dismissal and salary weeks (WIPO 2018, 2019, 2020; The World bank 2020). Individual surveys primarily determine this pillar. Several Arab countries scored higher than the world average (Jordan, Tunisia, and Morocco) or close to it (UAE and Oman). In contrast, all other Arab countries do much lower than the rest of the countries. This pillar assesses the whole institutional environment rather than innovation. Due to the region's condition and political instability, the ranking was reduced in several Arab countries to indicate political stability and operations. Many countries also fail to provide many sub-indicators data, contributing to this decrease (Samir et al. 2017). Therefore, it can be concluded that political and operational stability and organizational quality are the essential factors affecting the pillar. Furthermore, there is no data on the cost of redundancy dismissal, which would positively affect the ranking.

11. In your opinion, what are the factors that mainly affect the Infrastructure pillar?**Table 12. The factors that mainly affect the Infrastructure pillar.**

	Frequency	Percentage
E-government services via the Internet	61	31%
Environmental performance	46	23.4%
Logistics performance	65	33%
The use of ICT	53	26.9%
Other	0	0%

The table shows the factors that most affect the Infrastructure pillar, with 33 percent (65 respondents) and 31 percent (61 respondents), respectively. It is apparent that logistical performance and E-government services via the internet have the majority of replies. At the same time, a minority of respondents consider environmental performance as the most critical factor influencing the pillar. This pillar scored 48 points in 2019 and 56 in 2020. This pillar has three indicators that are further subdivided into ten sub-indicators. The three indices fell precipitously in 2019 and then slightly in 2020. Oman ranked 50 in the world in terms of ICT use in 2018, and it dropped to 52 in 2019 and 57 in 2020. ICT access sub-indicators in the ICTs indicator increased, whereas online government services and E-participation remained constant. Although the Sultanate ranked 14 in public infrastructure in 2018, it declined to 24th and 29th in 2019 and 2020, respectively, although this is insignificant. The two sub-indicators of general infrastructure increased logistics performance and electricity output while gross capital formation decreased.

Furthermore, in 2019, electricity outputs and logistics performance increased for more than two ranks, while in 2020, electricity outputs climbed to 23, and logistics performance remained constant. Thus, the environmental performance has fluctuated slightly. Additionally, it dropped from 93 in 2018 to 94 in 2019 and will rise to 91 in 2020 (WIPO 2018, 2019, 2020; The World bank 2020). Most Arab countries have good infrastructure, with some differences, including energy (GDP per unit of energy used). International comparisons show a significant difference in the consumption of energy used to produce added value, with some high-income countries achieving greater consumption efficiency. However, other studies have indicated that energy usage in Arab countries is double that of the world average. Arab oil-producing countries such as Iraq, Oman, Saudi Arabia, Kuwait, and Bahrain have the highest levels of energy waste. Another example is the Environmental Performance, which analyzes the most pressing environmental concerns, and several Arab countries have seen a performance improvement. However, while high-income countries (oil-producing countries such as the Gulf countries) rated low in areas where innovation is critical to attaining sustainable development (Samir et al. 2017; Al-Maliki and Abdul-Aziz 2016) and It is reasonable to conclude that, while the Sultanate's ranking decreased slightly, the most significant decline was in ICT and energy usage. Therefore, they consider as the most critical factors affecting the pillar.

12. In your opinion, what are the factors that mainly affect the Market Sophistication pillar?

Table 13. The factors that mainly affect the Market Sophistication pillar.

	Frequency	Percentage
Ease of obtaining credit	32	16.2%
The size of the local market	61	31%
Intense competition in the local markets	46	23.4%
The market value of companies	52	26.4%
Growth in microfinance loans	34	17.3%
Other	0	0%

The above table represents the factors that mainly affect the Market Sophistication pillar. It showed that 61 respondents believe the size of the local market has the most significant effect on the pillar, represented 31% of the total responses. Fifty-two participants determine the company's market value. Fewer respondents believe that the ease of obtaining credit is the most critical factor affecting market sophistication. The ranking of the pillar decreased from 72 in 2018 to 78 in 2019, and then it dropped dramatically to 104. This pillar consists of nine sub-indicators. Ease to obtain credit is one of the sub-indicators that dropped in 2020 to 118. In this sub-indicator, Oman is seen as one of the laggards. Looking at the results, it was seen that it was ranked 106 in 2018 and has since dropped to 110 in 2019. The size of the local market or domestic market scale also declined from 60 in 2018 to 62 in 2019. Many other sub-indicators were dropped, including domestic credit to the private sector and applied tariff rate. The intensity of local competition increased from 105 in 2018 to 76 in the last two years, and in 2019 the data microfinance loans are not available (WIPO 2018, 2019, 2020; The World bank 2020). According to the report, the Gulf countries are below the worldwide average. Most Gulf countries, even high-income countries, rank low or extremely low in terms of credit access. In comparison to other countries, the amount of domestic credit to the private sector is considered high. This difference might be attributed to the concentration of bank credit on significant businesses and non-performing credit. This is a shortcoming in terms of microfinance and a lack of effort to support new SMEs. The Sultanate of Oman, Kuwait, and Qatar are considered the most credit-vulnerable Gulf countries (Farhan 2017). Therefore, it is possible to conclude that the unavailability of data on gross microfinance loans is the primary cause of Oman's drop in the GII ranking. Furthermore, the decline in the ease of getting credit and the applied tariff rate in 2020 caused the Sultanate to fall more than 20 places in the pillar and is seen as one of the primary factors of pillar decline.

