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**Risk Management impact to life quality in Kingdom of Saudi Arabia**

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## 1. Abstract

World is changing rapidly, sometimes for the better and sometimes for the worse. When it comes to a human life, change towards positive results must be ensured; Catastrophic errors and unwanted or unjustified results are avoided. For this, the science of risk management has evolved to extend to planning our lifestyle and providing guarantees for its continuity. This is only in the good management of risks in all matters of life; Of food and water security, availability of energy, suitability of living space. Good risk management requires an awareness of the risks, and an examination of the risk inherent in it. In order to ensure the desired results, it must be real and reasonable enough to meet the need for their application. We can take the Kingdom of Saudi Arabia, which has a difficult continental climates' as good example, as the Kingdom of Saudi Arabia has devoted capabilities sought to change difficult circumstances into better ones in order to suited the area as more for living. This was through the use of risk management tools in an amazing way, as it redirected the steering wheel to the right track to provide a better environment for living and to providing the quality of life.

العالم يتغير بسرعة، أحيانا نحو الأفضل وأحيانا نحو الأسوأ. عندما يتعلق الأمر بحياة الإنسان، فلا بد من ضمان التغيير نحو النتائج الإيجابية؛ يتم استهداف تجنب الأخطاء الكارثية والنتائج غير المرغوب فيها أو غير المبررة. ولهذا

تطور علم إدارة المخاطر ليمتد إلى التخطيط لأسلوب حياتنا وتوفير الضمانات لاستمراريتها. وهذا لا يكون إلا في حسن إدارة المخاطر في كافة شؤون الحياة؛ الأمن الغذائي والمائي، وتوافر الطاقة، وملاءمة ظروف المعيشة. تتطلب الإدارة الجيدة للمخاطر الوعي بالمخاطر، وفحص المخاطر الكامنة فيها. ومن أجل ضمان النتائج المرجوة، يجب أن تكون تلك الإدارة حقيقية ومعقولة بما يكفي لإمكانية تطبيقها. ويمكننا أن نأخذ المملكة العربية السعودية، التي تتمتع بمناخ قاري صعب، كمثال جيد، حيث سخرت المملكة العربية السعودية إمكاناتها لتغيير الظروف الصعبة إلى ظروف أفضل لتناسب المنطقة أكثر للعيش. وكان ذلك من خلال استخدام أدوات إدارة المخاطر بطريقة مدهلة، حيث أعادت توجيه عجلة القيادة إلى المسار الصحيح لتوفير بيئة أفضل للعيش وتوفير نوعية الحياة الحضارية.

## Key Words

KSA, Kingdome of Saudi Arabia, Risk Management, Quality of Life, Risk, Saudi Arabia, Sustainable Energy, Insurance, Economy

## 2. Introduction

There is no doubt that humans were created in toil; a true confirmation of this saying, the story of Adam and Eve when their conditions changed and they descended down to earth -after they were peacefully lived in the heaven- a great lesson that always prompts us to avoid everything that can cause us harm, deficiency, loss, or even extinction!

When Adam and Eve ate from the tree that caused them to be expelled from Paradise, this was a real first risk that had been taken ever; and which despite their inherent knowledge that it was a source of hazard; And so forth. Yes, it is literally the management of risk that we must do in order to ensure proper management for an enduring quality of life. Risk management lies not only as the ability to get out of all life circumstances with positive results, but also to being the ideal tool for seizing and exploiting opportunities, in addition to avoiding the possible negative impact that may afflict us in various aspects of life.

When back analyzing the aforementioned story of Adam and Eve, we find that they tended to take a risk, and found a certain benefit in it, but that risk wasn't studied adequately and wasn't sufficiently analyzed, as the results and consequences were not certain (uncertainty), and this led to a negative result that deprived them of greater benefits than much the risk itself -it means a big loss of the great heaven for Adam and Eve eating from just a tree- also it means (the risk capacity and risk appetite); Whatever our beliefs and thoughts about something, we must proactively and appropriately hedge against negative outcomes. No matter how adults we are, how unique we are, and how ambitious and intelligent we are, there is always something that we must not lose sight of, something we must find the right tool to measure and evaluate before taking any risk in itself.

With the development of contemporary life and the complexity of its technologies, desires and objectives, the need for a more comprehensive and qualitative view in a modern and capable

manner to manage risks increases. We can enumerate many risk factors that we must deal with through systematic and comprehensive risk management. For example, but not limited to: the industrial revolution, the technical revolution, the economic era, financial crises, climate changes, environmental balance, health security, food security, supply chains, and even freedom in the many different intellectual orientations and the knowledge explosion, and in addition to many others that cannot be listing that all requires us to highlight the methodology used in managing its risks.

And because the risk has always been associated with humans, where the risk starts from the beginning of their desires and aspirations, and because the most important principles of risk management lie in the general culture of dealing with risks, improvement, development and progress; We witnessing that the world adopt risk management methods and practices to improve opportunities and prevent damages. In this regard, many global campaigns, international conferences, and even regional programs have been launched to pursue a targeted improvement in risk management approaches, and access to the best possible methods for quality of life.

And because that sounds risk management practices leads to better decisions which absolutely produce better quality of life; we found some countries pursue to achieves such results in human's life cycle by generating like (the [Quality of Life program](#) [20], 2018 in the Kingdom of Saudi Arabia, where the program is a model for the successful approach to creating a better living environment by improving ways of dealing with contemporary life and providing greater protection for people in the Kingdom of Saudi Arabia). Also, it's worth to mention the ([Decision Support Center](#)) [14], which is concerned with monitoring and analyzing events, developments, variables, phenomena, internal, regional and international issues and their repercussions, expressing appropriate options and alternatives regarding them, and proposing optimal scenarios to deal with them. Political and Security Affairs and the Council of Economic and Development Affairs, collecting

data and information related to the Centre's competencies, the tasks entrusted to it, and the issues assigned to it, documenting, analyzing, processing and preserving such data and information, and contributing to educating and educating public opinion about the decisions taken, the issues raised and the issues raised. Also ([Saudi Green Initiative Forum](#)) [22], which aims “a comprehensive, sustainable approach to safeguard our shared future”. All these and other programmers, centers and orientations have all followed the best ways to build a human society with better characteristics and with risky opportunities that tend more towards positivity.

**We would start with an interview of the main leader of the Quality of Life program's in Saudi Arabia, [Mr. Khalid Al-Bakr](#), CEO of the [Quality of Life program](#) [20] in the Kingdom of Saudi Arabia:**

Mr. Khalid Al-Bakr, as he is known, an advisor to the eastern region development authority “Sharqia Development Authority”, and a member of the “Saudi Management Association”. He held different executive's positions such as the executive director of the secretariat of the board of directors of the “Qiddiya Investment Company” as well as many positions in the “General Sports Authority” known today as the “Ministry of Sports”, where he was director of government cooperation and a member of the Dakar Rally Committee, head of coordination and cooperation in the “Formula E project”, and assistant director of the same project. He worked as an executive assistant for the “Saudi Sports for All Federation”. He holds a master's degree in business administration, and a BA in the same specialization, “PRINCE2”, certificate in sales from “Lamborghini International” in 2012, and a higher certificate in management in 2022 from “London Business School ” in UK.



We discuss with Mr. Khalid the general direction and horizon to improve the quality of life in Saudi Arabia by using modern risk management and the development of the methodology for this through the following axes:

**Q/ In general; In your opinion, how does the risk management methodology affect the qualitative changes in improving the quality of life?**

**A/** The implementing of Risk Management to any initiative gives better results; When the Kingdom's Vision 2030 was established, the initiatives emanating from it were linked to risk management at the level of leadership. Quality of life is considered one of the programs emanating from this vision. With quality of life initiatives, risks are associated with it. If we apply the methodology and risk management, it gives better results in implementing these initiatives.

**Q/ How do you describe the relationship of risk management in improving the quality of life and creating a sustainable environment in the Kingdom?**

**A/** When examining initiatives related to quality of life, we find that livability and lifestyle are two basic concepts within the goals of sustainable development to improve the living conditions of citizens and residents in the Kingdom, and thus create the necessary environment to give those options to them. It must be done under an analysis of the risks of these initiatives.

**Q/ What is the extent of the involvement of modern risk management frameworks in government programs to improve the quality of life in the Kingdom?**

A / The purpose of applying risk management frameworks is to gain a competitive advantage for government programs and the application of these frameworks varies from one party to another according to the nature of its work. One of the most important objectives of government programs is to improve the services provided to citizens and residents, which leads to an improvement in their quality of life.

**Q/ Are there specific methodologies, schools, systems or frameworks followed to manage risks in the Kingdom's Quality of Life Program?**

A / The Quality of Life program adopts the ISO 31000 standard for managing its corporate risks, which helps analyze its risks in order to increase operational and administrative efficiency and thus achieve its corporate strategic goals.

**Q/ What is the future vision of the Kingdom in the context of risk management within the general framework of improving the quality of life?**

A / Adopting enterprise risk management in the Quality of Life Program is a practice that is in line with good governance. Achieving the Kingdom's goals in the framework of quality of life to build a society whose members enjoy a lifestyle that is in an advanced position worthy of the Kingdom, as one of its goals is to make one of the Kingdom's cities on the list of the best cities to live in in the world. Since risk management is considered an essential element and an important tool that helps in better preparation for the future, its inclusion in strategic planning is important in making the right decisions... End of.

### 3. Research Problem

This research aims to shed light on the models and practices adopted by the government of the Kingdom of Saudi Arabia in finding the best ways to achieve a better quality of life for its living and their residents through best risk management practices intake. By reviewing the methods and methodologies used in the Kingdom of Saudi Arabia, we touch on the factors that helped this rapidly growing country to overcome many obstacles and recover quickly from crises, and even create a larger environment for possible opportunities. As the Kingdom of Saudi Arabia has proven; since the launch of (Vision-2030) in 2016; that the efforts made the ideas and the methods adopted are not a mere coincidence, rather, it is by creating an environment capable of sustainability, resilience, stability and securing life in light of the severe global crises, for example but not limited to, the global warming, The global energy crisis -that surfaced in the aftermath of the COVID-19 which consequences increasing in oil, gas and energy market prices-, Inflation, food insecurity, as well as fresh water crisis; In fact, Saudi Arabia is witnessing huge projects seeking to address the factors that would create stormy crises, or be a reason for creating real crises. The Saudi website of the unified national platform [26] highlights the most prominent challenges facing Saudi Arabia in recent decades [26], for example the lack of rain in most regions of the Kingdom of less than 200 mm per year and in desert areas at a rate of less than 100 mm per year, contaminated well water, cement plant waste, increased sulfur dioxide and nitrogen oxide emission, land degradation and desertification, and others that may result in increased pollution and environmental risks. These challenges are brought on by continuous population growth, rapid urbanization, increased demand for water and energy, as well as economic development requirements. Among the most prominent initiatives presented by the Kingdom to mitigate potential risks, improve environmental conditions, and mitigate the impact of harsh natural conditions: Environmental legislations for Preserving

Wildlife, includes General environmental system and its implementing regulations, The Law of Protected Areas for Wildlife, Hunting of Animals and Birds Law, Law of Trading in Endangered Species of Wildlife and its Products, United Nations Convention on Biological Diversity, PARTNERING WITH THE GLOBAL OCEAN ALLIANCE TO PROTECT OUR OCEANS, CUT METHANE EMISSIONS, GUIDING AND SUPPORTING GLOBAL SPORTS ACTORS: To amplify climate-positive collaboration across the international sporting community, Saudi Arabia has joined the UN Sports for Climate Action Initiative, SAUDI GREEN INITIATIVE, MIDDLE EAST GREEN INITIATIVE; In addition to local initiatives like Green Riyadh Project, Environment Week, The National Center for Vegetation Cover Development and Combating Desertification establishment, Reducing Soil Pollution, Reducing Water Pollution, Reducing Air Pollution; all these initiatives and so many others builds to contributing to mitigating risks' impacts and likelihoods enhancing better life quality and circumstances.

