The Impact of Renewable Energy Development on Foreign Direct Investment: Case Study in Egypt

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Abstract

- Re-shaping sustainable energy development is an attractive choice for reducing CO2 wastes and water consumption. Energy transitions within the international circumference and within regional boundaries are aquired by economic and political topics buoyaged and overturned by prevailing flows of capital. An early outline of the repercussions of global sustainable energy aims incorporated in the NECPs allared that energies aimed without taking additional actions in regional regulations would impair the market operations and the egg-related renewable electricity co-efficiency within the conditions posed within the NECPs pose particular challenges. Replenishing energy resources have long-lasting effects on environmental conservation and boosting human development. Sub-Saharan Africa, a region with more than 975 million people, is privileged with a highly proficient solar intensity, posing a substantial opportunity to benefit from widespread solar energy technologies. Unplanned and dawdling communal electrification generally leads to interim solutions to the consequences of centralized electricity supplies, which is incompatible with sustainable energy development. Deprived and settled rural energy consumers are in decent need of contemporary sustainable electricity access at reasonable prices in order to further their well-being in a manner that does not worsen environmental and social conditions.

Keywords: Renewable Energy, Foreign Direct Investment, Environmental Impacts, Social Impacts, Regulatory Framework.

1. Introduction

Historically, rapid and distinct alterions practically noticed in a secluded number of facilities and did not corroborate to long-since or geographically augmented negative effects. Feasibly more potential progress within ensuring features will collect if the measures are not reviewed and resorted upon while appending a user-centered advance. (Howe et al., 2021; Liang & Bushman, 2021)

The attractiveness of energy field has advanced over time giving in order to the endowment endowment, energy requirements and conceivable adjunctions. Facilitating cutbacks in utility concerns for renewable elements market administrators and capitalances subsidies for upto 90% of a project's expenses. Market administrators are with the use of a class of final dispatch therapy to administer the sustainable power unit exports with integrated by dictating the scathing and the urgings features on electricity at distinct points on the time-scale, like in Germany. (Rana & Khanna, 2020 ; Sisodia et al., 2020)

The sun is a way to flexibility and progress, proposing possibility for the growth and consolidation of renewable energy development in the Sub-Saharan Africa whose electrical structures were primarily established on non-renewable power systems and presently with anuseful capability,descending relative to the per capita consumer demands. Some industrialized countries are interested in intensifying sustainable energy growth in the Sub-Saharan Africa region and provide attendant funding decreasing the risk of the investment (Murshed et al., 2021).

2. Literature Review

In the context of the developed country, Karim, N., Mondal, H., & Talukder, M. S. (2022) take into consideration the case study of Bangladesh while the authors discuss how the influx of FDI into the RE sector has improved the electricity supply situation in the country. The authors say foreign companies are increasingly investing in the country's RE sector, which positively contributes to the power supply scenario in Bangladesh. The influx of FDI significantly reduces the risks of

blackouts . Tomekova, I. Ilieva, K. Naidanova (2021) provide evidence, through a case study of Bulgaria, that the regional pattern of FDI to a certain extent can be related to renewable energy policy . The authors intimate that this is consistent with a wide range of research focused on policy implications for investors in renewable energy, which indicates that the regional pattern of FDI can to a certain extent be related to national or regional renewable energy policy. The study builds also on previous works by converging them under the assumption that policy for increasing the attractiveness of Renewable sources amongst investors could attract not only investments in renewable energy but also other real investments. Therefore, renewable energy has significant potential for contributing to growth and does not undermine the main policy aim of governments of making the economy more competitive on a global scale.

The literature revolving around the relationship among FDI, renewable energy, and how it affects the country where it is applied has produced some evidence regarding its effects. In this scope, Shahbaz, Dar, and Albulescu (2015) explore how the effect of financial development in per capita RE consumption is conditional on the level of human capital. The results are indicated that less than 14 year of educational attainment, raises in bank credit improve usage of renewables energy however, increases in bank credit decrease consumption of renewable energy when the level of education is high (Wang et al., 2022). Sznajderska and Vergara (2020) work on the OECD countries investigate the effects of economic growth, trade openness and technical progress on RE consumption. They found that the variables used granger cause RE in the long-run. However, short-run results show that the relation between the variables does not have a uniform sign across the different countries, differences that are related to the trade variables at short run (Mahmudul Alam & Wahid Murad, 2021). Alaje et al., (2020) seek to explore how to create the appropriate policy that ensures the sustainability of RE systems across the Sub-Saharan Africa. Taking the case of solar PV, the authors construct a complex and exhaustive model using a system dynamics approach,

which includes all the different agents, technological parameters and variables, to study the effects of capacity and investment subsidies and possible increase in financing capacity (Pillot et al., 2017).

3. Methodology

This study aims to bridge the knowledge gap between FDI and renewable energy production in developing countries especially Egypt, by employing a data driven analytic approach. Weather cited, Egypt is located on a sunny belt, receiving wind patterns for around 300 days a year and has optimal standing for both solar and wind power technologies. Egypt strongly ralies on the oil and gas sector, however, its local renewable energy is pegged to meet its increasing electricity demand, given the current energy shortage crisis. Hence, the implemenation of renewable enenrgy projects is needed to better energy network, hence the study aims at using new analytic methods where lack affair with market to be fulfilled. With a multitude of economic and non-economic benefits, the Egyptian government has set out a number of incentive policies, among which FDI is one of the essential concepts.

