An-Najah National University
Faculty of Graduate Studies

ASSESSING THE ADOPTION OF RENEWABLE ENERGY AND SUSTAINABLE PERFORMANCE: THE GOVERNMENTAL ROLE AS A MODERATOR

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Dedication

(وَمَا تَوْفِيقِي إِلاَّ بِاللَّهِ عَلَيْهِ تَوَكَّلْتُ وَهُوَ رَبُّ الْعَرْشِ الْعَظِيمِ)

I dedicate my thesis to my native country Palestine, and the mighty Palestinian people.

To my lovely parents, without whom I would not be who I am today.

To my grandfather's soul (Abo Waleed), to my dear grandmother (Om Waleed).

To my uncles and aunts, especially my idolized uncle Imad Salem, who never hesitated to support me throughout my life.

To my beloved sister and her sweet son, I would not have done this without her support because she was like a real bond.

To my brother and my sweet friends.

To everyone who has wished me well and offered support even with a single word.

Thanks a lot, and gratitude is unlimited for everyone.

Acknowledgment

My sincere thanks and praises go to God Almighty, who gave me the strength, wisdom, and bravery to accomplish this thesis.

Thanks to my supervisors, Dr. Yahya Saleh, and Dr. Mohammed Alsayed for their effort, encouragement, and insightful comments and insights that contributed tremendously to the success of this thesis.

Additionally, thanks and gratitude go to my family and friends for motivating and supporting me throughout this journey.

I would like to thank everyone who aided me in the completion of this thesis, directly or indirectly.

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

ASSESSING THE ADOPTION OF RENEWABLE ENERGY AND SUSTAINABLE PERFORMANCE: THE GOVERNMENTAL ROLE AS A MODERATOR

I declare that the work provided in this thesis, unless otherwise referenced, is my own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: **Isra' Waheed Mahmoud Salem**

Signature: Isra' Salem

Date: **16/02/2023**

Table of Contents

List of Tables

List of Figures

List of Appendices

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Abstract

Renewable energy has attained enormous attention in recent years due to the exhaustion of certain energy resources, and the pollution caused by fossil fuels. At the same time, the adoption of renewable energy sources (RESs) is a complicated process influenced by multifarious factors.

Therefore, this study aims to investigate factors influencing consumers to adopt renewable energy in the Palestinian industrial and commercial sectors and their effect on sustainable performance, as well as the moderating effects of governmental role on the relationship between the adoption of RESs and sustainable performance. In addition, the extent of adoption of RESs, governmental role, and sustainable performance of industrial and commercial firms in Palestine. A quantitative method was used to collect data through questionnaires from 100 top managers. The data analysis was conducted using Smart PLS software to test hypotheses. The findings show that the adoption of RESs, sustainable performance, and government role are being implemented at a high level in Palestinian industrial and commercial sectors.

Additionally, the findings support the positive relationship between the adoption of RESs and sustainable performance, where there is a positive relationship between the adoption of RESs and the government's role. Whereas, the relationship between the government's role and sustainable performance is not established. Further, the government's role is supported as a moderator between adopting RESs and sustainable performance. However, we believe that the results of this study may be useful for assisting the government, decision-makers, and those who provide equipment for renewable energy with a better understanding of the factors that affect consumers in adopting RESs. Besides, the knowledge of the government's major and least effective policies that affect consumers for adopting this technology in industrial and commercial sectors in its entirety directs

the Palestinian government to improve part of their strategy in terms of legal regulations and subsidies and to provide support and various facilities to encourage investment in renewable energy.

Keywords: Government role; industrial and commercial sectors; renewable energy sources (RESs); sustainable performance.

Chapter One

Introduction and Literature Review

1.1 Chapter Overview

This chapter deals with an overview of the subject of the research. This research is divided into many sections, including general background, a problem statement, importance, objectives, hypotheses, and the structure of this thesis. In addition, this chapter presents a review of the literature and theoretical studies relevant to the topic that was used to illustrate a clear and comprehensive concept of renewable energy sources (RESs), sustainable performance, and the role of governments in adopting RESs. Moreover, the research presents the relationship between the adoption of RES and sustainable performance in achieving environmental, economic, and social dimensions in the Palestinian industrial and commercial sectors in the presence of a government role as a moderator. Also, this chapter concludes the research hypotheses developed based on a literature review.