#### **4. Research Objectives**

- Highlighting succeed risk management standards and promoting their dissemination and use.
- Develop and improve existing global standards to ensure their continuity and compatibility.
- Maintaining existing standards and promoting a culture of adhering to effective risk management.

## 5. Research Hypothesis

In today life, we count that the quality of life is based on the availability of Nutrition, Health, Society, Environment, Prosperity and Reasonable Governance in any region or community. So that a humanity can live with the natural orientation and desires through the availability of sources that meet these desires; In order to ensure the availability of such elements, there must be an ideal policy-management to ensure its availability and the possibility of its sustainability, especially with the increasing population of the world and the many crises and surprises that can afflict the planet at any moment. Natural resources in themselves are considered a sufficient reason for the sufficiency of living, but the only guarantee for the continuity of its existence remains the well management and control of the risks that lead to its depletion or even being absence. We can count that the quality of life is based on the availability of Nutrition, Health, Society, Environment, Prosperity and Reasonable Governance in any region or community. So that a humanity can live with the natural orientation and desires through the availability of sources that meet these desires; In order to ensure the availability of such elements, there must be an ideal policy-management to ensure its availability and the possibility of its sustainability, especially with the increasing population of the world and the many crises and surprises that can afflict the planet at any moment. Natural resources in themselves are considered a sufficient reason for the sufficiency of living, but the only guarantee for the continuity of its existence remains the well management and control of the risks that lead to its depletion or even being absence.

## 6. Previous studies

A distinguished research conducted by Alqurashi, Kumar & Sinha, (2016) [11], on urban change in the regions of the Kingdom of Saudi Arabia, in which he highlighted how the Kingdom of Saudi Arabia is rapidly moving towards the transition to the ideal urban environment in terms of re-centering, modern urban positioning, and building environmentally safe communities in terms of abundance of water, suitable soil, vegetation cover, and model urban plans; Where the Kingdom of Saudi Arabia used the latest and most advanced measurement methods to create a better and safer place to live.

Through the research of Addas (2018) [1], where he mentioned the development, change and modernity that took place in the Kingdom of Saudi Arabia in recent years, through the launch of 12 programs, including the quality of life in 2018; We find that the methods adopted previously could not make a difference in our present day; Where the Kingdom of Saudi Arabia took several measures that would have changed the rules of the game on the ground incredibly, as it became possible for the Kingdom of Saudi Arabia to be among the countries of the world by adopting the latest methodologies and technologies that contributed to the re-installation and construction of the general regulatory frameworks. He also focused on the new systems in managing the needs of life, which the Kingdom of Saudi Arabia has enhanced the chances of its continuity through restructuring and re-examining the reasons for its provision, in order to take the best decisions regarding it, including: Natural Environment, Nature reserves, Sustainable, Development, Water Management; which would pose a real dilemma in the event of risking its deficiency or mismanagement.

On the other hand, the researchers Imteyaz, Lawal, Tahir & Rehman (2021) [17], highlighted in their research, the efforts of the Kingdom of Saudi Arabia to create a sustainable environment, as the Kingdom conducted a measurement of the current risks from the production of electric energy by

stations that produce electricity through fossil fuels, and due studying the feasibility of replacing traditional plants with photovoltaic energy production plants, as this contributes to reducing the general cost of energy production, and in return guarantees fewer emissions that may increase global warming. All these initiatives and others that cannot be counted, highlight the interest of the Kingdom of Saudi Arabia in adopting the correct methods of risk management, in order to preserve the reasonable environment for human life and strive for a better quality of life. Where actual progress is demonstrated by choosing to avoid, mitigate, or even transfers other risks to be rebuild-remediation.

## **7. Real-time Examples of some projects impacted life quality in KSA**

### **7.1           \* Economic Revolution**

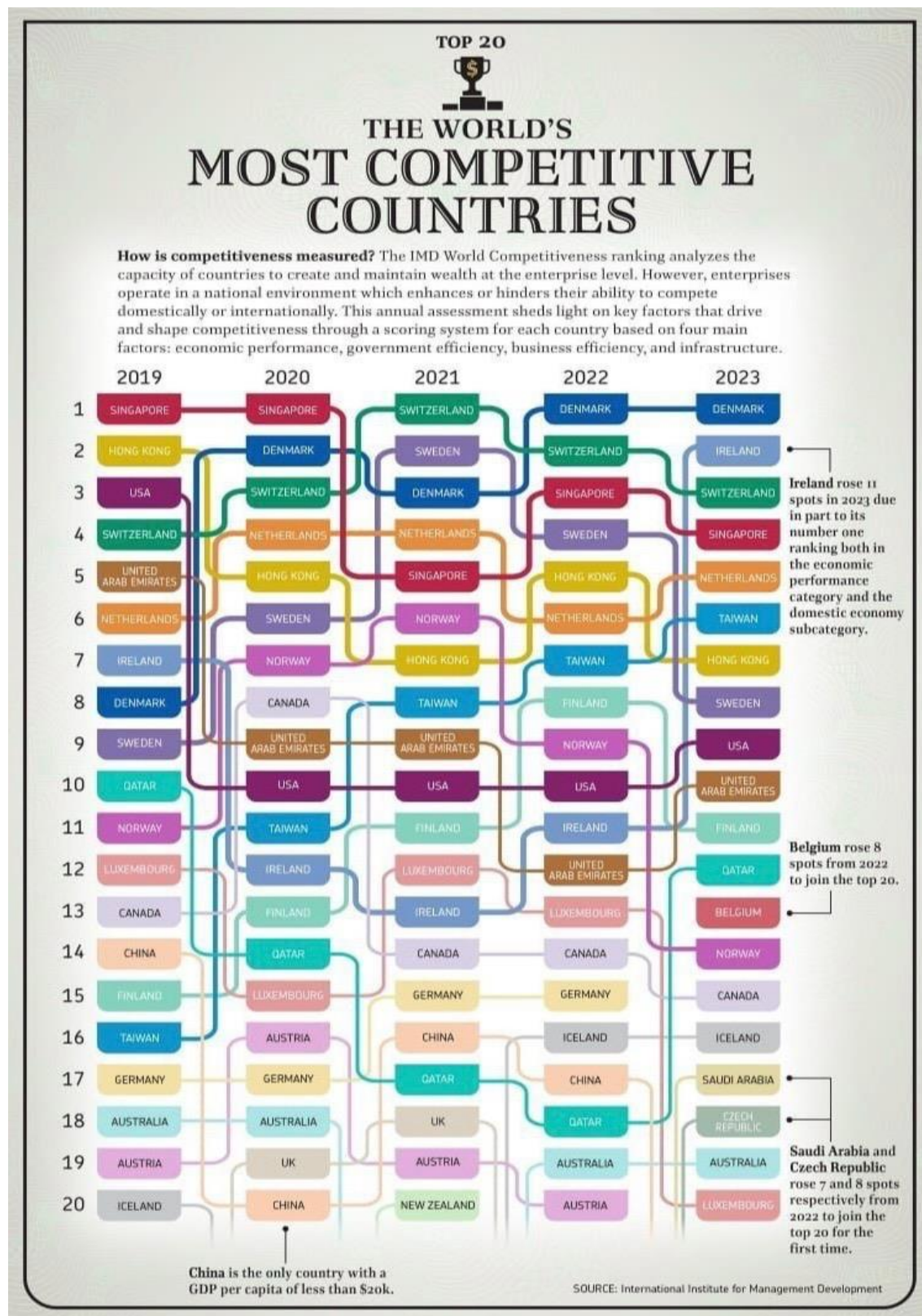
There is no doubt that what Saudi Arabia has become today as competitive economic power will bear fruit in general terms on the quality of life for the individual, as the economic rating has improved to the A+ level with a Stable Outlook according to Fitch Agency; In addition, the unemployment rate decreased to 8% and inflation decreased to 2.8, according to the data of the Central Bank of Saudi Arabia for the month of May 2023. All this improvement would reflect positively on the quality of life. However, it is worth asking in this context: How did the Kingdom of Saudi Arabia reach these targets? How was Saudi Arabia able to reduce the impact of the crises facing the world so that it redirected the indicators to the right path?

In research of Al-Faryan, M. A. S. (2019) [9], presented different ideas about the paradigm shift and how to work hard by the government of the Kingdom of Saudi Arabia in an effort to develop the economic infrastructure; Where he mentions Saudi Arabia's qualitative choices that would have splendidly pushed forward economic development; The choice of the adopted economic control method was a hybrid pattern between the Islamic economic foundation with high guarantees (which provides logical stability for the vast majority of local investors), and modern global best practices followed in governance, compliance and auditing, in addition to the royal British style in leading development plans from Since there have always been many ties between the Kingdom of Saudi Arabia and the Kingdom of Great Britain, which are reflected in the effectiveness of exchanging some experiences and trends. However, the Kingdom of Saudi Arabia pursued its policies and procedures based on a modern, developed mentality, as it saw fit with its sovereignty, as well as with the methods and directions of the local situation, and the preferred proportion to create optimal conditions for development, of course. The most prominent reforms and economic controls were through: Saudi's build better model of corporate governance, developed of corporate governance to reach highest standards of OECD, enhance company's law and structures, more focus on shareholder rights, improves company's controls seeks for SEC accreditation-approved, enhancing accounting and auditing standards and being combatable with NAAS and IFRS, maintaining strict capital market laws, coding corporate governance by integrated SOCPA, CMA and company law, more support to committees for the resolution of securities disputes, pay a great attention on the role of accounting and auditing profession and the Saudi Organization for Certified Public Accountants, accessibility and big authorities to National Anti-Corruption Commission, welcoming and marketing foreign investment internationally, introduction of privatization sectors, reforms tax, intellectual property rights boom. As these controls and a lot another were capable of making the Kingdom's economic

environment based on greater balance and more resilience, in terms of diversity of opportunities, guarantees, security, and economic expansion which impacted directly on better life chances.

On the other hand, in research conducted by researcher Hain, S. (2011) [16], on modern tools used in the Kingdom of Saudi Arabia to analyze and reduce the effects of financial risks through the main and subsidiary Saudi banks, where the researchers addressed the issue of laws and restrictions and their impact on economic growth and financial performance in Saudi Arabia, while those restrictions can lead to a slowdown in the pace of growth in the banking sector; However, given the precautions that Saudi Arabia is making towards providing a larger stock and carefully studied investment, it can be said that this extra care will suffice to prevent the occurrence of economic or qualitative crises in the banking and financial sector in the Kingdom of Saudi Arabia. In this regard, a good question may come to mind about how to balance the relentless tendency of the Kingdom of Saudi Arabia to invest foreign companies inside Saudi Arabia on the one hand, and the severe and studied control over the economic trend on the other hand?

In a research conducted by Albassam, B. A. (2015) [10], about the lack of an economically effective link between Saudi Arabia's tendency to attract foreign investment and the general picture of the Saudi economy. Where Saudi Arabia deliberately tightened control over the economic trend at the beginning of the era of external exclusive attraction inside the Kingdom, so that the success and progress of foreign investment inside Saudi Arabia (whether or not) does not result in economic delay or slowdown in the general pace of the progress of the Saudi economy in the event that it does not achieve giant successes; As that in itself was one of the smartest methods of economic control and hedging in order to adopt new opportunities, especially the giant ones, such as foreign investment inside the Kingdom of Saudi Arabia. All these guarantees and policies constitute an extraordinary support for internal and external investors, large or small, which really contributed to creating a better climate for the quality of life for the investment and the investor.



Source: [International Institute for Management Development](#) [18]

## 7.2 \* Promoting Energy Sources and Sustainable Energy

In this part, we can review the stimulating methods adopted by the Kingdom of Saudi Arabia to target sustainability and avoid critical moments, especially in energy production. Despite the difficult challenges faced by the natural environment of the Kingdom of Saudi Arabia, such as high temperatures and the scarcity of potable water; However, the Kingdom was able to pass this stage quietly and without being afflicted by the crisis (and without the residents noticing). This was a clear achievement of good risk management and an improvement in the quality of life in Saudi Arabia.