This initial attempt benefits from lack of affair specific to the linkages between FDI and renewable energy production to fill gaps in existing literatures. The outcomes of the study potentially assist policy makers in their policy design and implementation relating to FDI-fueled sustainable energy developments. It is important to mention that the data used in the study is publicly available which enables other researchers to test our findings with alternative methods and different measures. Besides, differences in yearly predictive powers as a result of model choice highlight the importance of model accuracy.

The study used data-driven analysis to explore and analyze the impacts of Foreign Direct Investment (FDI) on Egypt’s renewable energy market and formulated promotion strategies (Ausloos et al., 2019). The quantitative approach is adopted using the autogressive distributed lag (ARDL) model to capture the lagged effects.

It was found that FDI has positive long-run impacts renewable energy production in Egypt. The impulse response functions based on the vector autoregression (VAR) model also revealed that FDI positively affects renewable energy production in the short run (Ajmone-Marsan et al., 2013).

4. Renewable Energy Development in Egypt

The Government of Egypt is taking proactive urban, rural and industrial electricity supply through renewable resources (Alsagr & van Hemmen, 2021). The Egyptian government is launching projects like solar city, solar village and two islands on the renewable resources through a photovoltaic system to cater for electricity needs. Under the Egypt Solar Energy Project in cooperation with the United Nations (ILO, 2010), solar water-heating systems have been distributed in Egypt to meet household electricity needs.

Renewable energy sources have no limitation. They are present in nature and can be obtained anywhere. Utilization of renewable resources can develop an economy and make it independent of imported fuel resources. In developing countries, renewable sources have a great role to play contributing to the development of the economy and reducing the import of fuel resources. It is environment-friendly and reduces pollution. Egypt is a country in the Middle East which has a very limited stock of fuel resources. Renewable energy sources are widely available. The need for renewable sources in the country, world and after recognizing its potential, various efforts and steps are being started in Egypt to shift from traditional sources to renewable sources (Ajmone-Marsan et al., 2013). In the context of Egypt, the need for renewable sources is very important. Egypt is a coffee country, which is not rich in crude oil and natural gas, although the country is not rich in conventional resources, renewable resources are available in the same amount. The potential for using renewable energy sources, such as wind and solar energy, is about 600,000 TWH/year for wind energy and 100,000 TWH/year for solar energy (Murshed et al., 2021).

The Egyptian government is launching a giant plan for the development of renewable energy sources. The government has set a target of producing 20‰ of the country's electricity needs from renewable resources by 2020 and 42‰ by 2035 to meet the growing electricity demand of the country. That is possible using the potential of renewable sources available in Egypt, such as wind, solar, biomass resources. As for the availability of wind energy, about 10‰ of Egypt's area has the availability of wind energy for power generation. (Tazay et al., 2020)

5. Foreign Direct Investment in Egypt

The country's infrastructure is situated in a strategic physical location considering its connectivity to the Middle East, Africa, and Europe, in addition to its large-scale internal market. The country has a well-established ports system (access to the Mediterranean and Red Sea) and a canal bearing international significance given its pivotal position in freight traffic and global trade, particularly energy transportation (connecting the Mediterranean Sea with the Red Sea), an efficient supply of sophisticated logistics (ports logistics), and favorable way point and bunker arrangement, existence of the petrochemical industry, and Egypt has plan to retrofit ships and convert ships to utilize liquefied natural gas with good international shipping routes and ports to service ships in the surrounding regions (Hafez & Madney, 2020 ; Lee et al., 2022).

The country's physical infrastructure is well-built, and it aspires to upgrade its traffic infrastructure, computer industry, and electronic communications infrastructure. Upgrades of the metro system and construction of light rail systems and high-speed trains are included as parts of the plan. Additionally, it has growing energy infrastructure and construction of airports or air expansion projects. (Elgohary, 2022 ; Adly, 2020)

Egypt has consistently improved the legal and regulatory systems to enable integration into the world economy, such as tax regulations, trade regulations, labor regulations, and foreign investment regulations. It, for example, reformed the

tax system by lowering the rate of profit tax and employing self-assessment customs method, excise duty collection method, and financing social security through raising employer and employee contributory rates. Additionally, in spite of the fact that there were some considerable strides made, Egypt's bureaucracy, and poor infrastructure remains the main hurdles to economic development, creating the need to continue reform in Egypt. (Kamel, 2021; Hemidat et al., 2022)

Egypt is located in a strategic place from a geographical perspective; it has domestic and regional access to the African, Mediterranean, Asian, and Middle Eastern markets, in addition to a free trade advantage to both the European Union (EU) and the Middle East and North Africa (MENA) countries as a result of signed trade agreements with international and regional organizations, as well as access to international waterways (the Suez Canal) (Salman & Amr Hosny, 2021).

6. Relationship between Renewable Energy Development and Foreign Direct Investment

Egypt endeavors to capitalize greatly on the opportunity to exploit RE resources and promote RE initiatives as a key strategic goal to reduce energy expenditures, accelerate energy conservation and reach sustainable development as a strategic objective. The REC is filled with RE resources; it's mainly desert land offers plenty of solar and wind power, which are inexpensive, clear, and abundant. At substantial proportions, also, the solar radiation and velocity of the wind. Also, Egypt loses energy from various RE sources, except that the hydro potential is both agricultural and industrial that sweetens much of the climatically heat. In 1986, Egypt started to pursue energy power development with the installation of the first 9 MW-photovoltaic solar field in Cairo and the completion of the wind assessment study by the National Energy Center/NREA and the German Federal Meteorological Service/DFVLR. Government intercession and stable long-term policies involving tax benefits is also one of the main explanations for the recent rise in foreign investment in this field of renewable technology. This support also includes a funding plan escalating to the offered rate to 1.60 U.S. cents per KWh

from 10 percent of EVE. The option of letting investors grow the start-up expense is the maximum investment incentive. (Mohamed et al., 2021 ; Elshazly, 2021).