13. In your opinion, what are the factors that mainly affect the Business Sophistication pillar?

Table 14. The factors that mainly affect the Business Sophistication pillar

	Frequency	Percentage
Research competence in private companies	45	22.8%
High tech imports	35	17.8%
Revenue from intellectual property	33	16.8%
The number of patents	45	22.8%
Research cooperation between the academic and industrial sectors	42	21.3%
The contribution of the private sector to spending on scientific research and development	33	16.8%
Other	0	0%

The accompanying table depicts the responses of the factors that have the most significant effect on the business sophistication pillar. When asked which factors have the most impact on the pillar, 45 respondents feel that research competitiveness in private companies and the number of patents are the key factors, accounting for 22.8 percent of all replies. On the other hand, many respondents identified intellectual property revenue and the private sector's contribution to research and development as the key factors having the most significant impact on the pillar, accounting for 33% of the total. This pillar has significantly improved the rankings. Oman was ranked 110 in 2018, and it moved up to three ranks in 2019. It climbed to 95th ranking in 2020. The pillar has 15 sub-indicators. The sub-indicator of research competence in private companies (Research talents) declined. In 2018, the Sultanate was ranked 65th globally; however, in 2019, the Sultanate dropped to 79th, and in 2020, the Sultanate fell to 86th. Many sub-indicators have declined, such as ICT services imports and knowledge-intensive employment. In contrast, a few have grown in ranking, such as FDI net inflows and research cooperation between the academic and industrial sectors. In addition, several sub-indicators decreased in 2019 and 2020, including the state of cluster development, joint venture strategic alliances deal, and the number of patents. Furthermore, there are three sub-indicators for which Oman has no data: firms offering formal training, female employment, and intellectual property payments (WIPO 2018, 2019, 2020; The World bank 2020). Except for the United Arab Emirates and Lebanon, most Arab countries rank substantially lower than the worldwide average and the most popular destinations in the world. Most countries also have low rates in most pillar aspects, particularly in a research collaboration between academics and industry. The major challenge that Arab countries have in activating the main engine of innovation is the inability of Arab companies to absorb technology and the relationship between research and institutions (Samir et al. 2017). According to Al-Maliki and Abdul-Aziz (2016), Many Arab countries are experiencing issues registering patents, for instance, Oman, Qatar, and Kuwait, as evidenced by the sub-indicator of this pillar and the collaboration between the academic and industrial sectors in research. Therefore, it can be concluded that the drop was caused by the unavailability of data in two indicators. Furthermore, joint venture strategic alliances and the number of patents are the most critical factors affecting the pillar.

14. In your opinion, what are the factors that mainly affect the Knowledge and Technology output pillar?

Table 15. The factors that mainly affect the Knowledge and Technology output pillar

	Frequency	Percentage
The proportion of high technology exports out of the total exports	35	15.3
Receipts of intellectual property fees from the total trade	52	22.7
ISO certificates	23	10.0
Number of startups	29	12.7
The growth rate of GDP per person	38	16.6
Number of scientific publications	52	22.7
Total	229	100

When asked which factors impact the knowledge and technology pillar, 26.4 percent or 52 of the total respondents feel that the number of scientific publications and receipt of intellectual property fees from the overall trade are the most significant factors. Many respondents (29 respondents) said that the number of startups (29 respondents) and 35 respondents believed that the proportion of high technology exports out of overall exports was the most crucial factor affecting the pillar. Only 23 respondents believe ISO certification is the factor that mainly affects the knowledge and technology output pillar. This pillar consists of 14 sub-indicators. In this pillar, the Sultanate has fallen to the bottom of the international rankings. As a result, the ranking has dropped from 97 in 2018 to 112 and 124 in the last two years, respectively. Several of the sub-indices have decreased over the previous two years, with the majority of the decreases occurring in the Knowledge Impact indicator, which includes new startup or business (from 48 to 72), ISO 9001 certificate (from 71 to 80), growth rate (from 72 to 110 and 118 in the last two years), and high and medium-tech manufacturers. Other sub-indicators, such as computer software spending, high technology net export of total trade (from 76 in 2018 to 109 and 106 in the last two years, respectively), and science and technical publication (from 101 in 2018 to 105 and 99 in the previous two years), decreased in 2019 but enhanced in 2020. In addition, some sub-indicators, such as intellectual property receipts from the total trade and utility model by origin, do not have data (WIPO 2018, 2019, 2020; The World bank 2020). International comparisons reveal that middle-income Arab countries output more than predicted, whereas high-income countries (Oman, Bahrain, Kuwait, Saudi Arabia, and Qatar) output less than expected. The United Arab Emirates' outputs do not reflect its strength in terms of business environment development (Al-Maliki and Abdul-Aziz 2016). Moreover, Morocco also makes up for its shortcomings in developing the business environment by exporting information and communication technology services and its GDP growth rate. According to the WIPO report, GDP per capita is weak in low, middle, and high-income Arab countries, and there is also a weakness in the export of high-tech products, with imports regarded as high to fulfill market and industry demands (Samir et al. 2017). One of the reasons for the decrease of this pillar was a lack of data in two crucial sub-indicators. In this category, the Sultanate ranks poorly in the GII. The most significant factors affecting this pillar are new startups or businesses, growth rate, and high technology net export of total trade.