In a research conducted by Ting, L. S., Mohammed, A. H. B., & Wai, C. W. (2011, March) [27], on promoting energy conservation behavior: a plausible solution to energy sustainability threats; the researchers highlight the growing demand for energy consumption, which attracts with it the urgent need to increase awareness of energy consumption and spread urban health practices to deal with energy.

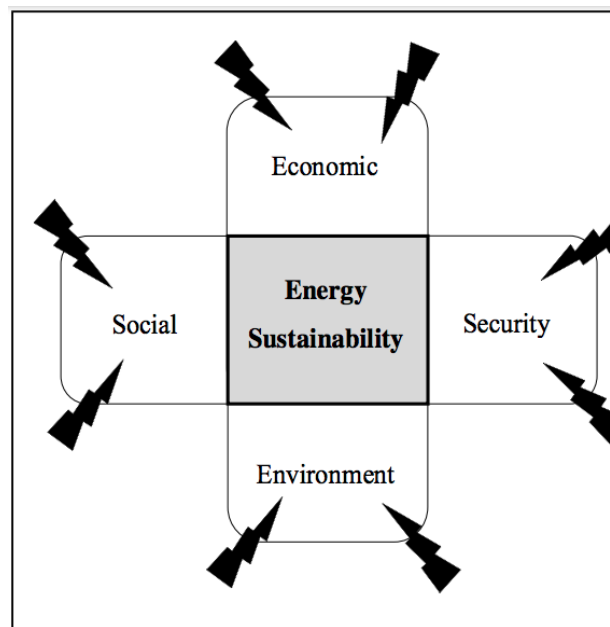


Figure 1. Threats to Energy Sustainability [27]

In this regard, the government of the Kingdom of Saudi Arabia has devoted tremendous efforts to ensure raising societal awareness of the correct ways to benefit from energy and reduce waste in

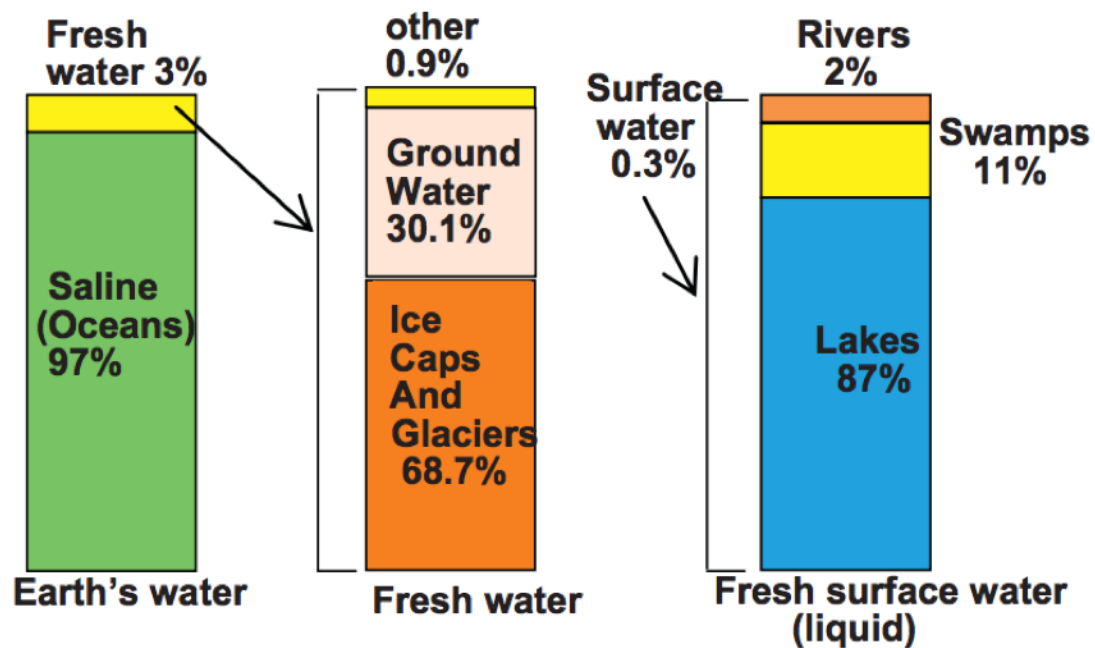
excess of need. Where it launched several programs and references for managing energy consumption, the most prominent of which was: ([Saudi Energy Efficiency Center © 2022](#))[2] This program was launched on the basis of is an ecosystem that aims to enhance the energy efficiency culture across various sectors in Saudi Arabia. Also, a national campaign (To Last) was launched entitled ([National Energy Efficiency Campaign © 2022](#))[1], the campaign designed to increase public awareness of the importance of energy conservation and changing energy-consuming behaviors. It employs a variety of communications strategies to reach different segments of the population with messages about energy efficiency.

By Eng. El-Ghonemy, A. M. K. (2012) [15] research of (Future sustainable water desalination technologies for Saudi Arabia; He shows the high potential and success ability for Saudi Arabia to involve concentrated Solar Power as “the average annual direct normal irradiance (DNI) is more than 6 kWh/m<sup>2</sup>/day, which are preferred for concentrated solar power (CSP) operation”. This was led to another level of utilization of natural resources in addition to improving the sources of living so as to reduce the issues of obsession and increase the benefits. On the other hand, El-Ghonemy shows the big quantum leap of Saudi Arabia in changing environmental conditions towards providing potable water and a fertile environment for agriculture by investing in water desalination, as Saudi Arabia has provided the required sufficiency for these two requirements through water desalination projects, given that the geographical area of the Kingdom is rich in salt water (the Red Sea and the Arabian Gulf). Some data from his scientific research in this field:

**Table 1**

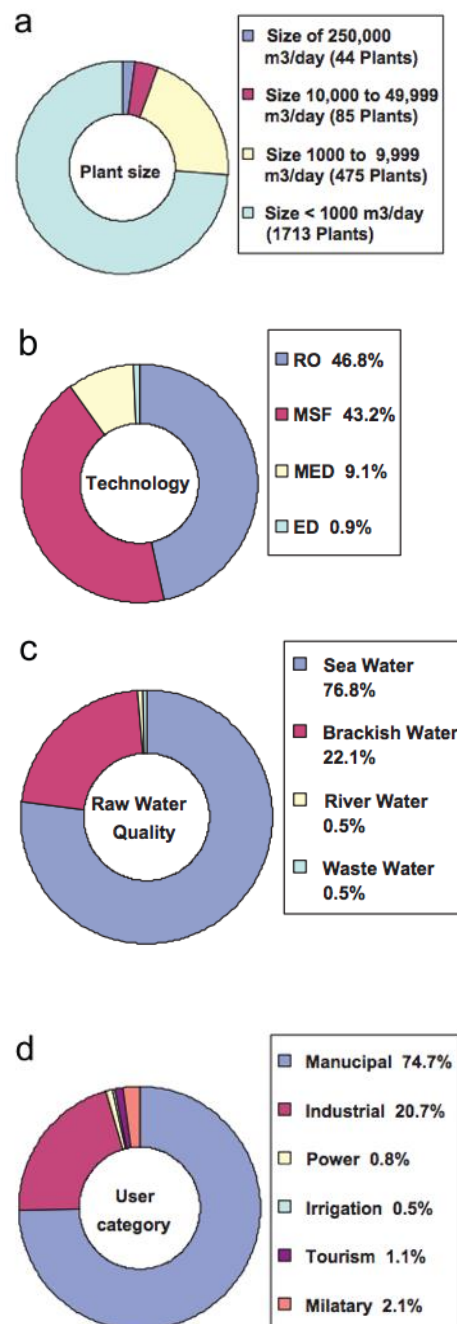
Power consumption of desalination technologies. [15]

| Desalination technology | Total electric energy      | Heat consumption |
|-------------------------|----------------------------|------------------|
| MSF                     | 3–5 KWh/m <sup>3</sup>     | 250–330 KJ/Kg    |
| MED/TVC                 | 1.5–2.5 KWh/m <sup>3</sup> | 145–390 KJ/Kg    |
| MVC                     | 8–15 KWh/m <sup>3</sup>    | –                |
| RO                      | 2.5–7                      | –                |

**Fig. 2** Water distribution on the earth [15]

**Table 2**  
The top five countries in desalination capacities [15]

| Country              | Total Capacity (m <sup>3</sup> /day) | % of Global production | MSF  | MED | MVC | RO   | ED   |
|----------------------|--------------------------------------|------------------------|------|-----|-----|------|------|
| Saudi Arabia         | 5,253,200                            | 25.9                   | 67.7 | 0.3 | 1.2 | 31   | 1.9  |
| United State         | 3,092,500                            | 15.2                   | 1.7  | 1.8 | 4.5 | 78   | 11.4 |
| United Arab Emirates | 2,164,500                            | 10.7                   | 10.7 | 0.4 | 3.0 | 6.5  | 0.2  |
| Kuwait               | 1,538,400                            | 7.6                    | 7.6  | 0.7 | 0.0 | 3.4  | 0.3  |
| Japan                | 745,300                              | 3.6                    | 3.7  | 2.0 | 0.0 | 86.4 | 6.8  |



**Fig. 3** KSA installed capacity by plant size, technology, raw water quality and user category [15]

Also, there is a great trend from the Kingdom of Saudi Arabia to use nuclear energy in water desalination, as Saudi Arabia aims to reduce dependence on other energies, such as fossil energy in water desalination. In addition, here some applications of Solar energy-desalination plants, in KSA, due the research of Eng. El-Ghonemy's:

1- PV power plant (The Solar Village Project). 2- Solar-Powered Water Desalination Projects. 3- The Solar Thermal Dish Project coupled with Stirling engines to convert the collected solar thermal energy into mechanical energy. 4- The 350 kW Solar Hydrogen Production Project (solar-powered hydrogen-generation plant). 5- The Solar-Powered Hydrogen Utilization Project using an internal combustion engine enabled it to use hydrogen as a fuel instead of petrol or gasoline. 6- The Solar-Powered Highway Devices Project (lightning). 7- Solar dryers (drying dates by solar energy). 8- The Solar Water Heating Project. 9- The Solar Energy Education and Training Project. All these initiatives and so many other could well contributed in best resources' unitizing and eco systems improvements.