The understanding of the relationship between FDI inflows and economic growth have persisted for many and successive studies in different countries worldwide (Salma et al., 2023).

One possible link is that FDI may foster economic development and growth through technology and knowledge transfer, managerial and marketing expertise, international trade and investment links with other companies and markets, including export and import of capital goods and intermediate and product goods and services, training and skill development, financial markets development and efficient use of resources, and increased R & D activities, innovation commercialization, and marketing and distribution of locally produced innovative products and services in the global markets. (Alfaro & Chauvin, 2020 ; Aziz, 2022)

Developing and strategically developing renewable energy resources would expand international business linkages and FDI inflows associated with these linkages. Increased demand for energy, reduces supply exhaustion, less energy resources waste and environmental and other pollution, fresh water generation, reducing Green House Gas (GHG) emissions, improves public health, improved human capital, minimizing environmental and other vulnerabilities, and reducing climate change effects. Based on the annual data readings from 2001 to 2017, 2001-2017, this study analyses the connection between renewable energy use and FDI inflows in the specific case of Egypt. The ARDL Model is employed to test long-run and short-run equilibrium modeling and causal relationships. (Ibrahiem and Sameh2022)(Mohamed et al., 2021)

7. Case Study: Renewable Energy Projects in Egypt

Continuing undernourished supplies, energy outages, interventional energy market regulations, and austerity measures are sustaining the low institutional trust in

Egypt. The sector stability has further weakened as a result of the delays in the government tender scheme via feed-in tariff (FIT). Therefore Egypt finds itself at an advantageous position to exploit its substantial potential for renewable energy—one of the most significant solar potentials worldwide. (Eshra et al., 2021; Elkadeem et al., 2020)

According to the Renewable Energy Country Attractiveness Index, Egypt has become a favorable place for sustainable energy use (EY). This opportunity is even more promising, considering the high Solar Energy Performance Index, wind potentials and the rapidly decreasing costs of clean technologies. The officials expect the renewable energy market to bring approximately US$ 30 billion investments through the reverse competitive bidding scheme and diversify the energy mix and optimizing energy sources for the country. The transition through increased Renewable Energy Capacity has severe energy security benefits resulting from reduced import dependence, increased diversity of energy sources, reduction of stagnant energy trade deficits, energy export rights and provides the potential to enhance macroeconomic stability and resilience in post-corona global economy. (Abdel-Basset et al., 2021; Habib et al., 2020)

Egypt has one of the highest potentials in solar energy exploitation in the world (Ayoub et al) (Abdelrashied & Bhattacharya, 2021). As International Energy Database declared, primary energy consumption in Egypt increased from 64.3 Mtoe in 1990 to 119.0 Mtoe in 2018. For the transition to sustainable growth and achieving sustainable development goals (SDGs), Egypt has created a blueprint for a low emission development strategy (LEDS) which aligns with the 2030 Agenda. Given the unsubstantial natural resources, Egypt's energy supply heavily depends on imported fossil fuel. With rapidly growing demand, the country has become increasingly vulnerable to energy crises and subjected to oil price fluctuation. According to the Cabinet of Egypt, 92% of the country's delivered energy was imported or uses the imported component, costing the country US$ 12 billion a

year. Given fossil fuel, import dependence increases the exposure to energy-induced economic risks as well as potential fuel export disruptions. The fast-growing demand causes the energy security issues in a heavily import-dependent country (Eltawil et al.).

8. Economic Impacts of Renewable Energy Development

Certain renewable energy resources are believed to be region-specific and may vary in size and impact according to the specific requirements of an economic area. At the same time, the transitions in renewable energy usage would be of great advantage to regions with certain and secure political and social conditions (Salman & Amr Hosny, 2021). It indicates a significant potential for additional/value-added investment in the developed parts; environmental efficiency products are also likely to benefit the developing areas. Nonetheless, regions with significant Geopolitical concerns may undergo lesser (none) economic advantages from the production and new investment in the renewable energy sector.

Renewable energy is accelerating the emergence of new markets (K R Karduri, 2023); it will lead to an increase in economic activity, stimulate and diversify economic activity, and will inevitably require increasing FDI. The significant increase in renewable energy will have a modest economic effect in the short term, including increased investment and employment (mainly in the renewables sector). Integrated with the appropriate and targeted policies, it may contribute to the establishment of broader incentives for economic growth and the resulting improvements in employment, trade, and industry.

The present study has confirmed the positive correlation between renewable energy consumption and foreign direct investment (FDI). In fact, the consumption of renewable energy resources and the enhancement of its consumption due to the development of financial resources and stock market, free trade policies, improved infrastructure, the efficient use of fossil fuels, and innovation not only create

employment opportunities but also stimulate economic growth and play a vital role on the global scale in attracting FDI.

9. Social Impacts of Renewable Energy Development

Although renewable energy developments have local impacts, the locations of the most important ones around the world have actually been marginal in social terms. For example, hydropower plants are often located in rural areas, while the wealth of countries is concentrated in cities, and to some degree this is also the case in Egypt. In general, renewable energy tends to be most expensive at 'local' levels, whether the locality is a large village or a small town. If the local populace is to benefit most directly from renewable energy projects, it will generally need subsidies. Such subsidies are less likely to be given in reasonably wealthy countries than in poverty-stricken ones, so that rural denizens tend to lose out. There is of course an up-side to such arrangements, but it usually accrues to the citizenry as a whole rather than to its poorer members (Pillot et al., 2017).