1.2 General Background

Recently, sustainability is the top goal for all businesses worldwide. In parallel, energy is a key factor in satisfying all human needs and contributes to the sustainable economic development of countries (Sasmaz et al., 2020), but it also poses a danger to the development of sustainability and the environment (Zhukovskiy et al., 2021). Due to the anticipated exhaustion of non-renewable energy, the shift to renewable energy sources such as wind, solar, and biomass is an important driver for reducing environmental damage (Vivek et al., 2021). Generally, renewable energy is closely-related to economic, social, and environmental sustainability. Where economic growth in some countries have contributed to the adoption of RESs through the development of accurate technologies to confront environmental problems and reduce the cost of production costs (Xu et al., 2022). Based on that , RESs are used to lower prices, minimize environmental impact and increase social well-being (Ramos & Rouboa, 2020). As a result, more consideration has been devoted to RESs without depleting the energy sources (Manzano-agugliaro et al., 2012).

According to Palestinian News and Information Agency (2022), Occupied Palestinian Territories (OPT) are significantly suffering from the dearth of conventional energy

sources, the rapidly increasing population, and the upsurge in energy pricing. Moreover, the OPT are relatively complex states with unstable political conditions. According to Hamada and Ghodieh (2021), Palestinians have to import almost 86% of their electricity from Jordan, Israel, and Egypt, while the rest of the energy making 14% of the total is produced locally in Palestine. As per 2021 data, among the different RESs, solar has much potential in Palestine. Additionally, the high costs are considered the driving force to figure out some RESs alternatives. In such a situation, renewable energy (RE) is considered to be the most hopeful solution to fulfill the energy crisis issue in Palestine (Yasin et al., 2021). Palestine has the potential to generate its own RESs that would eventually bring a significant change in the whole situation. For example, the Palestinian National Authority (PNA) has estimated annual average photovoltaic energy (solar) energy ranging from 5.4 to 6 kWh/m² with sunshine hours of more than 3000 hours in a year (Ajlouni & Alsamamra, 2019). Considering this, the government should develop a strategy to promote renewable energy technologies and stimulate labor capabilities to build a plan that increases the adoption of RESs to eliminate the Palestine government's dependency on Israel.

Nevertheless, the adoption of RESs can be a complex process, as there are many factors to consider when deciding to switch to these new technologies which encourage researchers to check these factors (Irfan et al., 2021). Typically, Blohm (2021) argues that adopting sustainable energy is not difficult if the government sets a strategic plan to ensure the provision of RESs. The government should provide incentives to invest in RESs, establish legislative regulations, and support programs to create a sustainable future to ensure the provision of stable energy free of pollutants at affordable prices, and achieve national stability in terms of energy efficiency (Gudlaugsson et al., 2022). Even so, the government should support projects and take appropriate steps that promote green energy sustainability (Binh An et al., 2023).Therefore, achieving a sustainable future begins with preparing and implementing policies that cover the current demand for energy from RESs. As a way to encourage the adoption of RESs technologies and enable their replacement with traditional fuels, incentives, encouraging government-industry corporations, programs for fostering research, and tax credits are being promoted (Abotah and Daim, 2017). Increasing evidence indicates that firms might improve their sustainability performance through RESs. For example, a study conducted by the

International Renewable Energy Agency (IRENA) found that RESs can improve a business's competitiveness, save money on energy costs, and reduce greenhouse gas emissions (Ferroukh et al., 2016). In compliance with this, Yürek et al. (2021) confirm that one of the main aspects of achieving sustainability is renewable energy utilization.

Because of this discussion, we can conclude that, on the one hand, the government's role has an antecedent effect on the adoption of RESs. Aside from that, the role of government affects sustainable performance. In this regard, the role of the government is identified as a moderator to enhance the relationship between the adoption of RESs and sustainable performance. Even though very little research has been conducted on this moderate effect (role of government), no comprehensive models have been developed how the role of government enhances the relationship between the adoption of RESs and sustainability performance. It is, therefore, necessary to conduct empirical study to fill this gap in this study area.

The industrial and commercial sectors are among the most energy-consuming in Palestine, According to 'Palestinian Electricity Regulatory Council' (2020), the energy consumption of the commercial sector is 22%, while the industrial sector consumes 17%. Based on the high cost of energy in Palestine, such large consumption would require an expensive cost. Therefore, the adoption of RESs is a way to reduce costs in the long-run.

In this research work, an empirical explanatory study is conducted to assess the adoption of RESs and sustainable performance in the industrial and commercial sectors in the West Bank of Palestine by looking at the various factors that need to be considered when deciding whether or not to adopt them. Next, this study investigates the adoption of RESs to improve sustainable performance in three dimensions; economics, environmental and social. After that, this research highlights the role of government in moderating the relationship between RESs adoption and sustainability performance in these sectors.