**Table 3.**

The Annual horizontal solar energy available in some countries [15]

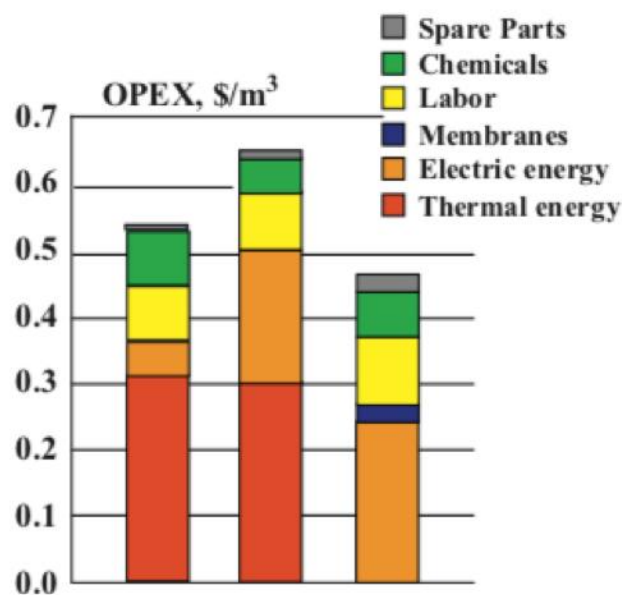
| Country       | Annual solar energy KWh/m <sup>2</sup> | Peak radiation W/m <sup>2</sup> |
|---------------|----------------------------------------|---------------------------------|
| Yemrn         | 2170                                   | 940                             |
| Saudi Arabia  | 2160                                   | 940                             |
| Oman          | 2140                                   | 930                             |
| Egypt         | 2050                                   | 1030                            |
| Jordan        | 2050                                   | 1020                            |
| Libya         | 2010                                   | 1040                            |
| U.A. Emirates | 1980                                   | 910                             |
| Israel        | 1930                                   | 1010                            |
| Syria         | 1910                                   | 1040                            |
| Malta         | 1900                                   | 1040                            |
| Morocco       | 1860                                   | 960                             |
| Algeria       | 1840                                   | 950                             |
| Tunisia       | 1750                                   | 980                             |

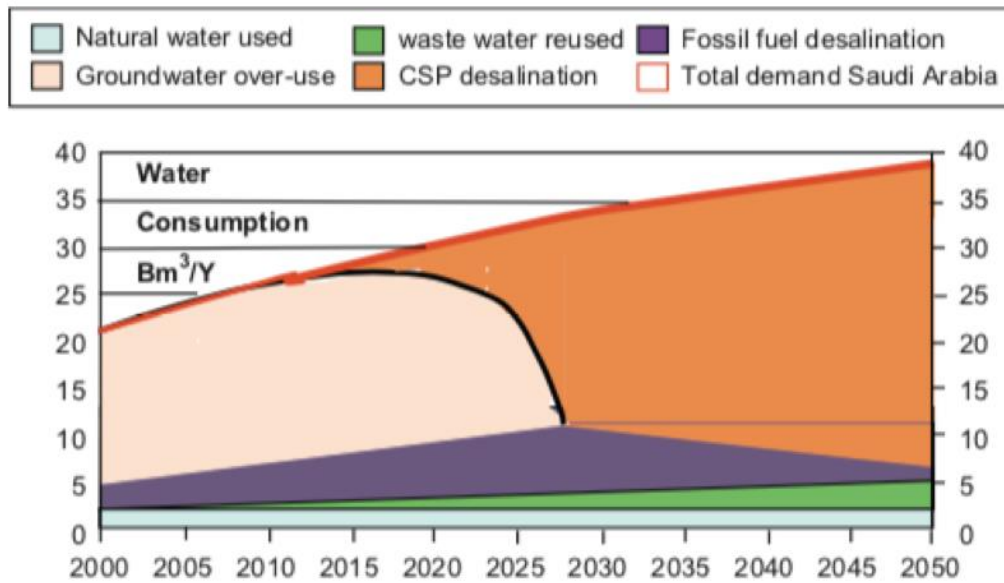
**Table 4**

Solar radiation resources in different cities of KSA [15]

| Station     | North latitude | East longitude | Altitude m | Global Radiation Wh/ m <sup>2</sup> | Sunshine Duration hours |
|-------------|----------------|----------------|------------|-------------------------------------|-------------------------|
| Abha        | 18° 13'        | 42° 29'        | 2200       | 5824                                | 8.7                     |
| Al-Hofuf    | 25° 30'        | 49° 34'        | 160        | 5671                                | 8.7                     |
| Al-Qatif    | 26° 33'        | 50° 00'        | 8          | 4729                                | 8.4                     |
| Bisha       | 20° 01'        | 42° 36'        | 1020       | 7004                                | 9.2                     |
| Derab       | 24° 25'        | 46° 34'        | 0          | 6183                                | 8.7                     |
| Hail        | 27° 28'        | 41° 38'        | 1010       | 5239                                | 9.4                     |
| Madina      | 24° 31'        | 39° 35'        | 590        | 6368                                | 9.1                     |
| Al-Munawara |                |                |            |                                     |                         |
| Najran      | 17° 33'        | 44° 14'        | 1250       | 6936                                | 9.1                     |
| Qurayyat    | 31° 20'        | 37° 21'        | 2          | 5562                                | 9.0                     |
| Riyadh      | 24° 34'        | 46° 43'        | 564        | 5132                                | 9.2                     |
| Sakaka      | 29° 58'        | 40° 12'        | 574        | 5319                                | 9.0                     |
| Tabuk       | 28° 23'        | 36° 35'        | 773        | 4479                                | 9.1                     |
| Taif        | 21° 14'        | 40° 21'        | 1530       | 5429                                | 8.9                     |
| Yabrin      | 23° 19'        | 48° 57'        | 200        | 5631                                | 9.1                     |

Of course, when work areas are remodeled and systems reformed, it will directly contribute to improving the general economy, as it reduces costs, reduces waste, and maximizes public profit.

**Fig. 4** OPEX for conventional desalination technologies(GWI 2010) [15]



**Fig. 5** Water demand scenario for KSA until 2050 and coverage of demand by sustainable sources, by unsustainable sources and by solar desalination [15]

Here some current Desalination Projects itemized in KSA as below depends on Eng. El-Ghonemy, A.

M. K. (2012) [9] research of (Future sustainable water desalination technologies for Saudi Arabia: A review):

- Saudi Arabia Al Khafji: 5680 m<sup>3</sup>/d, at design stage
- Saudi Arabia Al Khafji solar-powered SWRO 20,000–50,000 m<sup>3</sup>/d SWRO Early stage of procurement
- Saudi Arabia Al Khobar 2 expansion, Tender process ongoing
- Saudi Arabia Al-Waji 4 11,000 m<sup>3</sup>/d–13,500 m<sup>3</sup>/d, MED, Re-tender delayed
- Saudi Arabia Duba phase 4: 9000 m<sup>3</sup>/d, MED Re-tender delayed
- Saudi Arabia Gasan industrial RO plant 83,000 m<sup>3</sup>/d RO, Early conceptual stage
- Saudi Arabia Haql phase 3: 9000 m<sup>3</sup>/d, MED Re-tender delayed
- Saudi Arabia Jizan Economic City: 12,000 m<sup>3</sup>/d & 3000 m<sup>3</sup>/d Technical bids under evaluation
- Saudi Arabia Jubail RO upgrade: 78,182 m<sup>3</sup>/d, RO Tender process ongoing
- Saudi Arabia Khobar 4 IWPP: 250,000 m<sup>3</sup>/d & 250 MW Future plant planned over next 5–7

years

– Saudi Arabia King Abdullah Economic City 70,000 m<sup>3</sup>/d, SWRO Decision on project's future soon.

– Saudi Arabia Ras Tanura Approx: 150,000m<sup>3</sup>/d, 1000 MW, Awaiting RFP

– Saudi Arabia Shoaiba 4 IWPP: 650,000 m<sup>3</sup>/d & 665 MW Future plant planned over the next 5-7 years

– Saudi Arabia Shuqaiq 3 IWPP: 175,000 m<sup>3</sup>/d, MSF Awaiting RFP

– Saudi Arabia Yanbu:6000 m<sup>3</sup>/d, EPC bids under review

– Saudi Arabia Yanbu 3: 550,000 m<sup>3</sup>/d & 1700 MW, Bids submitted

Nevertheless, the government of the Kingdom of Saudi Arabia adopts the idea of taking advantage of the latest methods to modernize its purification systems in terms of producing hybrid energy instead of conventional energy, as it intends by the year 2030 to replace all consumer systems on which other main and subsidiary systems depend; According to scientific research conducted by Jawed Mostafa, Fahad, Saeed and Mohsen (2022) [12]; Saudi Arabia is making every effort to keep pace with the latest and smartest systems in place to produce energy and save on its consumption and waste, for example, but not limited to Machine Learning Algorithm for Energy Optimization and Forecasting, micro-grid hybrid energy system comprised of PV and wind energy, develop a dynamic model that appropriately forecasts the hourly energy demand. In opposite, the researchers Hakim Berradia, Mehdi, Habib, Zouheyr and Hanane (2022) [13], indicates to the existence of a causal relationship between the use of renewable energy and economic growth, as reliance on renewable energy reduces waste in natural, economic and other resources; Which reflects positively on the increase in abundance and storage, along with as an important way to reduce emissions and greenhouse gases, and thus contribute to mitigating the effects of climate change; This clearly reflects

the robustness of the reforms and remediation based on risk management in terms of including business continuity plans, disaster risk reduction in addition to sustainability directions.

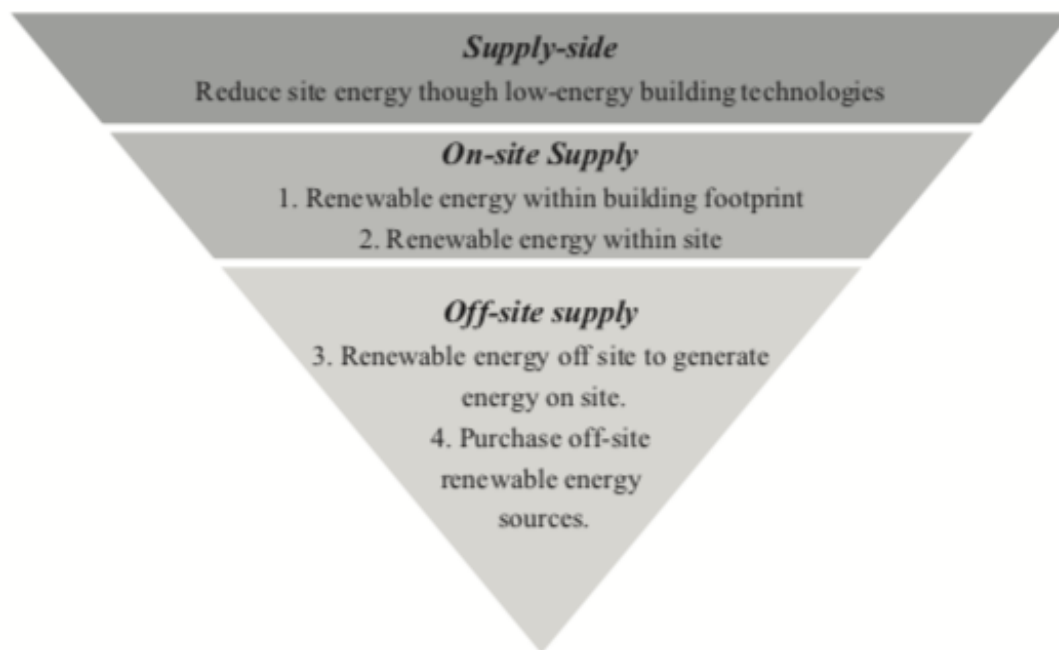
A more profound level, the researchers Al-Douri, Y., Waheeb, S. A., & Voon, C. H. (2019) [8], explains how the Saudi government focused on finding appropriate solutions to manage the risks of energy production and high temperatures, as there is a direct relationship in this regard in terms of the rise in temperatures and the increase in energy demand to provide adaptation to climate conditions, and to break this chain, the researcher states The strategies adopted by Saudi Arabia to break this chain link; The Kingdom of Saudi Arabia imposed new building codes that provide ventilation and are smarter from a practical point though insulation techniques within construction codes to provide better quality housing. After the Saudi government issued new building codes, went to strengthened institutional work in this regard, as it developed an energy rationalization organization to monitor consumption (conservation measurement) and gave full authority to The Electricity & Co-generation Regulatory Authority (ECRA) in order to raise awareness of consumption methods and alternative solutions.

In this regard, the researchers Alrashed, F., & Asif, M. (2012) [12], aimed the efforts of the Kingdom of Saudi Arabia to mitigate the impact of the increase in energy consumption; The Saudi government has developed control over this matter in terms of trying to create a new culture and framework based on facilities that do not consume a lot of energy, Zero-Energy Buildings (ZEBs) is the way that the world views the future, from this standpoint the Saudi government targeting through The National Energy Efficiency Program (NEEP) to address these issues. NEEP is a national organization that coordinates with many governmental ministries and other stakeholders to address energy and environmental issues with a forward-looking vision, to reach the best possible result, bringing the general energy consumption to zero numbers as possible as can.