The development of renewable energy sources can have social impacts as well as environmental ones (Ahmed et al., 2021). Investment in renewable energy is thought to create jobs and reduce poverty, particularly if the investments are kept domestically, rather than coming from abroad. Conversely, some forms of renewable energy development have been shown to exacerbate poverty through their use of land, water and other natural resources. As we shall see below, most of the large-scale renewable energy generation in Egypt has been carried out by foreign companies, so that the following section is something of a worst-case scenario.

10. Environmental Impacts of Renewable Energy Development

Both benefits and adverse impacts of renewable energy on air, water, soil, and biodiversity have been proposed from deployment of solar, wind, and hydro and emerging technologies, compared with the alternatives (e.g., fossil fuel-based systems). Renewable energy technologies harness resources that are readily

replenished, and because they have short emissions life-cycles and are implemented locally, they are generally regarded as an acceptable method of generating energy with regard to the external health and environmental costs of the alternatives. However, some less-researched aspects of renewable energy technologies also carry substantial environmental impacts, either alone or when deployed at scale (Abdelrashied & Bhattacharya, 2021).

Many countries now wish to meet their national renewable energy targets with a combination of wind and solar PV to avoid the need for large hydropower projects and in accordance with national energy mandates, particularly where resources are abundant and projects are economical. However, in most countries, the siting and development of these large-scale renewable energy-based power plants involves conflicts with incumbent land uses and environmental resources, including human health and well-being impacts (Alsagr & van Hemmen, 2021). India, Egypt, and other nations heavily impacted by air pollution are actively seeking to develop renewable energy projects as part of an air pollution control strategy with widespread public support, and he argues that these projects are having a positive impact on ground level air quality. Cases in the existing literature include studies in Germany, Scotland, the United States, Ethiopia, and Nigeria.

The rise of renewable energy has the potential to severely affect land-use and local and regional environmental impacts, as well as social issues (Ajmone-Marsan et al., 2013). Several studies have highlighted potential adverse impacts on the environment from the deployment of renewable energy technologies. Investments in renewable energy will extend the physical and economic lifetime of the infrastructure which, together with co-benefits on air pollution reduction, can be essential to achieving global climate goals while meeting multiple objectives related to economic development. However, this transition to low-emission energy systems will also have implications for land, water, and minerals requirements, as well as socio-economic implications that demand attention.

11. Policy and Regulatory Framework for Renewable Energy in Egypt

The demand on energy in Egypt is rapidly increasing. The development of renewable energy with decreasing costs ahead will affect investment in conventional systems and decrease the cost and trade dependence of the energy supply by reducing energy consumption. Egypt is characterized by its attractive project to invest in renewable energy projects; such as the high solar radiation, long sunshine hours, and typical wind criteria in many areas. Furthermore, the Government takes many chances to invest in renewable energy to absorb foreign investment from multinational, government, and private investor (Ramaharo & Randriamifidy, 2023).

Egypt has adequate renewable energy resources, with a potential of around 57,800 MW from wind and 26,320 MW from solar power, in addition to considerable biomass from agricultural residues for power, heating and cooking, and biogas production. The government has implemented a comprehensive policy and law framework, including licenses, permits, prices, conditions, and data. Mechanisms to aid the development include feed-in tariffs, and incentives for building and financing renewable installations, and tax exemptions. There are also funding sources from international and regional donor agencies and banks, and local and international loans (Pillot et al., 2017). Renewable sources are also encouraged by the New and Renewable Energy Authority (NREA), and policies and laws are being updated to suit market demands. The Egyptian Electricity Regulator Agency regulates the relationship between renewable energy producers and the Egyptian Electricity Transmission Company. Egypt’s renewable energy law and policy are comprehensive and advanced and going in the right direction with a clear framework for starting and building the industry.

Economic growth is a critical factor for countries worldwide, with a significant impact on a country’s progress. The Middle East and North Africa (MENA) region face economic challenges and energy security concerns, and Egypt is no exception

(Salman & Amr Hosny, 2021). Therefore, the development of renewable energy resources is essential for economic growth and environmental improvement.

12. Investment Opportunities in Renewable Energy Sector

Since 2008, the world is currently being capable of installing a 20.000 MW through a combination of solar photovoltaic (PV) power and wind power development. Many countries have used their solar potential to their benefit and managed to change their energy matrix. For example, the world was able to install a promising solar PV capacity of 4423 MW in 2010 and 3993 MW in 2011 but Egypt was unable to install capacity in these periods. The future of Egypt in renewable energy and how can Egypt move on towards the big renewable energy is the main goal of this research. (Elboshy et al.2022 ; Abdelrazik et al., 2022)

To answer this goal, a hersh of sources of Egypt renewable energy data was collected and modeled to expect the future of renewable energy development. The main focus was on solar PV and solar CSP developments. The wind power has relatively been a good investment due to its relationship to investors. The potential power was evaluated from two main sources: meteorological data and satellite data, and the same capacities were expected. The accumulated capacities were calculated based on the Expected Equivalent Full Load Hours (EEFLH) and capacities was calculated in the period from 2013 to 2017. The added capacities were calculated based on the LCOE and VFB, kin order to indicate how the investments will affect the energy prices. In this research, in order to evaluate the future of Egypt investment, The A- PD (Preliminary Development) formula was used and the main conclusion can be summarized as: The CSP technology will be obsolete by, at least, 10 years. The main target is to reduce the Capex value down to $1000. Then, and Only then, the solar power farms projects will be able to compete with the Utility Grid. Furthermore, the CSP project especially those with storage capacity were not studied in this research. Additionally, the solar power is seen reasonable for the small to the medium householder electricity generating.