15. In your opinion, what are the factors that mainly affect the Creative output pillar?**Table 16. The factors that mainly affect the Creative output pillar.**

	Frequency	Percentage
The number of public and local Internet domain names	46	22.33%
Mobile applications	30	14.56%
The ratio of exports of creativity products to total exports	42	20.39%
The proportion of industries in the field of publishing and printing	36	17.48%
Production of feature films	22	10.68%
Applications for registered trademarks	30	14.56%
Total		100%

The table above depicts the factors that have the most considerable effect on the creative output pillar. The majority of respondents chose the number of public and local internet domain names (46 respondents) and the ratio of creativity product exports to total export (42 respondents) as the most important factors affecting this pillar. They account for 22.3 percent and 20.3 percent, respectively. Other respondents, with 30 respondents, chose applications for registered trademarks and mobile applications, accounting for 30% of total replies. Finally, with 22 responses, few feel that feature film production is the pillar's primary factor. The creative outputs pillar consists of 13 sub-indicators. Oman's ranking dropped drastically from 65 in 2018 to 88 in 2019, and it dropped further to 94 in 2020. Trademark application by origin, Wikipedia edits, and the number of domain names are three sub-indicators that have decreased in the previous two years. Several sub-indicators fell in 2019 but climbed in 2020, including publishing and printing manufacturing (from 73 in 2018 to 89 and 86 in the past two years) and the entertainment and media market (from 45 in 2018 to 48 and 43 in the last two years). In several of the sub-indicators, the opposite occurred. The Sultanate's rank increased in 2019 and decreased in 2020, including national feature films (from 103 in 2018 to 79 and 84 in the previous two years), country code (from 109 in 2018 to 106 and 107 in the previous two years), creative goods export (from 98 in 2018 to 58 and 61 in the prior two years), industry design by origin, and ICT and organizational model. Statistics on cultural and creative services exports are unavailable, whereas Oman only submitted data on mobile app creation in 2020. There is consensus in selecting the respondents and the GII report on the most affected this pillar (WIPO 2018, 2019, 2020; The World Bank 2020). Lebanon ranks highly in creative goods and services, as does Morocco and Qatar regarding intangible assets. These indicators provide information on the social and economic environment, but they only evaluate the cultural influence of new technology, which significantly outweighs the cultural and recreational elements (Samir et al. 2017). It is stated that individuals have little interest in editing Wikipedia pages, and there is a lack of trademark applications in several Arab nations, including the Sultanate of Oman, Bahrain, Sudan, and Yemen. Many Arab countries' levels fell due to these two sub-indices (Al-Maliki and Abdul-Aziz 2016). According to the researcher, trademark application by origin, Wikipedia edits, and the number of domain names are the most significant factors affecting negatively on this pillar. In contrast, national feature films, creative goods export, and mobile app creation are the most significant factors affecting positively.

16.To what extent do you agree and disagree with this statement: Government institutions have adjusted their policies to improve Oman's ranking in the Global Innovation Index.

Table 17. Government policies adjustment

	Frequency	Percentage
Strongly Agree	98	49.75%
Agree	92	46.70%
Neutral	3	1.52%
Disagree	4	2.03%
Strongly Disagree	0	0.00%
Total	197	100%

The accompanying table indicates how many respondents agree and disagree with adjusting government policy to enhance Oman's ranking in GII. The majority of respondents, 49.7 percent, strongly agree that government institutions changed or modified their policies to enhance Oman's ranking, whereas four respondents, 2.03 percent, disagree with the statement. In addition, three of the participants neutrally expressed their opinions. It is also evident that the majority of respondents believe that some policies have changed. Moreover, the Sultanate has implemented specific policy changes, as highlighted by WIPO in a news statement announcing the Sultanate's inclusion in the GII. The Sultanate has made significant efforts to establish a solid foundation for the NIS and the completion of most of its components, such as policy harmony, preparing the ambitious national vision "Oman 2040," and reviewing laws and procedures to spruce up the national economy, creating a robust digital infrastructure for the intelligent digital government's transition. However, activating these policies and ensuring their appropriateness in light of fast advancements and governments racing to change their rules (TRC 2019). Therefore, it was concluded that several government institutions associated with the GII are making an effort to increase Oman's ranking. As is apparent, these institutions modify their policies and enact new laws, such as policies and regulations about small and medium-sized businesses, FDI, research and innovation, electricity, education, and providing data for NCSI.