Saudi Arabia conducted 92 studies on geopolymer concrete, which can be a suitable substitute for ordinary Portland cement (OPC): (Bond performance of GFRP and steel rebar's embedded in metakaolin based geopolymer concrete) and (Clean production and properties of geopolymer concrete); Almutairi, A. L., Tayeh, B. A., Adesina, A., Isleem, H. F., & Zeyad, A. M. (2021), Potential applications of geopolymer concrete in construction: A review. *Case Studies in Construction Materials* [4]. Resorting to these studies and adopting this idea shows the real efforts from the Kingdom of Saudi Arabia, as adopting this alternative can reduce carbon dioxide emissions to 80% during the process of production, construction, and use. This is on the one hand, and on the other hand, relying on the alternative provides greater durability and hardness that reduces the times of restoration and reconstruction in terms of resistance, especially in environments with difficult conditions such as high humidity and high dryness, as is the case in the coastal and desert environments of the Kingdom alike.

In a research conducted by Vedanarayanan, V., Vibhakar, C., Sujaatha, A., Chavda, J. K., Karthik, M., Pramila, P. V., & Raghavan, I. K. (2022), of Utilization of Sustainable Resources for Promoting Energy Efficiency in Environment Using Smart Technologies [6], the researchers found that the good use of technology will make a big difference in obtaining good alternatives to energy production, reducing waste rates and raising efficiency in this field, in addition to providing smart solutions. All of this explains Saudi Arabia's targeting of the modern trend and the selection of ideas accurately, such as imposing the modern building code, modern monitoring devices for energy, climate and natural resources, as well as attracting the latest technologies and experts to create a sustainable environment, which will ensure the reduction of unwanted energy consumption and direct reliance on the most accurate, most useful and effective solutions; For example, but not limited to, we find the modern city (The Line) in (NEOM), in which work has actually begun and will be ready

and eligible for habitation in the year 2030. It uses the highest global standards of life in terms of the least dependence in the world on conventional energy, (zero) carbon emissions, in addition to complex and repetitive circuits to produce sustainable energy at the lowest possible cost.



In a research conducted by Salam, M. A., & Khan, S. A. (2018) [21], they indicate that how the Kingdom of Saudi Arabia can be one of the largest sources of alternative energy, as it can, through its natural resources and geographical location, not only reach sufficiency in renewable energy, but also be a global source of it; Where the researchers mentioned that the European Commission Institute for Energy reported that 0.3% of the light falling on the Sahara Desert and the Middle East would be sufficient for the whole of Europe, and not only that, the presence of the longest hours of sunshine and the highest intensity of solar radiation in the world. Jeddah, Riyadh and Dammam, the three largest cities in Saudi Arabia have an average insolation rate of 5.78 kWh/m<sup>2</sup>/day which is much higher than the global standard of 1.36 kWh/m<sup>2</sup>/day.

The availability of raw materials also makes Saudi Arabia an attractive destination for solar energy. Silicon oxide for PVs is present in white rock/sand with the highest percentage of 99.5% compared to red sand and limestone with 86.7% and 13.5%, respectively; Saudi Arabia aims to provide up to 520 thousand barrels of oil in Saudi Arabia per day by 2032, also the alternative energy policy if adopted successfully in the Kingdom may lead to a more effective and cost-efficient energy system with nuclear and renewable technologies forming 70% of the electricity supply by 2032. Saudi Arabia plans to shift its reliance on solar, wind and nuclear energy sources, securing half of the country's electricity needs in the next 20 years.

The average solar radiation falling on the Arabian Peninsula is about 2200 kW/m<sup>2</sup> (Al-Awaji, 2001) as Saudi Arabia is located in one of the regions of the world rich in solar energy that receives the most powerful sunlight (Dargin, 2009).

Research, development and demonstration (RD&D) work conducted by the Energy Research Institute (ERI) at King Abdulaziz City for Science and Technology (KACST) confirms that solar energy can have many practical uses in Saudi Arabia. The Solar Radiation Atlas was developed by King Abdulaziz City for Science and Technology in collaboration with the US National Renewable Energy Laboratory (NREL) in 2013 to monitor Saudi Arabia's solar, wind, geothermal, and waste-to-energy resources. The purpose was to monitor data based on recordings from about 70 stations set up across the country. Based on the data, direct natural radiation has been found to exceed 30 MJ/m/day in some areas in summer, and not less than 24 MJ/m/day anywhere in the country even in January (NREL, 2000).

This is because the number of hours of natural sunshine that Saudi Arabia received was among the highest in the world, which increases its ability to use solar energy. In this regard, Saudi Arabia, which has a huge potential for solar energy, can harvest it not only to contribute to the domestic demand

but can export it to European countries with high energy demand (Ghafoor, 2011). It could lead to saving 500,000 barrels of oil and could avoid 200,000 tons of carbon dioxide emissions annually in Saudi Arabia.

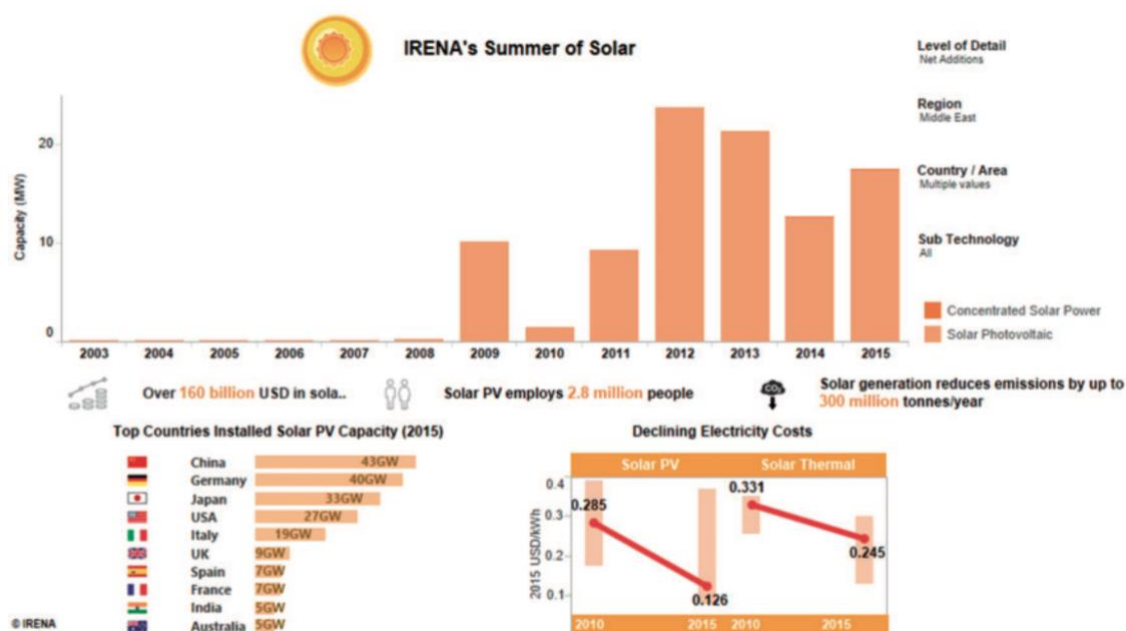
**Table 5.** Renewable energy targets conceived for Saudi Arabia and other GCC countries. [21]

| Country      | 2020 target                                                                            | 2030 target                                        |
|--------------|----------------------------------------------------------------------------------------|----------------------------------------------------|
| UAE          | Dubai: 1% of electricity installed capacity<br>Abu Dhabi: 7% of electricity generation | Dubai: 5% of electricity installed capacity<br>N/A |
| Qatar        | 6% of electricity generation <sup>a</sup>                                              | 20% of electricity generation <sup>a</sup>         |
| Oman         | N/A                                                                                    | N/A                                                |
| Kuwait       | 5% of electricity generation                                                           | 10% of electricity generation                      |
| Bahrain      | N/A                                                                                    | 5% of electricity generation <sup>a</sup>          |
| Saudi Arabia | N/A                                                                                    | 30% of electricity generation <sup>b</sup>         |

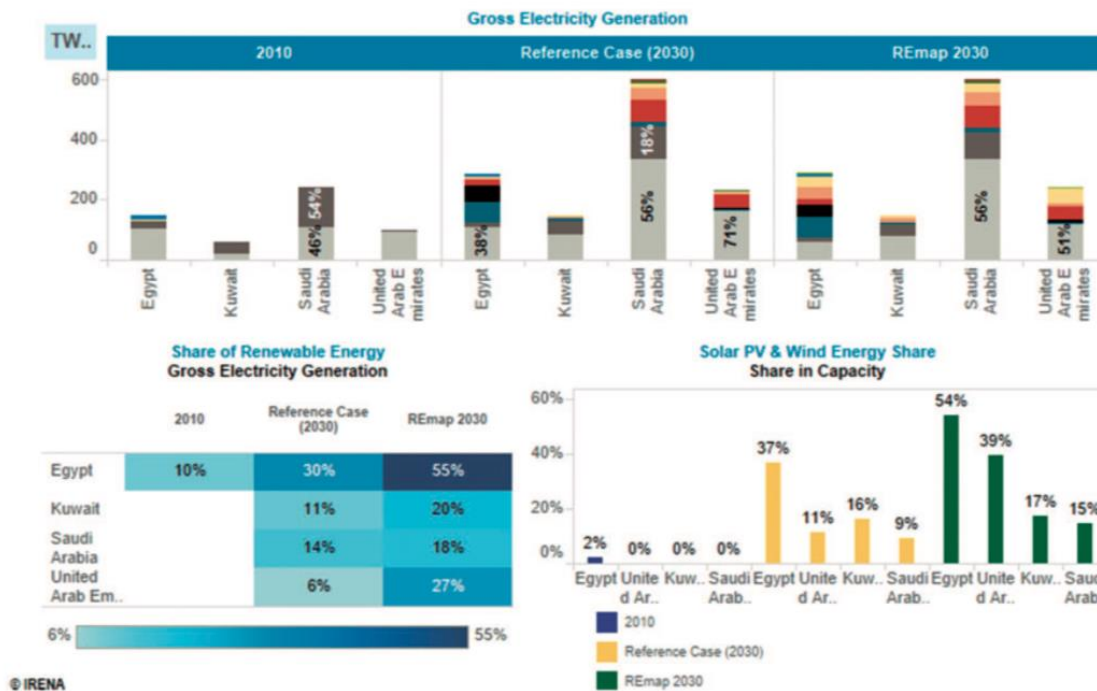
Source: Kuwait, Saudi Arabia and Yemen from League of Arab States (2013); RCREEE (2013a, 2013b); REN21 (2013); Dubai and Qatar (2020) from EU-GCC Clean Energy, and Masdar Institute (2013); Qatar (2030) from Eversheds, and Ernst and Young (2013); Kuwait 2030 target from Alsayegh et al. (2012).

<sup>a</sup>Unofficial targets.

<sup>b</sup>2032 target.