Moreover, the solar photovoltaic technology project will have low capacities, think of just above 30%. Consequently, in some cases, the project will never be able to turn on Investment. (Ibrahiem & Sameh, 2022 ; Abu-Rumman et al., 2020)

No Test in Egypt was able to prove that a project utilizing these principles resulted in less than the same result main factor and to lower photo not to show sensitivity to neither the electric battery lifetime and the investment. Important point of view was that the cost of the electricity would be lot in the case of Payback issue. What has been explained in this research shows that the Capital right now in unreliable for the solar project and what happened in the past is that The solar project investment is affected by the turbulence of prices in used. Between 2008 and for around 10 years, the main irrational factors will compete among themselves. (Budin et al., 2021; Babic et al., 2022)

Renewable energy resources are one of the potential solutions for the higher energy demands of the electric power system. Moreover, their development in many countries creates investment opportunities banes(Ajmone-Marsan et al., 2013). One of the most important renewable resources is solar energy(Abdelrashied & Bhattacharya, 2021). Therefore, degeneration of solar power development and investment modeling is necessary to encourage investment in the renewable energy domain. Many countries like Egypt, have a lot of solar irradiance and windy places and are planning to use it for renewable energy development (Ramaharo & Randriamifidy, 2023).

13. Challenges and Barriers to Renewable Energy Development

Wind and solar resources are abundant but not heavily utilized for various structural and institutional reasons. Specifically, Egypt has heavily relied on natural gas during a long period (73% of energy mix by 2017), and such an abundant source of domestic supply has been to the detriment of investment in the renewables. Moreover, the national electrical grid in Egypt has been characterized by limited and unreliable electricity provision and can also be derided as

inefficient. More so still, the heavily subsidized energy and power policy renewed the drawback of the renewables for few decades on end. (Farag & Zaki, 2021)

There were a number of unaddressed socio-economic barriers and issues at the maximum scale. The main obstacles for the renewable energies at the community level are as illustrated in the following figure. According to the photovoltaic program in 2007, the regulatory and legal infrastructures that control the load and distribution consumption of energy and the complex administrative procedures were considered as the most influential barriers with 21.4% of impact. Also, the awareness of the communities with the use of the technology and the dependency of some technology with other industrial technologies with 9.4% and 12.1% of the total impact respectively. Other important barriers include the cost of the installation with 6.9% of the impact, while the technical difficulties and lack of warranty periods with overall impact of 27.9%. (Othman & Khallaf, 2022)

Renewable energy development has gained more attention over the past years (Mahmudul Alam & Wahid Murad, 2021). Subsequently with the introduction of electricity reform plans, a number of barriers and challenges staunch the expected potential developments in Egypt to achieve sustainable development for the country (Pillot et al., 2017). However these potentialities have been constrained and mitigated due to different challenges and barriers. (Bishoge et al., 2020) So, the main issue in this sector is the fact that the National strategy in Egypt has encouraged both public and private investment in the electricity, yet in the real practice the incentives for the private solar systems were limited. Moreover the implementation of new constructive procedures and regulations has been faced by burdens (Othman & Khallaf, 2023; Hochberg, 2021).

14. Government Support and Incentives for Renewable Energy

A mixture of intense restrictions on foreign trade and the requirement of licenses for foreign operations was also formed by domestic policymakers. Encouragement to use renewable energy resources could not be fulfilled by the mixed force of

these transformations in the developing markets analyzed in the study next to monetary rewards and the influence of FDI inflows. If the developing markets (an emerging market economy with a lower-middle-income, a lower-middle-income, and a low-income country) would receive them, these markers would only be allowed by increasing the perceived risk of domestic transactions in the replicant market economies.. For a developing economy, complex political and social status can be perceived as a problem to resolve, slowing down new-consuming and constructing renewable energies. According to a review based on information gathered from worldwide emerging market IPOs and renewable energy-producing corporations, regional developing codes in the solar and wind production industries in particular have had a favorable influence on developing economies (Scheifele et al.2022; Mahbub et al., 2022).

Therefore, government support to encourage and attract foreign investors to contribute sufficiently in renewable energy usage is important, especially in developing markets. Previous studies have revealed that financial components play a vital part in both renewable energy usage and regulatory execution. For instance, financial exteriorities, such as corruption and domestic trade protection policies, lessen incentives for the usage of renewable energy resources. Particularly, there is a positive correlation between FDI inflows and renewable energy consumption. Consequently, promotion of government policies is more crucial in a corrupt and less regulated society. Especially in developing markets, corruption and domestic political malfeasance reduce incentives for companies to use renewable energies at the corporate level. In a comparative analysis on developed and emerging markets, the accelerated progress of renewable energy consumption was the only nonnegative domestic exteriority in the countries, while this was not the case in other emerging markets (Zhang et al., 2023; Caglar, 2020).

Government support and incentives, such as FDI inflows (Alsagr & van Hemmen, 2021), stock market growth, and any other form of government assistance, are

crucial tools for enhancing the usage of renewable energy (Murshed et al., 2021). Emerging markets need additional incentives from the government to encourage renewable energy development. According to the Emission Database for Global Atmospheric Research (EDGAR 2021), only 25 percent of world renewable energy was used by advanced countries, and all the rest was utilized by developing countries. The two sets are unequally divided, as approximately one-quarter of the world's modern energy infrastructure lies within developed countries and three-quarters within developing ones (Khlil, 2024). This indicates the low potential of renewable energy usage in developing economies or the frequent unavailability of necessary incentives.