17.To what extent do you agree and disagree with this statement: Due to the reforms in the policies, these institutions have been successful in raising Oman's ranking in the GII.

Table 18. Government success in raising Oman's ranking in the GII

	Frequency	Percentage
Strongly Agree	87	44.16
Agree	96	48.73
Neutral	7	3.55
Disagree	6	3.05
Strongly Disagree	1	0.51
Total	197	100

The table above shows how many respondents agree and disagree that the government has successfully raised Oman's ranking in GII. The majority of respondents, 48.7 percent, clearly believe that the government successfully increased Oman's ranking in GII. Following that, 44.2 percent of total responses strongly agree with the statement, and one responder (0.51 percent)

strongly disagrees with the statement. Seven of the participants neutrally voiced their thoughts. Many indicators and sub-indicators are connected to countries' policies and laws, and their advancement in the GII ranking is determined by how rapidly these policies keep pace with developments.

Regarding Oman, the Sultanate advanced in foreign direct investment and ranked high in the ease of starting a business in 2019 and 2020, following the amendment of laws and policies for small and medium enterprises and the exemptions granted to this category of institutions. Furthermore, education policies in terms of expenditure and government support, and education funding significantly influenced the Sultanate's rise to high ranks in 2019. Additionally, the Sultanate rose to the tenth rank from 44th in 2018.

Moreover, TRC initiatives such as integrating the industrial sector with colleges and universities to collaborate and implementing the Specialized Zones Law had a role in increasing several sub-indicators (TRC 2019, WIPO 2019, and 2020). However, Al Harthy said that there is a delay in activating state-issued regulations and policies, which harms the Sultanate's performance in the global innovation index for the year 2019. For instance, but not limited to, bankruptcy law did not contribute to the Sultanate's improvement in this indicator; where the Sultanate is still ranked 88 worldwide, and the issue applies to the rest of the laws, policies, and processes established by the state but not implemented (TRC 2020). Therefore, it can be concluded that various laws, policies, and legislation need to be modified or created, which have impacted the Sultanate's performance in certain sub-indicators. However, numerous government institutions did not implement many new laws and policies, which affected Oman's ranking in the GII.

18. In your opinion, what is the reason for the sudden decline of Oman's ranking in GII?

The researcher received many different responses to this question. Many people believe that the government had a vital role in the decline in the ranking. This would be because of too many factors, for example, the inefficiency of some institutions. Furthermore, most participants believed that government rules and regulations, availability of data, and policies' stability and validity contributed to the sudden decline. Others claim that these regulations are out of date and therefore do not reflect current world developments. Numerous replies suggest that obtaining data from public institutions is challenging since they believe that information is not available in those institutions, which is the crucial factor that impacted Oman's ranking in GII. Others argue that public and private sector R&D funding continues a substantial barrier, which impacts innovation development. Several more participants believed that the engagement of SMEs is inadequate and moving at a slow pace, demanding to speed up the work of legislation that protects such a sector. Finally, the majority have felt that Covid-19 and its implications are the main factors of the fall.

Moreover, the ICT field is essential in assessing the country's infrastructure. There are many sub-indicators linked to the ICT sector; the prices of all telecommunication services like the internet are high, and there is a high impact on the usage of these services domestically. Thus, it can affect technology export, Wikipedia, and ICT sub-indicators. According to the released report of TRC (2019 and 2020), numerous reasons contributed to the Sultanate's substantial fall in indicators. As per the report, data collecting specialists face challenges in collecting the

essential data, with the most significant difficulty being a lack of this data from government institutions. Furthermore, the Coronavirus became the most significant impediment, disrupting all indications. Furthermore, several policies and legislation have been created; however, the relevant authorities have not implemented them.

CONCLUSIONS AND RECOMMENDATIONS

This study considered four objectives and questions into account. Furthermore, it linked to the GII report from many perspectives to investigate the influence of such reports on government institutions, society, and the country's overall performance. To conduct the investigation, the researcher interviewed five specialists from TRC, SQU, and NCI. In addition, a questionnaire was distributed to 204 respondents to address the research objectives and questions. Here, the researcher will report the outcomes that have been obtained for each objective.

Research Objective #1: To evaluate the possible factors that contributed to Oman's decline in GII.