1.2.1 Problem Statement and the Research Questions

Considering the present situation of OPT, which highly depend on the Israeli Government for energy, the Israeli government has all the control for regulating the energy supply to Palestine due to political reasons. Not only the political reasons but also the natural resources in Palestine are declining with each passing day. The problem that OPT have

been facing for a very long time the lack of energy independence and dependence on the import of energy from the Israeli occupation (Khatib et al., 2021).

In Palestine, Based on the best knowledge of the researchers, there is no research done that has evaluated or assessed the industrial and commercial sector's opinion regarding the adoption of new renewable energy technology. Therefore, this research is designed to provide an evaluation and adoption of renewable energy in OPT based on the industrial and commercial sectors' perspectives. The focus of this research would be finding ways of adopting RESs particularly solar and biomass.

RESs are often praised for their potential ability to reduce pollution and address climate change. However, a lack of reliable data on the costs and benefits of these technologies has hampered their wider adoption (Cheam et al., 2021). In Palestine, a reduction of investment in RESs infrastructure and policies that incentivize the use of these technologies has resulted in a reliance on conventional sources (Zaid and El-Kilani, 2015). Governments worldwide are making significant efforts to promote RESs use to enhance sustainability. Many initiatives and policies are implemented to increase the adoption of RESs that demonstrate these efforts. The aim of these measures is to achieve sustainability by minimizing the environmental impact of energy production through the promotion of RESs (Gomesh et al., 2013).Therefore, this study investigates the hurdles to the adoption of RESs in the industrial and commercial sectors in Palestine and makes policy recommendations to promote their use. Over this, the ultimate reason for this research lies in clarifying the role of the government as a moderator in the relationship between the adoption of RESs and the performance of sustainability in its three dimensions: (1) economic, (2) social and (3) environmental in the sectors of industry and commerce that have not been studied in Palestine.

Scholars that the high cost of RESs technologies is the main barrier to their adoption. In addition, a lack of government incentives and policies that favor the use of renewables has resulted in a slower uptake of these technologies. Among the other barriers to renewable energy usage is a lack of knowledge about their benefits and the absence of standards and regulations for their deployment (Seetharaman et al., 2019).

Based on the problem statement, this research seeks to address the following questions:

- RQ1: What is the extent of RESs adopting and governmental role among industrial and commercial firms in Palestine?
- RQ2: What is the relationship between the adopted RESs and sustainable performance in Palestinian industrial and commercial sectors?
- RQ3: What is the relationship between the governmental role and RESs adoption in Palestinian industrial and commercial sectors?
- RQ4: What is the relationship between the governmental role and sustainable performance in Palestinian industrial and commercial sectors?
- RQ5: Does the governmental role moderate the relationship between RESs adoption and sustainable performance in Palestinian industrial and commercial sectors?

1.2.2 The Significance of Research

The importance of this research derives from its theoretical and practical contributions. In theoretical contribution, the study will create a conceptual framework model for the adoption of RESs, sustainable performance, and the government's role. In general, the adoption of RES leads to improving sustainable performance in three dimensions; economic, environmental, and social. Afterward, this study also examines how the government's role moderates the relationship between sustainable performance and the adoption of RESs. Previously, this topic has not been addressed in this manner. The government's role includes many factors such as policies, legislation, competitive bid, and financial incentives. Furthermore, the research would focus on the industrial and commercial sectors' attitudes toward the acceptance of clean energy sources, as well as the factors that influence their decisions to adopt RESs. Likewise, the research-based analysis and evaluation will also measure what level of implementation of RESs in the industrial and commercial sectors in Palestine as well sustainable performance and government role. As a practical contribution, this study's findings to identify the challenges and factors associated with the adoption of RESs may assist enterprises and governments in developing successful technology adoption strategies and policies that will create investment opportunities in renewable energy and create jobs. Subsequently, the more sectors adopt renewable energy, the more we can reduce carbon emissions and their adverse effects on climate.

1.2.3 The Objectives of Research

This study primarily seeks to bridge the research gap by evaluating the moderating role of the government in the relationship of adoption of RESs and sustainable performance in the industrial and commercial sectors of Palestine.