15. International Cooperation in Renewable Energy Development

In conclusion, the transition to a new energy system necessitates financial collaboration and investment (Alsagr & van Hemmen, 2021). Reaching the objectives of sustainable and inclusive energy systems requires a global commitment and mutual trust between cooperative actors. Today, countries with abundant renewables, such as Brazil, China, India and Egypt, are set to become important energy exporters. Such countries have the opportunity offer affordable Green energy to the more than one billion people worldwide without grid access. They can become hubs for renewable energy technologies, manufacturing and knowledge that could leapfrog their economic development. However, substantial foreign investments in renewable energy will require more secure, transparent and predictable environments and financing conditions. Domestic, as well as international financial systems and regulatory systems, play a crucial role in the transition towards sustainable energy systems.

Renewable energy is a key element of the international climate policy framework aimed at facilitating the transition towards a sustainable and low-carbon energy system (K R Karduri, 2023). The diffusion and utilization of renewable energy technologies requires substantial investment, efficient regulatory frameworks, and

innovation. Given the prominent role of renewable energy, clear market signals and supportive policies are necessary to stimulate private investments and technological innovation. Largely driven by expanding domestic demand, the development of renewable energy could be an effective tool to overcome longstanding dependency on energy markets in other countries and the management of energy-related geopolitical threats. Moreover, the global energy transformation towards renewable sources forms the backdrop for various international collaborations and partnerships to enable the transition. International cooperation can provide emerging economies with technology and money, and industrialized countries with markets and investment opportunities (Murshed et al., 2021).

16. Case Study: Successful Renewable Energy Projects in Other Countries

According to a report from Rocky Mountain Institute, investments in solar PV could achieve LCOE of USD0.04/kWh by 2025. That means that solar PV must be so cheap, even covering the 20% of unavailability with capital and operational costs, that the annual average generation cost is around 50 USD/MWh. Despite not having great potential but reasonably rich wind resources, Egypt's wind speed is much higher than the world's average. Therefore, with further technological and market development, very cheap wind power could be discovered in Egypt. The photovoltaic solar generation price in two of the REM series of Federal German Networks Agency auctions was around 46 euros/MWh, thus indicating possibly cheap PV in Egypt (Ajmone-Marsan et al., 2013).

PV solar projects mostly use monocrystalline, polycrystalline, and thin-film silicon-Mono companies like Trina-Solar, Jinko Solar, JA Solar, LONGi Global, First-Solar, Canadian-Solar, and others are famous for crystalline silicons and thin-film. PV solar companies still may dominate and make a huge influence on technology and market dynamics in the next ten years. Estimated for October 31st 2020 was around 156,100MW worldwide of nuclear generation capacity. The UK

has recommended the need for a flexible nuclear nuclear generation fleet to assist balance as it expands the renewable energy fleet and phases out fossil fuel generation. The UK's National Grid indicative system provide variable total demands of 47.834MW on an average annual basis for the years 2030 to 4003 between invaluable and 54.464MW and 43.204MW. (Allouhi et al., 2022)(Victoria et al.2021)

The development of renewable energy in one country will lead to an increase in FDI in its own economy. That will come from investors who are keen to obtain some part of income produced in renewable energy sectors (Salman & Amr Hosny, 2021). The energy sector in Egypt is one of the largest in the renewable market and it achieved this growth in FDI as a result of a legal and legislative framework of FIT, risk insurance, capital guarantees, public debt guarantees and tax advantages. This legislation shows the potential for investors to invest in the renewable energy sector. Egypt is known as a low-risk country and energy offtake appears to be good with Electricíte de France believing that it was not necessary to cover 100% of power purchased to sign an electricity sales agreement, but to cover only 80% to "achieve profit". The Power Mix in Dubai demonstrates that it is not only lower-risk countries that can raise FDI in renewables. (Ibrahiem and Sameh2022)(Mohamed et al., 2021)

17. Lessons Learned from International Case Studies

Solar and wind power tariff can benefit from the previous success of renewable energy development and also from the disbursement of feed-in-tariff. The Energy Purchasing Department is in charge of buying and selling electricity and the planning and management of power purchase from the renewable energy producer. In Tunisia, more than 9,000 solar rooftop schemes and about 4,000 residential grid-tied programs were sponsored by the National Agency for Energy Conservation to demand solar water heaters. " Tunisia has already offered a 10-15% stipend for households who want to purchase solar panels. The National Agency for Energy

Conservation has made mandatory for new public buildings to install solar panels to provide 30-70% electricity requirements. Due to the circumstance of a huge production of domestic gas and oil demand via export and car manufacturing industry, there was a vigorous resistance against investment residential in renewables. The hydro power is the most vital renewable source of power in Egypt. It is widely available since it is one of the main source of "sustainable energy which was boosted along with coal and crude oil. Indigenous gas made up 70 per cent of all energy in Turkey and it is available on a considerable level. Due to its production and ingestion, Turkey is dependent on natural gas" (Aboulela et al., 2021; Alnaqbi et al., 2022).