The study concluded that the interviewees offered similar answers to the question and linked the drop to various factors, including oil prices, Covid-19, R&D expenditure, data updating, data unavailability, and delayed enforcement of legislation. There are also challenges with providing correct data, and not updating it is a critical contributor to the drop. Government spending on education, research, development, innovation, and educational and industrial sector engagement has a detrimental effect on the decrease. The questionnaire responses were similar to the answers from the interviews; however, they highlighted that the country relies on a rentier economy and has not transformed its economy into a knowledge-based economy which affects by the crisis quickly and, the market has not evolved substantially and that there is weakness in economic power. Support for talented individuals and innovations and the inadequacy of government and foreign investments are also declining factors. Some have noted that the ICT sector's costs are high, which plays a role in societal engagement in this sector. According to WIPO (2019 and 2020) and TRC 2019, each pillar includes numerous factors (indicators) that can enhance or reduce a country's total score in GII. In the case of Oman, the most significant factors associated with the drop include company R&D spending, ease of getting credit, ICT services import, growth rate, high tech export, knowledge impact, and printing and other media manufacture. Furthermore, there are some missing and outdated data.

Research Objective #2: To investigate whether if there are any complex issues behind the decline.

The researcher received a response to the query only during the interview. The research concluded that the respondents believed that after releasing GII reports in 2019 and 2020, numerous complex issues appeared, including a lack of implementation of laws and police and a lack of appropriate marketing of the Sultanate both internally and externally, which stems from a lack of awareness of the significance of marketing to develop the country. Moreover, government policies have not been amended or updated, and the rest of the countries are developing their policies and laws to be adequately assessed in these reports. The most complex issue, according to the participants, is the availability and updating of data. The issue was not visible from 2013 to 2018; however, its consequences were revealed in two WIPO reports. The specialists encountered several challenges with the rest of the government

institutions, including data delays, a lack of awareness of the needed data, incorrect data, and outdated data.

Research Objective #3: To analyze the consequences of this decline on policies implemented by Omani institutions and linked to the indicators and the action taken in response to the sudden decline.

As per the study, it concluded that there are consequences of this decline on various government institutions. For example, TRC has launched several initiatives to raise public awareness, such as holding workshops to analyze the rapid drop in ranking. Furthermore, as one of the initiatives to improve innovative outputs in the report, TRC adopted the law of scientific and other specialized areas. Moreover, TRC, in collaboration with the NCO, visited several government organizations and decision-makers to encourage specialists to provide data and follow up on its updating. In addition, the government has made several efforts to improve Oman's ranking, including centralizing data collection to the NCO, adopting a unified methodology for monitoring the performance and efficiency of various state institutions. Moreover, the methodology uses standardized performance indicators linked to five-year plans. It obliges the relevant institutions to provide valid and reliable data to the Center On-time to demonstrate the actual reality of the Sultanate's position in international reports and improve its position in international competitiveness and innovation reports.

Research Objective #4: To identify and evaluate the impact of this decline on public perception and their confidence level on innovation performance.

The study concluded that worldwide reports positively or negatively influence country performance and their outcomes on society and its perception. According to the survey findings, participants felt that these reports have a significant influence on society. If it is negative, the community will complain; if it is positive, the community will be optimistic. Therefore, according to experts, society plays an essential part in the report on GII. As the data collectors, they include the community in the surveys required by the organization. As a result, they play an essential role in raising the country's ranking and serving as community promoters of this report, which raises social awareness.

Recommendations

In a situation where many challenges must be addressed simultaneously, Priorities must be established since public resources are limited. The researcher would like to offer suggestions about critical aspects relating to national engagement, high-level collaboration, and a transformational strategy.

- **National engagement:** The relevant authorities must develop a specific compact for innovation to fulfill Oman's 2040 vision. This compact applied within two years, and all government sectors must participate in developing it; encourages the presentation of new ideas and interest in these ideas, which will aid in developing national human resources in the field of innovation. In addition, this charter will help secure databases used to support innovation policies and research, the security of tools and information, and the provision of an appropriate environment for practicing innovative thinking, all of which will increase the number of patents and intellectual property. Furthermore, this charter would assist small and medium-sized businesses in implementing new technologies and will improve public and private sector services by using the latest technologies. Finally, it contains a list of metrics that the government undertakes to

implement with the practical help of the people and stakeholders, such as the company and academics, and their implementation should be evaluated, as it will have a significant impact on the GII measures. Thus, the innovation compact will quickly remove barriers to innovative efforts, resulting in a more dynamic environment, although it does not result in the quick launch of new goods, services, and processes to produce appropriate turnover and revenues. Furthermore, eliminating or reducing barriers to innovation necessitates deliberate efforts and appropriate tools.