The following goals are the focus of this research:

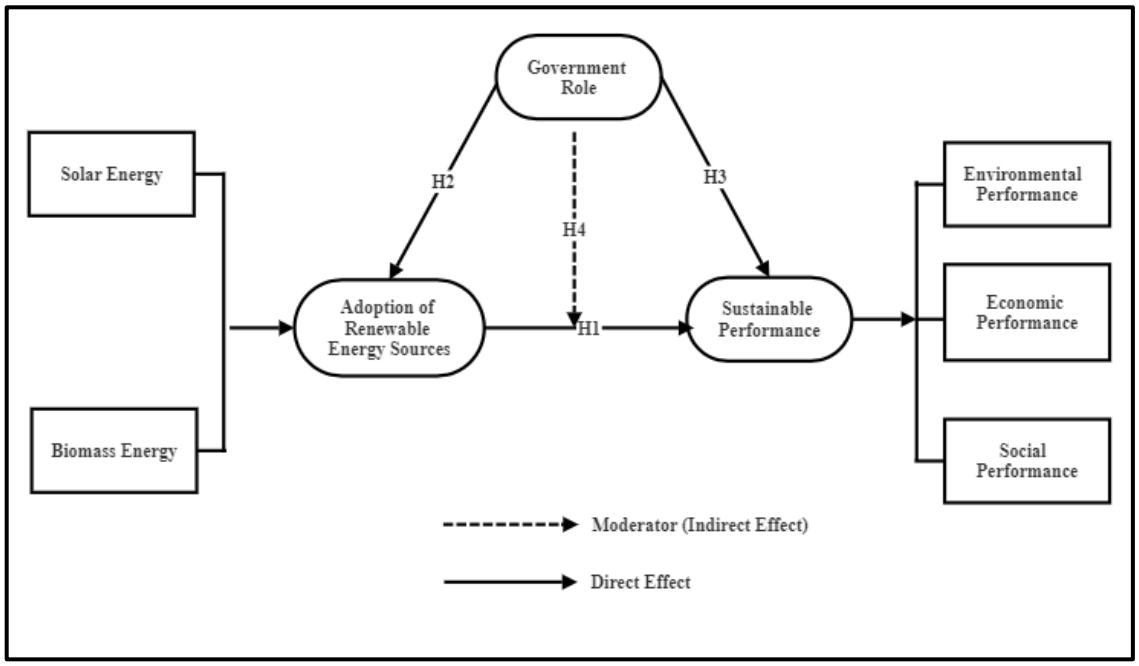
1. To examine the level adopting RESs and governmental role of industrial and commercial firms in Palestine.
2. To determine the relationship between RESs adoption and sustainable performance in Palestinian industrial and commercial sectors.
3. To determine the relationship between governmental role and RESs adoption in Palestinian industrial and commercial sectors.
4. To determine the relationship between governmental role and sustainable performance in Palestinian industrial and commercial sectors.
5. To examine if the Palestinian governmental role moderates the relation between the adoption of RESs and sustainability in Palestinian industrial and commercial sectors.

1.2.4 The Research Hypotheses

Figure 1 illustrates the research model and the corresponding hypotheses (more details on the hypotheses are given in the following sections). The foremost subject matter of this figure is that knowing more about the connection between the adoption of RESs and the government's role can result in a higher knowledge of the connection between the adoption of RESs and sustainability performance. Specifically, this study examines the moderator (government role) effect on the relationship between the adoption of RESs and sustainability performance. Also, it examines whether there is an antecedent effect of the government’s role on the adoption of RESs in addition to examining the direct effect of the government’s role on sustainable performance.

Figure 1

Research Model and Proposed Hypotheses



1.2.5 The Structure of the Thesis

This thesis is divided into four chapters as follows: Chapter one provides the research problem, hypothesis, and objectives, and provides a comprehensive literature review that shows the previous work done in this field. Chapter two gives a description the methodology and data collection methods followed in this research. Chapter three gives a results presentation and analysis. Chapter four gives a summary of discussion of the results of this study, conclusions, recommendations, practical and theoretical implications, limitations, and future works.

1.3 Renewable Energy Sources (RESs)

The economic and social growth of any country is significantly influenced by its energy sector progress and development (Hao, 2022). Oftentimes, the availability of energy is one of the most common issues facing humanity, especially with the increase in the number of people and economic development, both of which call for raising energy consumption. Then, politicians and decision-makers have pushed to consider other ways to obtain energy, such as RESs (Zhang et al., 2022).

RESs have become increasingly significant worldwide due to their abundance, inability to deplete quickly, and lack of expensive raw materials, in this way, RESs contribute to a

sustainable and reliable energy future (Adelaja, 2020). As reported in the literature by Jaiswal et al. (2022), renewable energy technologies are environmentally-friendly, require low operating and installation costs, and achieve economic sustainability. Obviously, energy particularly RESs, is essential to meeting a significant portion of global energy needs and for generating the wealth and jobs that will result from sustainable development. So, RESs is an essential option to guarantee sustainability and energy for future generations .Besides, it has been stated that the PT have RESs capable of creating a solid foundation, particularly in creating jobs (Yamin, 2020).