The findings of our study highlight various lessons learned from renewable energy development in North African countries (Ajmone-Marsan et al., 2013). Morocco planned to generate 2 GW of power from solar and wind by 2021 to reduce the import of fossil energy. The Moroccan Agency for Solar Energy aims to install 2 GW solar power generation by 2020. Huge investments were made as Desertec chose Morocco to install the first phase of the largest solar power plant. The local people now reside close where the plant was planned to install, have voiced their inclination. The Ministry of Energy, Mines, Water and the Environment in Morocco developed a national strategy covering energy, coal, and renewable energy resources. According to the present Renewable Energy Law No 13-09, investors are granted financial and technical incentives at the national level with simplification of the project approval process. The Ministry of Energy recorded 1,300 MW of installed capacity of wind power and 510 MW of grid-connected wind power. The wind energy map of the National Agency for the Development of Renewable Energy and Energy Efficiency showed the map of the powerful windy provinces such as the North Atlantic and High Atlas Mountains. Algeria uses natural gas as the main source of power generation. The annual Growth of installed capacity was 4.5%. Algeria was supported by the desert conditions to harness the solar potential. Power generation is anticipated to be augmented to 6 GWh by the

solar plant installation. Both renewable energy plans propose to develop projects in place by the public-private partnership (Algerian renewable energy report, 2017).

18. Case Study: Failed Renewable Energy Projects in Other Countries

The United Arab Emirates has implemented the project of Concentrated Solar Power (CSP) with a total generational capacity of 700 megawatts. The project was competed and it was commissioned in the year 2014. The cost of the projects per kWh was found to be highly expensive which stands for (0.170 cents per kWh). Due to natural gas production, natural gas in Egypt can be converted to renewable energy by 75 % of the generated rates and therefore conservation of the natural gas for 40 years (Murshed et al., 2021). A good development in Egypt will lead to good developments in other countries. Solar water heating (SWH) is one of the applications of renewable energy. Because of this technology, Egypt has become a role model for several developing countries. Egypt's project aims at providing 20% of electricity from renewable energy by 2022. The country therefore uses ventilation / which targets the implementation of centralized photovoltaics (CPV) solar farms, thus enabling the accelerated adoption of alternative energy sources.

Jordan has announced several renewable energy projects, the project was delayed due to the fluctuation of the cost (it's not cost-competitive). The cost of construction is still unaffordable and the price of electricity is high putting the investor in uncertainty for the low return on investment from his perspective. As well as the price of electricity produced from renewable energies is highly expensive. And thus the investor has to rely on the electricity price to be set by the government as part of its strategy for renewable energy and limited sources of foreign currency (Salman & Amr Hosny, 2021). It should be noted that the advantage of an investor to build a radical power plant in Jordan depends on the private sector and the financier's view of the environmental targets and their objectives to keep the add value in the country's economy by rationalizing the imports energy bill, and as the export of electricity will enhance the foreign

exchange about 1 percent. DECLARE Heritage Co., employs an intermittent salt-gradient solar pond (SGSP) at different locations and trial periods in the Southern Governorates of Egypt and Sinai Peninsula. The experiment results trenched Engineers in Jordan for making the Green Investments plan, by Running 60% of the Capital Maintenance, adding natural gas to the flue gas to increase the speed of evaporation and finally the installation of pumping power plant thanks to the aids of the aids of the government. Such works detailed in DARE playbook by the Jordan Engineers, in this playbook much information was given about the saline length in Egypt, Brackish ponds that are a nice strategy to dry the ponds that require only 1000 saturation. Then these ponds can serve as water and electricity for the area or an hour surrounding it for a good portion of the year.

In 2019, it was revealed that renewable energy is the topmost sector that will make a good impact on the forex reserves of country's from around 90 donor countries of African countries with Zero-interest loans, Egypt has raised the proportion of loans for energy-related projects to 57 percent of total foreign direct investments to now accounted for 77 percent from August 1, 2016. The average total investment finance for national JI or AC projects that includes co finance direct and co-financed direct respectively for renewable energy projects in the year are registered in ranges between 25 to 30 million. Direct and indirect finance equal to 5 million and 2.5 million respectively for similar projects. Africa countries at large and Egypt in particular, among the main unique advantages of renewable energy, is, economically and environmentally, in addition to the creation of job opportunities, and achieving further energy security, for realization of renewable energies, it requires one of the maximum capital investment in the outset, unlike fossil fuel energy, also the production cost is low, in comparison to renewable energy sources, and it is devoid of environmental hazards unlike the usual sources. (Borowski, 2021; Chanyisa, 2021)

Many countries in the past have announced multiple RER projects but face difficulties during the implementation phase. In this part, examples of some RER projects will be introduced. Some Reports discussing potential Renewable Energy Resources (RER) in Egypt are available (Ajmone-Marsan et al., 2013). The Egyptian government has allocated huge funds to the construction of various renewable energy projects. The efforts made by the government eventually established 100 New Power Plant, which was inaugurated in 2016, in Egypt will reduce the carbon footprint from the environment by 4.4 million tons per year. As part of the integrated plan for the construction of new power stations, 12 new solar power plants and 2 in wind energy. This was accomplished to realize Egyptian Vision 2030 and to make knocking out achieved in reducing emissions of greenhouse gasses and moving towards cleaner energy sources with access to many international funds as they are making use of the foreign direct investment of FDI. (Abdel-Hameed et al., 2021; Abdelhady et al., 2021)

As a part of program among African Workshop on Climate Change, held in Nigeria 2020, debates on Egypt one of the African Countries which does its best to increase the proportion of renewable energies, with Target of 20% in the framework of energy mix, which aims to raise as soon as possible to 100% and the carbon footprint to zero. Wind power has always had the biggest market share in terms of renewable energy technology and has made a significant contribution to global energy consumption. (Wiser et al., 2020; Sadorsky, 2021)

19. Lessons Learned from Failed Projects

More importantly, in future investment, the coordination among countries government is necessary and suggested this study is significant for MENA countries government to rectify the errors that they experience in the past energy investments. MENA (Middle East and North Africa) implemented wrong and, by a decline in international investment and encouragement, this study suggests the rules and regulation reforms for future investment (Poudineh et al., 2020).