- **High-level collaboration:** It is essential to ensure good top-level coordination government to implement practical Science, Technology, and Innovation policies to increase Oman's economic growth and performance. As seen by the research's findings, there is a challenge in providing data. The researcher believes that a centralized electronic system should be developed within the last quarter of 2021 and the formation of a high-level committee to evaluate the challenges that those in charge of administering the system would confront. The committee establishes by the NCO and reports to the Minister's Cabinet on the progress of the committee's work and the level of involvement of specialists in government institutions in providing the needed data regularly.
- **Transformational Strategy:** The researcher suggests developing a multi-stage comprehensive, transformative approach that lasts for the third quarter of 2022. The Minister Cabinet must make an effort to apply this strategy. The first stage begins with identifying minor policies and initiatives that are worthwhile to pursue and will contribute to developing favorable attitudes toward change, especially among policymakers. The second stage will be further policy change influenced by bottom-up transformation, which will prepare the way for the third stage of policy reform. At this stage, the government is combining a short-term strategy focused on quick wins with a longer-term plan focused on fundamental transformation. The third stage will see the adoption of more sweeping changes. The GII is directly affected by these measures. All legislation relating to the GII and the remaining indicators will undergo fundamental revisions with long-term implications.
- **Encourage innovation and entrepreneurship:** Since innovation is the primary driver of the GII, one of the challenges is a lack of entrepreneurs with creative ideas who are ready to take risks. To encourage entrepreneurial creativity among students and entrepreneurs, the Ministry of Higher Education, Research, and Innovation, in collaboration with the Ministry of Education and Riyadh, should implement several initiatives, such as training and support. For example, proliferating fab labs (small-scale workshops providing automated manufacturing) around the regions enables students and entrepreneurs to improve creative ideas and products. These labs must be built before 2024. Fab labs enable society to make their ideas to reality. They can build and maintain nearly anything using the available tools and a variety of devices. It promotes the flow of new companies while teaching current entrepreneurs and students about the Lab's ability to produce innovative products and services.

References

- Oxford Business Group (2017) *The Report: Oman 2017: Country Profile* [online] available from <<https://oxfordbusinessgroup.com/node/915981/reader>> [9 April 2021]
- Al-wahaibi, M. (2016) 'The Journey of Oman with Economic Diversification' [online] 1-10. available from <https://www.researchgate.net/publication/320806284_The_Journey_of_Oman_with_Economic_Diversification>
- Sira, E., Vavrek, R., Vozarova, I., and Kotuli, R. (2020) 'Knowledge Economy Indicators and Their Impact on the Sustainable Competitiveness of the EU Countries'. *MDPI Journal* [online] 1-22. available from <<https://www.mdpi.com/2071-1050/12/10/4172/pdf>> [9 April 2021]
- UNCTAD (2014) *Science, Technology, and Innovation Policy Review- Oman* [online] available from <https://unctad.org/system/files/official-document/dtlstict2014d1_en.pdf> [9 April 2021]
- Mansour, A. (n.d.) 'Planning for Economic Diversification in Oman' [online] 1-11. available from <<http://www.oea-oman.org/03-Mansouier.pdf>> [9 April 2021]
- The Research Council (2017) *Scientific Insights - The National Innovation Strategy* [online] available from <https://www.trc.gov.om/trcweb/sites/default/files/2017-08/scientific%20insights%202017_ar.pdf> [9 April 2021].
- The Research Council (2019) *The Sultanate in the Global Innovation Index Report 2018*. Muscat: TRC
- The Research Council (2020) *The National Innovation Strategy*. Muscat: TRC
- The Research Council (2020) *The Sultanate in the Global Innovation Index Report 2019*. Muscat: TRC
- The Research Council (2019) *Initiation of the national workshop on the Global Innovation Indicators Report Analysis Lab* [online] available from <<https://www.trc.gov.om/trcweb/ar/topics/media/news/6719>> [30 April 2021].
- The Research Council (2019) *The launch of the first national workshop for the project of preparing the national strategy for research and development 2020-2040* [online] available from <<https://www.trc.gov.om/trcweb/ar/topics/media/news/7025>> [2 May 2021].
- Malahim, S., Hejazin, R., and Alqallab, H. (2018) 'Countries Development Trends Based on Global Innovation Index as An Indicator'. *Innovare Journal of Business Management* [online] 6(2), 1-3. available from <https://www.researchgate.net/publication/329514842_arab_countries_development_trends_based_on_global_innovation_index_as_an_indicator> [9 April 2021]
- Al-Gamdi, A., and Alhaniti, W. (2014) *the role of higher education in the Global Innovation Index* [online] 1st edn. Riyadh: King Saud University available from <https://www.researchgate.net/publication/311454592_Global_Innovation_Index> [9 April 2021]
- WIPO (2013) *Global Innovation Index 2013- The Local Dynamics of Innovation* [online] available from <https://www.wipo.int/edocs/pubdocs/en/economics/gii/gii_2013.pdf> [9 April 2021].
- WIPO (2015) *Global Innovation Index 2015- Effective Innovation Policies for Development* [online] available from <https://www.wipo.int/edocs/pubdocs/en/wipo_gii_2015.pdf> [9 April 2021]
- WIPO (2016) *Global Innovation Index 2016- Winning with Global Innovation* [online] available from <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2016.pdf> [9 April 2021]
- WIPO (2017) *Global Innovation Index 2017- Innovation Feeding the World* [online] available from <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017.pdf> [9 April 2021]
- WIPO (2018) *Global Innovation Index 2018- Energizing the World with Innovation* [online] available from <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018.pdf> [9 April 2021]
- WIPO (2019) *Global Innovation Index 2019- Creating Healthy Lives—The Future of Medical Innovation* [online] available from <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020.pdf> [9 April 2021]
- WIPO (2020) *Global Innovation Index 2020- Who Will Finance Innovation?* [online] available from <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020.pdf> [9 April 2021]