The bottom line is that RESs are critical to achieving global and urban sustainable development. The main objective of the energy system is to find a way to obtain RESs, such as solar or biomass, for their vital role in the satisfaction of people in all aspects of life (Bhuiyan et al., 2022). The sections that follow give an overview of the many sorts of RESs

1.3.1 Solar Energy

Solar energy is one of the world's most famous sources of electricity, as the development of solar energy technology has contributed to obtaining electricity at competitive costs (Honrubia-Escribano et al., 2018).Referring to Omar et al. (2018), solar photovoltaic (PV) is becoming an attractive alternative for electricity generation. In developing countries, solar energy is the most promising source capable of meeting future energy requirements. Moreover, solar energy is good for the environment, reduces pollution, and generates more employment (Kabir et al., 2018). Besides, Gisha (2017) discusses that solar energy represents half of the renewable energy in Palestine, with the other half being biomass and other sources. Solar PV is the most widespread technology to achieve effective sustainability for future investments. Further, solar energy has contributed to addressing energy poverty in Palestine and achieving economic development related to the life of the population, given that Palestine receives one of the greatest radiations directed to the sun (Hilal and Nasser, 2018). Additionally, this type of RE is preferred over others that do not produce solids, liquids, or waste during operation, except dust and pollutants that reduce the efficiency of PV panels, and the water required for infrequent panel cleaning (Fernando and Oliveira, 2018). With this in mind, climate change is a common environmental issue today, then, using solar energy to generate electricity can reduce greenhouse gas emissions. For this to happen, the government should take the necessary

measures and develop policies that promote energy production and environmental protection (Fayaz et al., 2022).

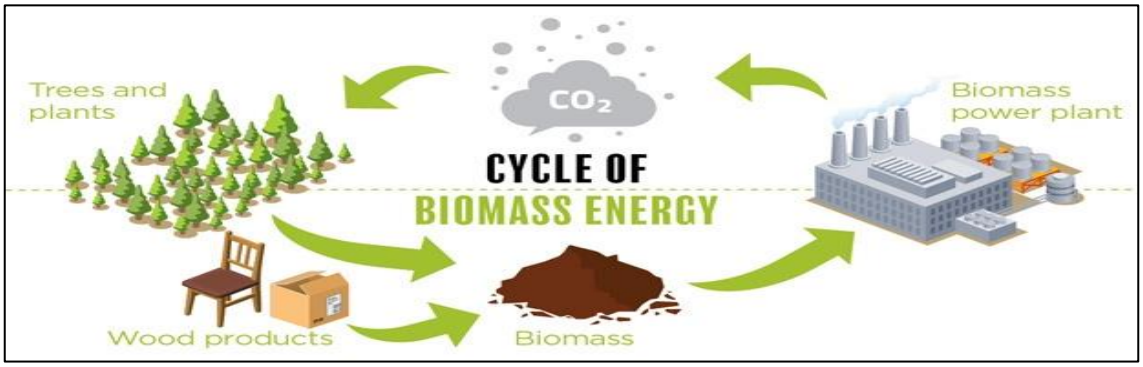
1.3.2 Biomass Energy

The biomass energy cycle refers to the process by which organic matter, such as plant material, is converted into energy. (See Figure 2 for an illustration of a biomass energy cycle).Undoubtedly, biomass constitutes an effective source of renewable energy through its ability to convert waste into a source of electricity production through direct combustion, and the use of natural resources, which increases energy efficiency and reduces carbon dioxide emissions to ensure a sustainable green environment (Moreno et al., 2019). In the same vein, Stevanović and Stevanović (2022) claim that the combustion characteristic of biomass energy enhances economic sustainability, and protects the environment. These types of fuels store the energy that is captured by the sun during photosynthesis. Further, biomass energy has been considered humanity's oldest renewable energy source .Proceeding with the study, pertaining to Schuenemann et al. (2018) also presented that biomass energy is the heart of sustainable development as it relates to food security and is an essential component of energy sector strategies, for its contribution to environmental protection.

Palestine has the potential for bioenergy production. Despite this, few initiatives have been undertaken to produce and use bioenergy. Where around 19% of the energy consumption can be fulfilled by bioenergy if a proper approach is implemented for taking benefit from their in Palestine (Salah et al., 2021).