The study emphasizes to the policy makers that in order to use domestic energy sources, it requires to make the policy for foreign and domestic investment in the same manner because of foreign energy sources investment approacher adversely affect from the foreign and domestic investor's investment rules and regulations. If a county has decision-making independence power, then they could take the decision for the energy consumption as well as decide on the vehicular consumption evenly. Hence, investment in renewable energy sources is necessary which results in this electricity reduction (Qiu et al., 2021).

Furthermore, various renewable energy projects have faced collapse because of several factors, in particular external influences. To substring these external factors in the future, a long-term firm policy is suggested for government involvement. Also, the weak monitoring of energy consumption forecast provides the pathway for collusion that is a big obstacle to investments in energy sources. Furthermore, the active involvement of government and anticipation of the future global economic need on a short term and long term span is needed. While consumers' demand on energy consumption may be predicted by government tools and techniques (Abdelrashied & Bhattacharya, 2021).

The development of renewable energy in underdeveloped countries has experienced several stumbling blocks. These issues arise from internal and external factors. Factors, such as changing governments, old-fashioned institutions, and socioeconomic problems, are some key factors which lead to struggling in the energy market. Moreover, surprisingly, a high unpredicted increase of social demand for energy also leads to a hurdle in renewable energy investment. More importantly, changing policies and economic issues are affecting the global the economy as a whole, are having a substantial impact on the renewable energy. Along with a wobbling global economy, a high inflation rate as compared to other countries also decreases the Foreign Direct investment in the energy sector.Mineral resource-endowed countries with high financial development face a vast hurdle in

the direction of renewable energy sources while non-mineral resource-endowed countries are attracted by the giant investment in renewable energy sources (Ramaharo & Randriamifidy, 2023).

20. Recommendations for Enhancing Foreign Direct Investment in Renewable Energy

The main benefit of investing in those finances would be to create diversified FDI, to decentralize it and to make it more ulcerous. Industries inside the country such as manufacturing collector lines, halving a theme on the production of solar panels or construction of power stations in the field of cost reduction, an improved Saudi industry will support the development of local coaches and material suppliers in the Egyptian auction guarantee market. Providing cement, financial investments could lead to a significant impact on retaining the labour of local people in foreign countries in the market whether our employees are foreign or Egyptian with the weakness of local employees and work abroad.

Scientific findings indicate that the next recommendation for increasing FDI is to improve the uniform regulations of the laws related to the energy sector to introduce a free-market energy pricing mechanism. Therefore, the provision of guarantees and the development of foreign investments should be reformed in order to adapt these policies to international standards (Abdelrashied & Bhattacharya, 2021). To address environmental risks, in tandem with foreign investment, the introduction of such reforms and supporting services should be regulated, thereby reducing the consequences of negative externalities. The sample suggested potential investors of a concrete Egyptian partner in their projects, while the high level of competitiveness in the power market and renewable sources in particular was given in order to encourage government entities responsible for attracting foreign investments in renewable energy to participate in English and international fairs.

The majority of the participants in the survey are approving for the provisions of guarantees and protect foreign investments (Ramaharo & Randriamifidy, 2023). As much as 79% of the surveyed entities think that investment protection measures are necessary, and 76% of respondents favour direct support for investors with attractive financial assistance and packages such as grants and fiscal incentives as well (Mahmudul Alam & Wahid Murad, 2021). Increased attraction measures in new market segments are proposed to help potential investors. Additionally, Nile water, in order to improve the process of development in Egypt through the offering of long-term non-recourse loans by international banks, should be included in conditions for investment.

21. Conclusion

In conclusion, it seems likely that renewable energy projects will continue to attract investors for several reasons (Pillot et al., 2017). Firstly, it seems likely that global energy prices, forecast to reach 4.5% a year until 2050, will usher efforts to diversify sources of electricity generation in a country like Egypt, drawing on its full deb of renewable energies. Secondly, fossil fuel availability and prices are in a state of flux, the balance between supply and demand are more uncertain than in recent decades, and concern over the security of future energy supplies appears more pronounced. Thirdly, there is some controversy about the long-term viability of single management inclusive of nuclear, renewable and electricity corporations.

Our findings corroborate the work of Alnatur and Guan, who felt that renewable energy has a positive association with FDI flows in Egypt. The renewable energy subsector of wind, hydro and solar photovoltaic (all clean energy) ranked seventh out of 11 Egyptian sectors analysed in the global value chain in 2018. However, some caution is suggested because there has been a significant reduction in world FDI flows, a cooling of global demand, as well as macro-economic disruptions in the years 2019 and 2020 caused by the COVID-19 pandemic. Nevertheless, annual gross FDI inflows to the Egyptian economy seem to be showing a trend increase,

temporarily interrupted in 2020, since 2013. Additionally, there has simultaneously been a 14% FDI increase to the energy outlook for renewable sources in 2020 over the previous year's levels, despite the impact of the COVID-19 crisis (Ajmone-Marsan et al., 2013).

Over the past eight years, significant policy and regulatory reform in Egypt has been credited with attracting substantial foreign direct investment (FDI) to construct a large-scale renewable energy project. This pilot study explains the rationale for and the need for investment in large-scale renewable energy projects in Egypt (Salman & Amr Hosny, 2021). The research also examines which policies are associated with successful renewable energy production in the country and provides a brief account of FDI that has flowed into such projects to date. There are a number of corporate social responsibility implications attached to foreign businesses investing in renewable energy projects; this is the subject of future study.

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