Vochozka, M., and Kasych, A. (2019) 'Globalization processes in the modern world challenging the national economy development'. *SHS Web of Conferences* [online] 2–3. available from <<https://doi.org/10.1051/shsconf/20196509002>> [2 May 2021].

Feinson, S. (n.d.) 'National innovation systems overview and country cases' [online] 14-20. available from <https://cspso.org/legacy/library/110215F4ZY_lib_FeinsonInnovatio.pdf> [9 April 2021]

Sohn, S. Y., Kim, D.-H., and Jeon, S. Y. (2016) 'Re-evaluation of global innovation index based on a structural equation model'. *Technology Analysis and Strategic Management* [online] 28(4), 1–14. available from <<https://doi.org/10.1080/09537325.2015.1104412>> [30 April 2021].

Eggink, M. (2012) 'Innovation System Performance: How to Address the Measurement of a System's Performance'. *Journal of Innovation & Business Best Practices* [online] 1–9. available from <<https://doi.org/10.5171/2012.593268>> [30 April 2021]

Haghi, S., Sabahi, A., and Salnazaryan, A. (2011) 'Institutions and functions of national innovation system in Norway and Iran'. *African Journal of Business Management* [online] 5(24), 10108–10116. available from <<https://doi.org/10.5897/ajbm10.1355>> [9 April 2021]

Casadella, V. (2017) 'Innovation Boosters in Economic Systems'. *Journal of Innovation Economics & Management* [online] 23. available from <<https://www.cairn.info/revue-journal-of-innovation-economics-2017-2.htm>> [2 May 2021]

Carvalho, N., Carvalho, L., and Nunes, S. (2015) 'A methodology to measure innovation in European Union through the national innovation system'. *International Journal of Innovation and Regional Development* [online] 6(2), 159. available from <[10.1504/IJIRD.2015.069703](https://doi.org/10.1504/IJIRD.2015.069703)> [2 May 2021]

Nicolaides, A. (2014) 'Research and innovation – the drivers of economic development'. *African Journal of Hospitality, Tourism and Leisure* [online] 2(3), 1–16. available from <http://www.ajhtl.com/uploads/7/1/6/3/7163688/article_9_vol.3_2_july.pdf> [9 April 2021].

Balaton, K., and Varga, K. (2017) 'Social Innovation and Competitiveness – A Literature Review of the Theoretical Work in the Field'. *Virgil Madgearu Review of Economic Studies and Research* [online] 10(2), 27–42. available from <<https://doi.org/10.24193/rvm.2017.10.08>> [2 May 2021]

European Investment Bank (2016) *Restoring EU competitiveness* [online] available from <http://www.eib.org/attachments/efs/restoring_eu_competitiveness_en.pdf> [30 April 2021]

Atkinson, R. (2013) 'Competitiveness, Innovation and Productivity: Clearing Up the Confusion' [online] available from <<http://www2.itif.org/2013-competitiveness-innovation-productivity-clearing-up-confusion.pdf>> [30 April 2021]

Martin, R., Florida, R., Pogue, M. and Mellander, C. (2015) 'Creativity, clusters and the competitive advantage of cities'. *Competitiveness Review* [online] 25(5), 482-496. available from <<https://doi.org/10.1108/CR-07-2015-0069>> [30 April 2021]

World Economic Forum (2014) *Enhancing Europe's Competitiveness Fostering Innovation Driven Entrepreneurship in Europe* [online] available from <http://www3.weforum.org/docs/WEF_EuropeCompetitiveness_FosteringInnovationDrivenEntrepreneurship_Report_2014.pdf> [30 April 2021].

Aiginger, K., Bärenthaler-Sieber, S. and Vogel, J. (2013) 'Competitiveness under New Perspectives' [online] available from <<https://www.oecd.org/eco/Competitivenessunder-New-Perspectives.pdf>> [30 April 2021]

Petrarca, F., and Terzi, S. (2017) 'The Global Competitiveness Index: an alternative measure with endogenously derived weights'. *Quality & Quantity* [online] 52(5), 2197–2219. available from <<https://doi.org/10.1007/s11135-017-0655-8>> [9 April 2021].

Nečadová, M. (2020) 'Impact of Aggregation Methods on Countries' Ranking in Composite Index of National Competitiveness'. *Malaysian Journal of Economic Studies* [online] 57, 39–58. available from <<https://doi.org/10.22452/mjes.vol57no1.3>> [9 April 2021].