Figure 2

Cycle of Biomass Energy

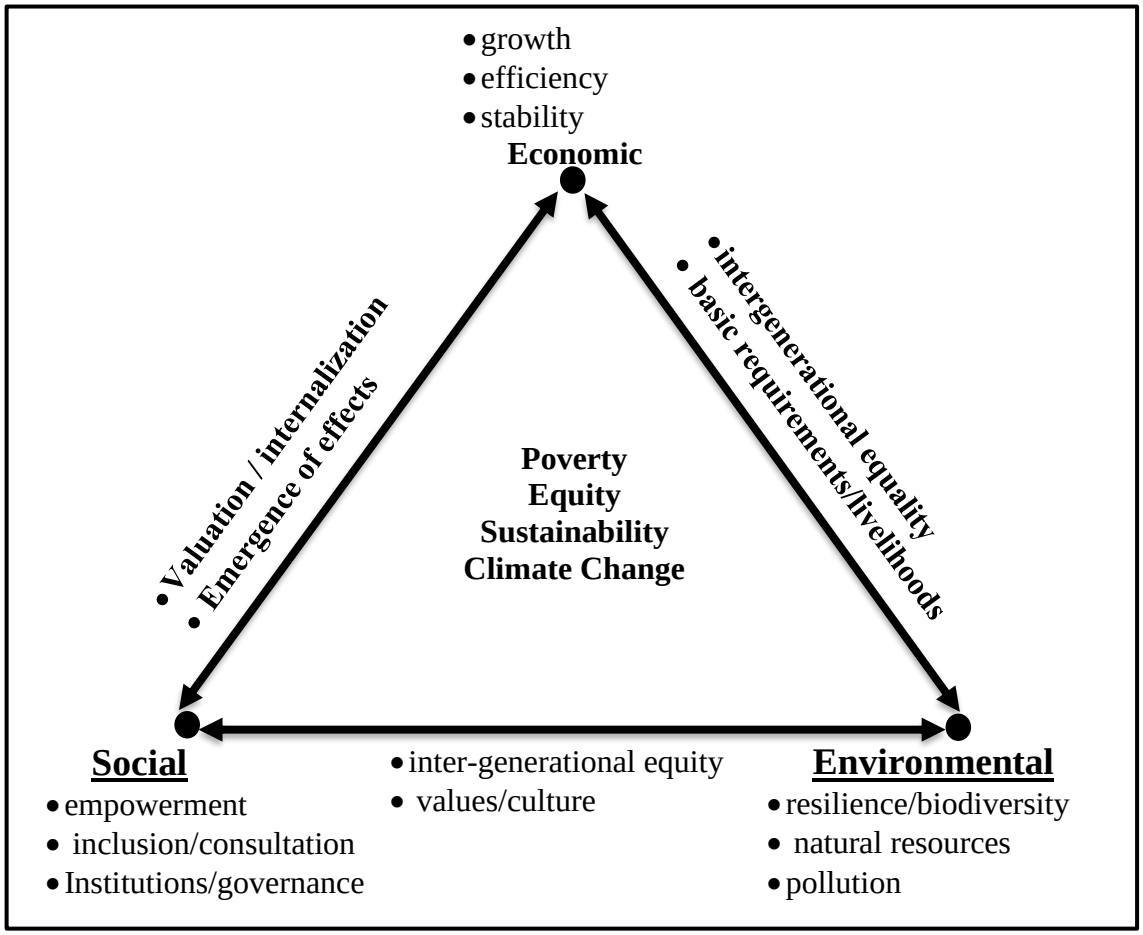


1.4 Sustainable Performance

The concept of sustainability has evolved into a broad and complex one whereby sustainability is defined as a comprehensive system that meets current needs while preserving the ability of future generations to meet their needs well (Brundtland, 1987). Also, sustainability is an integrated measurement system linked to a strategy that includes all dimensions to be compatible with the nature of the work environment (Silva et al., 2020). In light of this, sustainability gives human activities attention by keeping focused on the needs and wants of people and their capacity to meet those needs without depleting their resources (Mensah, 2019). In addition to this, Ruckli et al. (2022) explained that sustainability is an important pillar and a baseline for its three dimensions (environmental, social, and economic namely as a triple bottom line (TBL). Environmental sustainability involves ensuring that future generations can access natural resources without disrupting the environment (Place, 2017). Whereas Courtnell (2019) defined economic sustainability as a strategy that stimulates economic development while promoting the environmental and social development of society. Relating to Popovic et al. (2018), social sustainability focuses on securing resources and opportunities that provide social services such as learning, well-being, gender justice, and political participation. Therefore, social sustainability is the degree of trust between individuals and their ability to discuss common issues and communicate with decision-makers (Atanda, 2019). Furthermore, environmental sustainability concerns the effects of business on the environment, economic sustainability focuses on the financial prosperity of the organization, and social sustainability addresses factors relevant to human society (Trisyulianti et al., 2022). Figure 3 presents a framework that represents the triangle of sustainable development and consists of three domain elements: economic, social, and environmental. (An example of each domain can be observed in the Figure 3)