**Figure 6.** Solar energy expansion in the Middle East and its socioeconomic benefits. Source: IRENA (2016a). [21]



**Figure 7.** Comparative data of Saudi Arabia and other GCC countries for RE, solar and wind energy. Source: IRENA (2016a). [21]

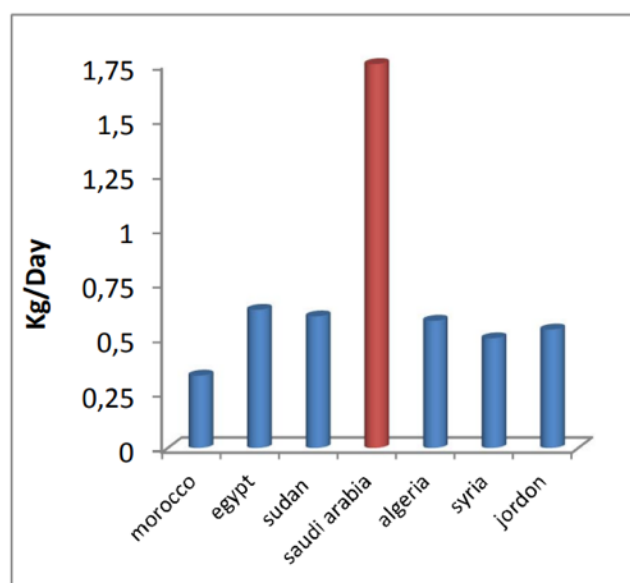
The researchers, Salam, M. A., & Khan, S. A. (2018) [21], highlight the Kingdom's efforts in this regard as the Center of Excellence for Research in Renewable Energy (CoRE-RE), the first Saudi national research center, was established in 2007 with the aim of being the center A national program that contributes to the advancement of research and commercialization of renewable energy technologies in Saudi Arabia and the region (CoRE-RE, 2016). Subsequently, the late King Abdullah took another climate research initiative with the establishment of the King Abdullah Petroleum Studies and Research Center (KAPSARC) in 2010 which is a dedicated global non-profit organization, as Saudi Arabia has targeted many investments in the field of alternative energy production with the largest international companies and organizations. Such as: SOLERAS, Hitachi Zosen, Technip E&C,

Kyoto Protocol, Conergy, CMTI and Association of California Water Agencies (ACWA), NYSE: IBM, General Electric (GE), Électricité de France (EDF) and Areva France, Manz AG, Soitec. Besides, a niche market for renewable energy is being created in the western part of the country in four expensive economic cities at a cost of more than US\$60 billion before large markets develop across Saudi Arabia. King Abdullah City for Atomic and Renewable Energy encourages businessmen to invest in Saudi Arabia's energy scheme, the country's ecosystem with global initiatives. On the other hand, through an exclusive partnership with Manz, Germany's leading manufacturer, it is expected to have access to world-class German technology. The increase in personal income and bank deposits in the GCC countries, particularly in Saudi Arabia, the United Arab Emirates and Qatar, has led to policies in which banks expand their credit limits. King Abdullah City for Atomic and Renewable Energy plans to export 10 gigawatts (equivalent to 10 nuclear plants) in Europe in the winter via North Africa, Italy or Spain (Edemo, 2014b; Tagoe, 2014a; Taha, 2013). The new Saudi Vision 2030 adopted in April 2016 also speaks of partnership between the public and private sectors (PPP) to facilitate the flow of private investment, encourage competitiveness and promote the localization of renewable energy (Kingdom of Saudi Arabia Government, 2016).

The research of Al-Sharafi, A., Sahin, A. Z., Ayar, T., & Yilbas, B. S. (2017), Techno-economic analysis and optimization of solar and wind energy systems for power generation and hydrogen production in Saudi Arabia [3], it provides an overview of the work system in the Kingdom of Saudi Arabia to produce energy through wind in several different and vital locations and cities such as Dhahran, Riyadh, Jeddah, Abha and Yanbu. Where the Kingdom of Saudi Arabia has sought to reduce the costs of energy production by traditional methods, to what touches the global minimum for the general cost of energy production. The city of Abha was a good example, as the city relied on

photovoltaic cells and the production of energy by means of wind, as it touched the minimum to approximately \$1.28/kWh.

In this regard, researchers Khan, M. S. M., & Kaneesamkandi, Z. (2013), Biodegradable waste to biogas: renewable energy option for the Kingdom of Saudi Arabia [5], the efforts of the Kingdom of Saudi Arabia in plans to shift to modern patterns of energy production and investment in recycling assets in order to create effective development that will find alternatives and benefit as much as possible from the own resources themselves; Researchers mention " King Abdullah research centre for atomic and renewable energy (K.A.CARE) in Saudi Arabia is planning to get 16 GW from PV, 25 GW from ,17 GW nuclear,9 GW from wind, 3 GW from waste to energy and 1GW from geothermal by the year 2032".



**Fig. 8. Solid waste generation rate per capita[5]**

In the same context in this research, we find that Saudi Arabia has exceptional investment opportunities in building and strengthening a massive system for investment in alternative energy and is in the process of developing to achieve these goals at a very rapid pace. In the following figure taken from the research "if the biomass energy available is effectively utilized then it can provide

energy at about \$101/MWh which is 65.65% and 57.23% cheaper than solar and tidal energy respectively” as researchers mentioned.

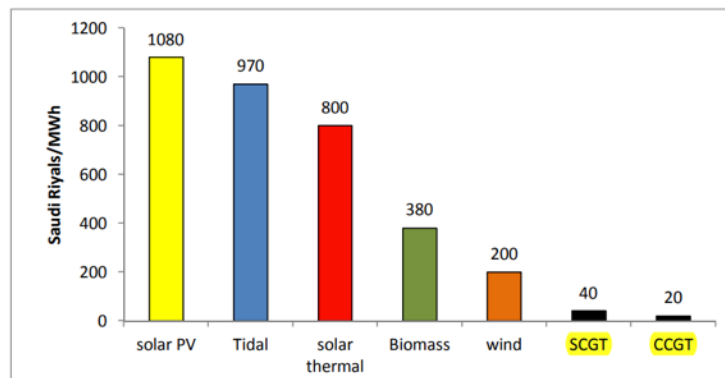


Fig. 9. Comparison of Renewable Energy costs in KSA [5]

### 7.3 \* Safety Health and Insurance

Medical insurance plays a crucial role in improving the quality of life in the Kingdom of Saudi Arabia. By providing access to healthcare services and financial protection against potential healthcare costs, medical insurance can help individuals and families maintain good health and well-being, manage chronic illnesses, and address unexpected health issues.

Access to healthcare services is a significant factor in improving the quality of life in the Kingdom of Saudi Arabia. Medical insurance can provide individuals and families with access to a wide range of healthcare services, including preventive care, diagnostic testing, and treatments for acute and chronic illnesses. This can help individuals and families maintain good health and well-being and address health issues before they become more severe.

Financial protection is another important factor that medical insurance can provide. Healthcare costs can be significant, particularly for individuals and families with chronic illnesses or medical emergencies. Medical insurance can help individuals and families manage the financial burden of

healthcare costs, ensuring that they can access the care they need without incurring significant financial hardship.

In addition to providing access to healthcare services and financial protection, medical insurance can also provide peace of mind and reduce stress and anxiety related to healthcare. Knowing that they have access to healthcare services and financial protection can help individuals and families feel more secure and confident in their ability to manage their health and well-being.

The government of the Kingdom of Saudi Arabia has implemented several initiatives to support medical insurance and improve access to healthcare services for its citizens and residents. Here are some ways the government supports medical insurance in KSA:

1. Mandating medical insurance: The government has mandated medical insurance for all residents in the Kingdom of Saudi Arabia, including expatriates and their dependents. This includes a requirement for employers to provide medical insurance for their employees and their dependents.
2. Providing subsidies: The government provides subsidies to support medical insurance for low-income individuals and families. This includes subsidies for premiums and copayments to help ensure that everyone has access to medical insurance and healthcare services.
3. Regulating medical insurance providers: The government regulates medical insurance providers to ensure that they comply with the highest standards of quality and service. This includes monitoring and enforcing regulations related to coverage, benefits, and claims processing.
4. Promoting competition: The government promotes competition among medical insurance providers to improve the quality of services and reduce costs. This includes encouraging the development of new insurance products and services that cater to the needs of different segments of the population.

5. Investing in healthcare infrastructure: The government is investing heavily in healthcare infrastructure, including hospitals, clinics, and medical facilities, to improve access to healthcare services throughout the country. This includes the construction of new hospitals and clinics and the expansion of existing facilities to provide more comprehensive medical services.

6. Supporting preventive care: The government supports preventive care initiatives to promote good health and well-being and reduce the burden of chronic illnesses. This includes programs to promote healthy lifestyles, such as physical activity and nutrition, and vaccination programs to prevent the spread of infectious diseases.

7. Developing national health insurance programs: The government has developed national health insurance programs to provide access to healthcare services for all citizens and residents. The programs aim to provide comprehensive coverage for healthcare services, including preventive care, diagnostic testing, and treatment for acute and chronic illnesses.

8. Implementing electronic health records (EHRs): The government is implementing EHRs to improve the quality and efficiency of healthcare services. EHRs enable healthcare providers to access patients' medical records electronically, which can improve care coordination and reduce the risk of medical errors.

9. Encouraging medical tourism: The government is encouraging medical tourism to attract patients from other countries to receive medical treatments and services in the Kingdom of Saudi Arabia. This can help to improve the quality of healthcare services and generate revenue for the country.

10. Supporting research and development: The government is supporting research and development in the healthcare sector to promote innovation and improve the quality of healthcare services. This

includes funding for research projects, development of new medical technologies, and collaboration with international research institutions.

11. Providing training and education: The government is providing training and education programs for healthcare providers to improve the quality of healthcare services and promote professional development. This includes training programs for nurses, physicians, and other healthcare professionals, as well as educational programs for patients and their families.

12. Establishing healthcare regulatory bodies: The government has established healthcare regulatory bodies to oversee the quality and safety of healthcare services. These bodies ensure that healthcare providers comply with regulations and standards related to patient safety, quality of care, and ethical practices.

Here are some examples of specific risk management strategies that health insurance companies can implement to identify, assess, and mitigate potential risks:

1. Conduct regular risk assessments: Health insurance companies can conduct regular risk assessments to identify potential risks to members' health and financial security. This includes assessing risks related to infectious diseases, chronic illnesses, workplace hazards, and environmental pollutants.

2. Implement safety protocols: Health insurance companies can implement safety protocols to reduce the likelihood of accidents and injuries. This includes workplace safety protocols, road safety protocols, and protocols to reduce exposure to environmental health risks, such as air and water pollution.

3. Develop emergency response plans: Health insurance companies can develop emergency response plans to ensure a timely response to potential risks. This includes plans to respond to

natural disasters, infectious disease outbreaks, and other emergencies that could impact members' health and financial security.

4. Provide education and training: Health insurance companies can provide education and training programs to members and healthcare providers to promote health and safety. This includes programs to promote healthy lifestyles, workplace safety training, and training on how to respond to emergencies.

5. Implement data analytics: Health insurance companies can implement data analytics tools to identify potential risks and trends in healthcare utilization. This includes analyzing claims data to identify potential fraud and abuse, as well as identifying potential gaps in care that could impact members' health and financial security.

6. Collaborate with healthcare providers: Health insurance companies can collaborate with healthcare providers to promote health and safety. This includes working with providers to promote preventive care, identify potential health risks, and coordinate care to ensure that members receive the care they need in a timely and effective manner.

These are just a few examples of the risk management strategies that health insurance companies can implement to promote health and safety for their members and protect their financial security. By identifying, assessing, and mitigating potential risks, health insurance companies can contribute to the overall well-being and prosperity of the Kingdom of Saudi Arabia.

Developing medical insurance in Saudi Arabia can contribute to improving the quality of life for citizens and residents in the country. The following are some ideas and suggestions that can be adopted to develop medical insurance in Saudi Arabia and improve the quality of life:

1. Expanding healthcare coverage: Healthcare coverage can be expanded to include all citizens and residents in the country, including remote and underprivileged areas.

2. Developing healthcare services: Healthcare services can be improved by providing advanced and integrated medical services in various regions of the country, including specialized and therapeutic healthcare services.

3. Promoting prevention and public health: Prevention and public health can be promoted by providing awareness and educational programs to citizens and residents about disease prevention and promoting healthy lifestyles.

4. Improving access to healthcare services: Access to healthcare services can be improved by providing telemedicine services and home-based healthcare services.

5. Encouraging innovation in healthcare services: Innovation in healthcare services can be encouraged by providing support and funding for medical research and development, and encouraging companies to invest in this field.

6. Collaborating with the private sector: Collaboration with the private sector can be strengthened, and investments in the healthcare sector can be encouraged, including providing innovative insurance solutions and improving the quality of healthcare services.

7. Providing psychological and social support: Psychological and social support can be provided to patients and their families, and psychological and social services can be provided to improve patient well-being and alleviate the psychological stress associated with illness and treatment.

Developing medical insurance in Saudi Arabia requires joint efforts from the government, healthcare institutions, insurance companies, and civil society. It can significantly contribute to improving the quality of life and healthcare well-being for citizens and residents in the country.