Schwab K. (2015) *The Global Competitiveness Report 2015-2016*. Geneva: World Economic Forum.

- Petrylè, V. (2016) 'Does the Global Competitiveness Index Demonstrate the Resilience of Countries to Economic Crises?'. *Ekonomika* [online] 95(3), 28-36. available from < 10.15388/Ekon.2016.3.10326> [9 April 2021].
- Samir, A., N., and Denir, L., and Sabidin, H. (2017) 'Features of innovation in Arab countries' [online] 2-20. available from< <https://www.unescwa.org/sites/www.unescwa.org/files/publications/files/innovation-landscape-arab-countries-critical-analysis-arabic.pdf>> [30 April 2021]
- Dutta, S., and Lanvin, B. (2013) *The Global Innovation Index 2013: The Local Dynamics of Innovation*. Geneva: Cornell University, INSEAD, and WIPO
- Farhan, A. (2017)'Innovation in the GCC Countries: An Economic Analysis'. *Journal of Economics and Development Studies* [online] 5(4), 51-62. available from <http://jedsnet.com/journals/jeds/Vol_5_No_4_December_2017/4.pdf> [30 April 2021]
- Almaliki, Z., and Abdulaziz, N. (2016) 'Report on the Global Innovation Index 2016'. *Athar Innovation* [online] 5-22. available from <<http://atharinnov.org/Resources/images/Book/GlobalInnovationIndex.pdf>> [30 April 2021]
- Cui, R., Sun, J., Li, Y., Yang, K., and Wu, X. (2020) 'Data-driven approach with artificial neural network for Global Innovation Index re-evaluation'. *2020 6th International Conference on Big Data and Information Analytics* [online] 5-15. available from <<https://doi.org/10.1109/bigdia51454.2020.00022>> [30 April 2021]
- Usman, K., and Liu, Z (2015) 'Innovation Index Framework to Measure the Innovation Capacity and Efficiency of SAARC Countries'. *European Journal of Social Sciences* [online] 46(3), 325-338. available from <https://www.researchgate.net/publication/284073756_Innovation_Index_Framework_to_Measure_the_Innovation_Capacity_and_Efficiency_of_SAARC_Countries> [2 May 2021].
- Reis, D., Moura, F., and Aragao, I. (2021) 'The Linkage between Input and Output in the Innovation Ecosystem'. *Global Journal of Human-Social Science* [online] 21(3), 1-12. available from< https://globaljournals.org/GJHSS_Volume21/3-The-Linkage-between-Input.pdf> [2 May 2021].
- Gray, E. (2014) *Doing research in the real world*. London: SAGE
- Boru, T. (2018) 'chapter five research design and methodology' [online] available from < https://www.researchgate.net/publication/329715052_CHAPTER_FIVE_RESEARCH_DESIGN_AND_METHODOLOGY_51_Introduction_Citation_Lelissa_TB_2018_Research_Methodology_University_of_South_Africa_PHD_Thesis> [2 May 2021]
- Loab, S., Dynarski, S., McFlrland, S., Reber, S., Reardon, S., and Morris, P. (2017) *Descriptive analysis in education: A guide for researchers*. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance
- Kabir, M. (2016) 'Methods of data collection' [online] available from< https://www.researchgate.net/publication/325846997_methods_of_data_collection> [2 May 2021]
- Ajayi, O. (2017) Distinguish between primary sources of data and secondary sources of data [online] 2-5. available from< https://www.academia.edu/34661351/Primary_Sources_of_Data_and_Secondary_Sources_of_Data> [2 May 2021]
- Trigueros, R., Juan, M., and Sandoval, F. (2017) 'Qualitative and quantitative research instruments research tools' [online] 2-5. available from< https://www.researchgate.net/publication/323014697_qualitative_and_quantitative_research_instruments_research_tools> [2 May 2021]
- Canals, L. (2017) *Instruments for gathering data* [online] 390-394. available from< <https://files.eric.ed.gov/fulltext/ED573582.pdf>> [2 May 2021]
- Oribhabor, C., and Anyanwu, C. (2019) 'Research Sampling and Sample Size Determination: A practical Application' [online] 2, 47-56. available from< https://www.researchgate.net/publication/336723498_Research_Sampling_and_Sample_Size_Determination_A_practical_Application> [2 May 2021].

Taherdoost, H. (2016) 'Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research'. *International Journal of Academic Research in Management* [online] 5, 18-27. available from<https://www.researchgate.net/publication/319998246_Sampling_Methods_in_Research_Methodology_How_to_Choose_a_Sampling_Technique_for_Research> [2 May 2021].

Sanjoy, D. (2018) *Sampling methods* [online] 1-10. available from<https://www.researchgate.net/publication/327891202_Sampling_methods> [2 May 2021].

Oman 2040 (n.d) *Oman Vision 2040* [online] 5-13. available from <<https://www.2040.om/Oman2040-AR.pdf>> [2 May 2021]