Figure 3

Sustainable Development Triangle –Relations between Basic Elements



Sustainability has entered into many industrial and commercial sectors through recycling by adopting techniques that promote sustainable economic development, ensuring the provision of energy free of greenhouse gas emissions, thus reducing environmental damage and balancing climate fluctuations (Neves and Freire, 2022). As well, sustainability performance is an essential element in achieving business objectives to ensure specific strategies that help meet the needs and achieve the underlying sustainability indicators represented by the economic, social, and environmental aspects which, in turn, represent the performance of the company's influence (Rodgers et al., 2019; Jr et al., 2018). Consequently, a company should also strive to achieve financial and economic success by protecting the environment, and providing social benefits. To achieve sustainable performance, a company should satisfy current needs without compromising future needs and effective application of knowledge management (Sapta et al., 2021).

Hypotheses Development

1.5 RESs and Sustainable Performance

There is still a lack of understanding about the interrelationships between sustainable development and RESs (Owusu and Asumadu-sarkodie, 2016). Precisely, focusing on the issue of RESs and sustainability leads to compensate for the shortage of conventional sources, for their role in improving the environment, and reducing costs, given that RESs effectively affect sustainable development (Said et al., 2022). In addition, in a developing country, the adoption of RESs has contributed significantly to raising employment opportunities, improving sustainable social performance, and promoting sustainable economic growth (Arroyo and Miguel, 2020). RESs are also known to contribute to environmental sustainability. It reduces pollution and improves network efficiency (Franzitta et al., 2013). Also, the continuity of utilization of RESs reduces carbon dioxide emissions and makes the public more aware of climate change (Kumar, 2020).

For RESs, there will be a stronger emphasis on sustainability from an environmental and economic perspective given the generally high cost of this technology (Garrido et al., 2020). According to Brodny and Tutak (2020), all countries of the world have been invoking the utilization of renewable energy that is a way to enhance environmental sustainability. Therefore, previous studies have demonstrated that RESs contribute to economic, social, and environmental sustainability. This is because creating jobs and a protective environment in the countries, one more benefit of RESs is enhanced energy production sustainability, which in recent decades has been an issue that has preoccupied the opinion of decision-makers *(*Sunday et al., 2022). RESs are key factors for raising the level of sustainable performance at the social, economic, and environmental dimensions by solving environmental pollution problems and improving sustainable economic development, using technological applications for the adoption of renewable energy (Xu and Liu, 2019). In complement, the top priority of most companies is to achieve sustainability goals and contribute to the development of renewable energy by installing solar panels on their premises (Strielkowski et al., 2021). This is in line with Ahn (2020), had also affirmed that companies can maintain environmental sustainability and increase their economic value and eliminate waste by using RESs.

In this regard, the continuous use of RESs aims to achieve sustainability objectives. Because high-efficiency energy generation plays a vital role in the current advanced technology. In addition, adoption of RESs may be a solid path to sustainable development. Also, RESs can benefit the environment and foster development by lowering energy costs. As a result, based on the above discussion, the following hypotheses have been proposed:

H1: The adoption of RESs has a significant impact on sustainable performance (economic, environmental, and social) in the Palestinian industrial and commercial sectors.

1.6 Adoption of Renewable Energy Sources (RESs)

The significance of adopting new technologies related to renewable energy lies in measuring the degree of society's acceptance and neglect of it (Ibarloza et al., 2018). In terms of public acceptance and perception regarding the new energy forms, very little work is present in the empirical and theoretical literature. Decision-makers (government) and investors have to face various challenges for this, owing to the increased significance of the RESs on energy production and generation through various means. Potentially, the adoption of RESs as a good innovation and modern technology requires government support to facilitate the adoption of RESs and reduce the barriers to adoption (Tseng et al., 2021). PNA has been willing to adopt RESs to enhance its citizens' lives and develop Palestinian economic growth. The key driver behind this willingness is Palestine's high energy costs (Abdallah et al., 2022). Therefore, by adapting to RESs, the PNA can help to minimize the cost of electricity and decrease its dependence on imports energy from Israeli.