Overall, the government of the Kingdom of Saudi Arabia is committed to supporting medical insurance and improving access to healthcare services for its citizens and residents. By mandating medical insurance, providing subsidies, regulating insurance providers, promoting competition, investing in healthcare infrastructure, and supporting preventive care initiatives, the government is working to improve the health and well-being of the population and promote the overall prosperity of the country.

## **8. Research Data and Methodologies**

We chose to make extraordinary qualitative structured interview with prominent person in related to the scope of research through the view and experience of the public sector and the private sector; With [Mr. Khalid AlBakr](#) the Chief Executive Officer of Quality of Life program for Kingdom of Saudi Arabia, in order to demonstrates the fact of relationship between risk management and the quality of life; In addition to present deferent major litterers of the study reviews. Also, some models and tables from previous studies were used, based on the research of Eng. El-Ghonemy, A. M. K. (2012) [9], in the part related to renewable energy in Saudi Arabia (particularly in Section No. 7.2). Also, we measured the impact of risk management procedures and outputs that been applied in Saudi Arabia on community by conducting a general community questionnaire.

## **9. Research Findings**

This research shows the aspects which outline approaches that may contributes to better practices and experiences of how can risk management effect positively in the quality of life;

In line with the practices that are essential in order to build better, more cohesive and greater inclusive societies in terms of finding solutions and making decisions. Creating true coexistence and flexibility cannot be only from the perspective of clear benefit after today, but rather it must be through careful analysis and a broader and more comprehensive view towards the future, starting from all vital aspects for building societies.

The use of risk management tools is in conjunction between clearer decisions and a well-established culture for this quantitative, qualitative, scientific and literary expression. It is indispensable to exchange experiences in this field locally, regionally and internationally. No matter how different the circumstances and places are, the only link in risk management remains the healthy mentality in shaping the future.

To make the picture clearer in this regard, a general questionnaire was conducted for nearly 200 people from society in Saudi Arabia about the effectiveness of the practices taken to improve the quality of life. Through the questions in the questionnaire process, we tried to measure the following points (in Saudi Arabia):

- 1 -The effectiveness of risk management practices and their impact on public benefits in programs to develop and improve the quality of life.
- 2 -The effectiveness of quality of life programs in improving general living conditions.
- 3 -Measuring the availability of actual tools for sustainability and risk management.
- 4 -Measuring the actual linkage of risk management and quality of life programs.
- 5 -Requirements for improving and developing the performance of the public and private sectors with regard to risk management.

6- The general culture of risk management (whether or not it exists).

The results were as follows: The results of the conducted questionnaire showed that there is a direct link between the society's feeling of being more secure regarding the correct use of risk management, and the clarification of the visions adopted towards societal progress in general.

A well-thought-out risk-oriented approach can ensure stability, more opportunities, less losses and volatility, which contributes to a greater quality of life at various levels. Approximately 68.1% of private sector employees and 31.9% of public sector employees participated in this survey, with ages ranging from approximately 18 to 50 years. Approximately 65% of respondents were positive about the usefulness of the results of risk management in the Kingdom of Saudi Arabia, while 23% believed that it might be useful at times, while 17% believed that they did not see the results of risk management in improving the quality of life, which is in fact not a small percentage. Where additional ideas can be built upon to enhance the sense of the outputs regarding these two variables.

On the other hand, 16% of those who conducted the questionnaire called for intensifying institutional, governmental and societal efforts to create a broader culture of risk management, for example among the proposed proposals: the establishment of risk management committees that work to supervise various sectors to ensure effective management of this management approach. Some also opposed Opinions believe that this type of work framework may create restrictions on some sectors, especially at this stage of the Saudi renaissance, which is considered the beginning of a new era. One of the things that also caught our attention through this questionnaire was the request of some to propose the inclusion of risk management in the titles of administrative subjects for general education.

Where some are looking forward to instilling the principles and theories of risk management in the new generation from an early age to create a generation aware of risks of all kinds. In this regard, we

can stress the nature of integrated risk management with financial management and others, as it is logical to request the education of modern generations about financial or even employment risks, in addition to the risks of decision-making, which appear and manifest many of its failures in the early stages of life, especially in adolescence, due to the lack of a methodology Clear at this age to make more accurate decisions.

Finally, a good number (approximately 35%) demanded the imposition of general and comprehensive training initiatives by the government for all sector practitioners to increase general knowledge of risk management of all kinds, due to their feeling of a lack of knowledge they have and their need to increase it in this field.

### **\$LifeQualityEffectiveness Frequencies**

|                                                          |                  | Responses<br>Percent |
|----------------------------------------------------------|------------------|----------------------|
| Life Quality Effectiveness<br>Survey Result <sup>a</sup> | Yes              | 77.0%                |
|                                                          | No, I don't know | 3.5%                 |
|                                                          | Maybe            | 19.5%                |
| Total                                                    |                  | 100.0%               |

**Table 6.Life Quality Effectiveness Survey Results**



In the chart below, the size of people with experience in risk management is shown in both the private and public sectors of the study sample. The results show a noticeable discrepancy in the existence of a gap in the expansion of culture and knowledge of risk management socially and professionally, as approximately 37.1% expressed their lack of knowledge of risk management. On the other hand, about 85.9% demanded training and societal and professional development in risk management and raising public awareness of risk management, as approximately 88% see the link between proper risk management and the general improvement of life, economy and living.

| Risk Management and Quality of Life Correlation (depend on responses)                                           |                                                                        |                         | Is Improving the quality of life contribute to general economy in KSA? |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------|
| Control Variables                                                                                               |                                                                        |                         |                                                                        |
| Is risk management improve the quality of life in KSA? & Is risk management improve the overall economy in KSA? | Is Quality of life program improves life in KSA?                       | Correlation             | .548                                                                   |
|                                                                                                                 |                                                                        | Significance (2-tailed) | <.001                                                                  |
|                                                                                                                 |                                                                        | df                      | 182                                                                    |
|                                                                                                                 | Is Improving the quality of life contribute to general economy in KSA? | Correlation             | 1.000                                                                  |
|                                                                                                                 |                                                                        | Significance (2-tailed) | .                                                                      |
|                                                                                                                 |                                                                        | df                      | 0                                                                      |

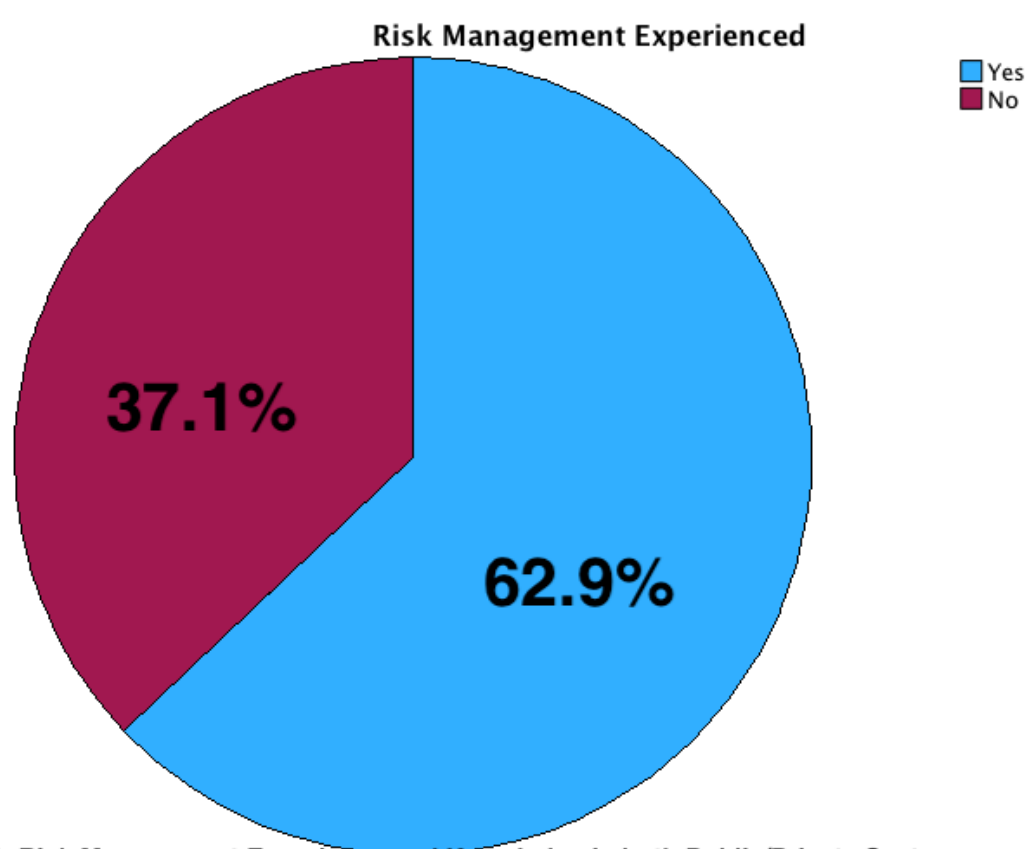
Table 7. The Correlation between to variables Risk Management and Quality of Life in KSA

## Descriptive Statistics

|                                                                        | Std. Deviation | N   |
|------------------------------------------------------------------------|----------------|-----|
| Is Quality of life program improves life in KSA?                       | .785           | 186 |
| Is Improving the quality of life contribute to general economy in KSA? | .796           | 186 |
| Is risk management improve the quality of life in KSA?                 | .819           | 186 |
| Is risk management improve the overall economy in KSA?                 | .813           | 186 |

Table 8. S.Dev. shows agreement in sector satisfaction

| Risk Management Experienced |       |           |         |               |                    |
|-----------------------------|-------|-----------|---------|---------------|--------------------|
|                             |       | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                       | Yes   | 117       | 62.9    | 62.9          | 62.9               |
|                             | No    | 69        | 37.1    | 37.1          | 100.0              |
|                             | Total | 186       | 100.0   | 100.0         |                    |



**Fig. 11. Risk Management Experience and Knowledge in both Public/Private Sectors**

## Frequency Table

**Do you think that raising awareness and education about risk management can contribute to improving the quality of life and community life?**

|       |                  | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------------|-----------|---------|---------------|--------------------|
| Valid | Yes              | 162       | 87.1    | 87.1          | 87.1               |
|       | No, I don't know | 2         | 1.1     | 1.1           | 88.2               |
|       | Maybe            | 22        | 11.8    | 11.8          | 100.0              |
|       | Total            | 186       | 100.0   | 100.0         |                    |

**To what extent do you agree that the existence of training and educational programs on risk management can contribute to enabling individuals and institutions to better deal with challenges and risks?**

|       |                  | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------------|-----------|---------|---------------|--------------------|
| Valid | Yes              | 154       | 82.8    | 82.8          | 82.8               |
|       | No, I don't know | 12        | 6.5     | 6.5           | 89.2               |
|       | Maybe            | 20        | 10.8    | 10.8          | 100.0              |
|       | Total            | 186       | 100.0   | 100.0         |                    |

**Table 9. Social Training / Knowledge demands of Risk Management**

The participants in the questionnaire also emphasized the importance of proper employment of all available tools in order to create a livable society-environment in terms of managing risks, promoting and supporting work within the scope of renewable energy, and reducing reliance on traditional methods in order to improve the quality of life during the coming years. In the following table, an illustration of the extent of agreement between the private and public sectors regarding the promotion of reliance on modern tools to make life difficult with modern technical quality:

## Sector \* Quality of Life Effectiveness \* Quality of Life and Risk Management Crosstabulation

| Relation/ Quality of Life and Risk Management                              |               |                                               | Quality of Life Programs Effectiveness            |                                                                        |                                                                             |                                                                     |
|----------------------------------------------------------------------------|---------------|-----------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------|
|                                                                            |               |                                               | Is Quality of life program improving life in KSA? | Is Improving the quality of life contribute to general economy in KSA? | Is Promoting sustainable energy sources improve the quality of life in KSA? | Is Promoting sustainable energy sources improve the economy in KSA? |
| Any experience in risk management sector?                                  | Public Sector | Count of Participants                         | 19                                                | 18                                                                     | 18                                                                          | 17                                                                  |
|                                                                            |               | % Agreed within Quality of Life Effectiveness | 28.8%                                             | 28.6%                                                                  | 29.5%                                                                       | 27.4%                                                               |
|                                                                            |               | % of Total                                    | 26.4%                                             | 25.0%                                                                  | 25.0%                                                                       | 23.6%                                                               |
|                                                                            | Privet Sector | Count of Participants                         | 47                                                | 45                                                                     | 43                                                                          | 45                                                                  |
|                                                                            |               | % Agreed within Quality of Life Effectiveness | 71.2%                                             | 71.4%                                                                  | 70.5%                                                                       | 72.6%                                                               |
|                                                                            |               | % of Total                                    | 65.3%                                             | 62.5%                                                                  | 59.7%                                                                       | 62.5%                                                               |
|                                                                            | Total         | Count of Participants                         | 66                                                | 63                                                                     | 61                                                                          | 62                                                                  |
| Is risk management contributing directly to improving the quality of life? | Public Sector | Count of Participants                         | 41                                                | 39                                                                     | 37                                                                          | 38                                                                  |
|                                                                            |               | % Agreed within Quality of Life Effectiveness | 31.8%                                             | 30.7%                                                                  | 29.6%                                                                       | 29.2%                                                               |
|                                                                            |               | % of Total                                    | 28.5%                                             | 27.1%                                                                  | 25.7%                                                                       | 26.4%                                                               |
|                                                                            | Privet Sector | Count of Participants                         | 88                                                | 88                                                                     | 88                                                                          | 92                                                                  |
|                                                                            |               | % Agreed within Quality of Life Effectiveness | 68.2%                                             | 69.3%                                                                  | 70.4%                                                                       | 70.8%                                                               |
|                                                                            |               | % of Total                                    | 61.1%                                             | 61.1%                                                                  | 61.1%                                                                       | 63.9%                                                               |

|                                                                                    |               |                                               |       |       |       |       |
|------------------------------------------------------------------------------------|---------------|-----------------------------------------------|-------|-------|-------|-------|
|                                                                                    | Total         | Count of Participants                         | 129   | 127   | 125   | 130   |
| Is risk management improving profitability for companies and organizations in KSA? | Public Sector | Count of Participants                         | 26    | 24    | 28    | 24    |
|                                                                                    |               | % Agreed within Quality of Life Effectiveness | 24.3% | 22.2% | 27.2% | 22.9% |
|                                                                                    |               | % of Total                                    | 22.2% | 20.5% | 23.9% | 20.5% |
|                                                                                    | Privet Sector | Count of Participants                         | 81    | 84    | 75    | 81    |
|                                                                                    |               | % Agreed within Quality of Life Effectiveness | 75.7% | 77.8% | 72.8% | 77.1% |
|                                                                                    |               | % of Total                                    | 69.2% | 71.8% | 64.1% | 69.2% |
|                                                                                    | Total         | Count of Participants                         | 107   | 108   | 103   | 105   |
|                                                                                    | Public Sector | Count of Participants                         | 27    | 27    | 27    | 28    |
|                                                                                    |               | % Agreed within Quality of Life Effectiveness | 25.7% | 25.5% | 26.5% | 26.2% |
|                                                                                    |               | % of Total                                    | 22.9% | 22.9% | 22.9% | 23.7% |
|                                                                                    | Privet Sector | Count of Participants                         | 78    | 79    | 75    | 79    |
|                                                                                    |               | % Agreed within Quality Of Life Effectiveness | 74.3% | 74.5% | 73.5% | 73.8% |
|                                                                                    |               | % of Total                                    | 66.1% | 66.9% | 63.6% | 66.9% |
|                                                                                    | Total         | Count of Participants                         | 105   | 106   | 102   | 107   |

**Table 10. Crosstabulation of Risk Management and Quality of Life**

## 10. Research Limits

There may be more data that can be accessed, but considering risk management depends in its entirety on the internal and external management of risks in addition to being reputational risks

in itself, it may appear that the data and information that can be disclosed by organizations are limited, with the exception of successful and noticeable projects in kind.

## **11. Conclusion**

In conclusion; The Kingdom of Saudi Arabia is witnessing an unprecedented renaissance regionally and internationally towards developing the quality of life, using several tools, one of the most important of which is risk management; Where the enterprise risk management approach contributed to reducing public waste and enhancing the general culture towards making better decisions in light of the accelerating global pace towards pursuing and adopting various investment, reform and progressive opportunities.

Every action has consequences, and every intention has goals. What matters here is that goals and consequences are always considered. When we look at abstract things, the superficial view may fail us if we are not accurate in contemplation and details. This is the concept of quality, in life, and in various matters, we must always calculate every step and its inherent risks, in order to get the best desired results. If we really want that, if we want to build societies that are less stressful and more effective and objective, risk management must be encouraged in all areas of life, as the effort, time and cost wasting by not doing that means in reality: the absolute of loss, given the success in any field and in any Society, there has always been a good management of risks, regardless of the difference in principle and application. The quality of humanity life means their actual life, and the lack of quality means a life without colors and without a soul. Let us strengthen the encouragement of development (without mistakes to do so) or at least let us do it together by avoiding unjustified losses, to make this planet a better, easier and smarter place to live.

## 12. Recommendations

It was great for us as researchers to see such awareness and interest in the Kingdom of Saudi Arabia towards the positively oriented approach towards risk management and improving the quality of life through this research. However, the need to exert greater focus towards highlighting risk management standards and tools, and to exert greater efforts towards disseminating and using them, remains the only approach through which better outputs and faster improvement can be ensured in various sectors.

We also recommend taking advantage of opportunities by all internal and external parties, local, regional and international, towards focusing efforts and re-employing assets towards appropriate risk management so that it can enhance the improvement of the quality of life in communities.

Finally, maintaining the upward pattern and success achievements remains the key to continuous progress, as constant commitment to risk management and continuous improvement is absolute in improving the quality of life in societies.

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## 13. Research Structure

- Research Index
- Acknowledgments
- 1. Abstract
- 2. Introduction
- 3. Research Problem
- 4. Research Objectives
- 5. Research Hypothesis
- 6. Previous studies
- 7. Real-time Examples and Evidence due some projects impacted life quality
  - 7.1 Economic Revolution
  - 7.2 Promoting Energy Sources and Sustainable Energy
  - 7.3 Safety Health and Insurance
- 8. Research Methodology
- 9. Research Findings
- 10. Research Limits
- 11. Conclusion
- 12. Recommendations
- 13. Research Structure
- 14. References
- Appendixes: English Arabic Abstract + The Questionnaire Conducted

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## Appendixes: English Arabic Abstract:

World is changing rapidly, sometimes for the better and sometimes for the worse. When it comes to a human life, change towards positive results must be ensured; Catastrophic errors and unwanted or unjustified results are avoided. For this, the science of risk management has evolved to extend to planning our lifestyle and providing guarantees for its continuity. This is only in the good management of risks in all matters of life; of food and water security, availability of energy, suitability of living space. Good risk management requires an awareness of the risks, and an examination of the risk inherent in it. In order to ensure the desired results, it must be real and reasonable enough to meet the need for their application. We can take the Kingdom of Saudi Arabia, which has a difficult continental climates' as good example, as the Kingdom of Saudi Arabia has devoted capabilities sought to change difficult circumstances into better ones in order to suited the area as more for living. This was through the use of risk management tools in an amazing way, as it redirected the steering wheel to the right track to provide a better environment for living and to providing the quality of life.

العالم يتغير بسرعة، أحيانا نحو الأفضل وأحيانا نحو الأسوأ. عندما يتعلق الأمر بحياة الإنسان، فلا بد من ضمان التغيير نحو النتائج الإيجابية؛ يتم استهداف تجنب الأخطاء الكارثية والنتائج غير المرغوب فيها أو غير المبررة. ولهذا تطور علم إدارة المخاطر ليمتد إلى التخطيط لأسلوب حياتنا وتوفير الضمانات لاستمراريتها. وهذا لا يكون إلا في حسن إدارة المخاطر في كافة شؤون الحياة؛ الأمن الغذائي والمائي، وتوافر الطاقة، وملاءمة ظروف المعيشة. تتطلب الإدارة الجيدة للمخاطر الوعي بالمخاطر، وفحص المخاطر الكامنة فيها. ومن أجل ضمان النتائج المرجوة، يجب أن تكون تلك الإدارة حقيقية ومعقولة بما يكفي لإمكانية تطبيقها. ويمكننا أن نأخذ المملكة العربية السعودية، التي تتمتع بمناخ قاري صعب، كمثال جيد، حيث سخرت المملكة العربية السعودية إمكاناتها لتغيير الظروف الصعبة إلى ظروف أفضل لتناسب المنطقة أكثر للعيش. وكان ذلك من خلال استخدام أدوات إدارة المخاطر بطريقة مدهلة، حيث أعادت توجيه عجلة القيادة إلى المسار الصحيح لتوفير بيئة أفضل للعيش وتوفير نوعية الحياة الحضارية.

## Appendixes: The Questionnaire Conducted:

- 1) Age
- 2) Public OR Privet Sector
- 3) Years of work experience
- 4) Risk Management Experiences
- 5) Do you think that the quality of life program can help improve life in Saudi Arabia?
- 6) Do you think that improving the quality of life can contribute to the general economy in the Kingdom of Saudi Arabia?
- 7) Do you think that promoting sustainable energy sources can help improve the quality of life in Saudi Arabia?
- 8) Do you think that promoting sustainable energy sources can help improve the economy in Saudi Arabia?
- 9) Do you think risk management can help improve the quality of life in Saudi Arabia?
- 10) Do you think risk management can help improve the overall economy in Saudi Arabia?
- 11) Do you have any experience in risk management sector?
- 12) Do you think risk management contributes directly to improving the quality of life?
- 13) Do you think that raising awareness and education about risk management can contribute to improving the quality of life and community life?
- 14) To what extent do you agree that the existence of training and educational programs on risk management can contribute to enabling individuals and institutions to better deal with challenges and risks?
- 15) Do you think that providing advanced risk management tools and technologies can contribute to improving the ability of organizations to deal with risks effectively?
- 16) Do you believe that having an effective legal and legislative framework for risk management can help achieve protection and safety objectives?
- 17) Do you think that cooperation and partnerships between the public and private sectors in risk management can contribute to enhancing the ability to deal with risks and improve the quality of life?
- 18) Do you think that providing adequate financing for risk management projects can support the implementation of innovative solutions and improve the quality of life?

- 19) Do you think that encouraging research and innovation in the field of risk management can contribute to the development of new and effective solutions to improve the quality of life?
- 20) Do you think that your organization/company pays enough attention to risk management?
- 21) Do you think that providing adequate financial resources to manage risks is an important factor for achieving positive results?
- 22) Do you think that the existence of mechanisms for measuring and evaluating performance in risk management can help improve operations and achieve the desired goals?
- 23) Do you think that providing leadership support and senior management commitment to risk management can contribute to enhancing the culture of safety and protection in the organization?
- 24) Do you think that the Kingdom of Saudi Arabia sufficiently encourages companies and institutions to adopt risk management?
- 25) Do you think that companies and institutions in the Kingdom of Saudi Arabia need more training on risk management?
- 26) Do you think risk management can help improve trust between businesses and consumers in Saudi Arabia?
- 27) Do you think risk management can help improve relations between companies and society in Saudi Arabia?
- 28) Do you think that risk management can help improve the ability to deal with crises in Saudi Arabia?
- 29) Do you think risk management can help improve the ability to adapt to changes in Saudi Arabia?
- 30) Do you think risk management can help improve the overall performance of companies and organizations in Saudi Arabia?
- 31) Do you think risk management can help improve profitability for companies and organizations in Saudi Arabia?
- 32) Do you think risk management can help improve innovation and development in Saudi Arabia?
- 33) Do you think risk management can help improve the organizational culture in Saudi Arabia?