The adoption of RESs is one of the most important technologies in Palestine to meet future energy requirements and promote sustainable development because renewable energy is cost-effective and sustainable energy that helps reduce greenhouse gas emissions (Federici et al., 2020). Many factors have an impact adoption, production, and consumption of RESs, as will be explained in the below sections

1.6.1 Cost

Jiang et al. (2022) examined that many factors influence the adoption of RESs as cost, where the initial cost of RESs is higher than traditional sources, and decision makers consider economic losses when purchasing RESs. The initial cost of solar energy is a barrier to its adoption, be it installing, building, and maintaining equipment, as the cost is directly related to the adoption of RESs (McDonagh et al., 2019). The cost of renewable energy has been dropping steadily for the past few years, making it more and more cost-effective to adopt. Cost is one of the necessary factors affecting the adoption of clean energy, as renewable energy projects require large capital due to high-interest rates, which leads lenders to demand higher interest rates, which makes RESs expensive. In this case, the adoption of renewable energy faces a major challenge due to the high costs associated with purchasing renewable energy products. Many Studies have revealed that the technology of RESs adoption is related to the cost, indicating that consumers are less willing to spend more for RESs (Ing et al., 2017).

1.6.2 Environmental Concern

Environmental concerns and the extent of climate change are other factors that affect adopting RESs (Kabeyi and Olanrewaju, 2022). The concept of environmental concerns plays a crucial role in the adoption of RESs. In the situation of the adoption of renewable energy, environmental concerns affect consumer attitudes regarding clean energy technology purchases in a significant way. RESs are necessary to protect the environment by reducing global warming, as RESs releases fewer greenhouse gases than traditional sources (Elmustapha and Hoppe, 2018) . A study also showed that environmental concern has an impact on consumers' desire to conserve energy (Kowalska-Pyzalska, 2018). In this sense, environmental concerns may positively influence consumers toward adopt renewable energy. By this justification, environmental concern influences adopting RESs.

1.6.3 Trust and Risk

Trust and the risk factor affects the adoption of RESs, as trusts funds can finance renewable energy infrastructure, but their usage is susceptible to fluctuations in power pricing, as many risks are associated with investing in renewable energy in terms of political and regulatory risks, which affects the adoption of RESs (Khalid et al., 2021). On the other hand, risk refers to how a person perceives the risks associated with RESs

adoption. In other words, if someone imagines a new technology has less risk than other sources, then they are more likely to adopt it. In terms of trust in renewable energy implies anticipating a positive outcome from its advantages, and thus trust is thought to be a driving force behind the adoption of RESs (Dóci and Gotchev, 2016a).

1.6.4 Perception of the Benefits of Using RESs

In situations where the perception of this technology's benefits increases, the likelihood of adoption and purchase increases. Wall et al. (2021) embraced that the perception about the benefit of using RESs influences the adoption of green energy. The perception that renewable energy is beneficial is also related to consumers' knowledge of green energy's advantages over fossil fuels in terms of energy efficiency and security, thus reducing pollution. The perceived benefit is an important factor in adoption of RESs (Komendantova and Yazdanpanah, 2017). However, in the meantime, consumers adopt renewable technologies based on their socioeconomic benefits. Consequently, consumers are unlikely to purchase products that do not improve their socioeconomic situation (Ntanos et al., 2018).

1.6.5 Ease of Use

Perceived ease of use has been defined as a person's perception of how easy it would be to use a system (Widjaja, 2020). It has been demonstrated Bandara & Amarasena (2020) that the perceived ease of use of RESs is heavily influenced by the opinion of users or customers about installation, maintenance, and frequent use, as well as how the technology is recycled. According to most researchers, RESs adoption is influenced positively by ease of use (Ahmad et al., 2017).

1.6.6 Relative Advantage

In addition to the above, relative advantage is defined as the degree to which a particular innovation outperforms older methods. The importance of the relative advantage of RESs compared to conventional sources lies in maintaining environmental sustainability, where the increasing relative advantage in favor of renewable energy helps to adopt this (Kuik et al., 2019). Thereafter, Previous studies have proven that the adoption of RESs are influenced positively by relative advantage (Jabeen et al., 2019).

1.6.7 Awareness

In general, awareness is another vital factor affecting consumer adoption of RESs, as awareness entails obtaining a comprehensive understanding the effectiveness of RESs technologies as well as the cost related to these technologies, in order to improve the sustainable development (Žikić et al., 2021). A study done by Shen et al. (2015), considered awareness is a crucial element for adopting RESs. Increasing awareness about the benefits of renewable energy, which is beneficial to the environment and sustainability, thereby increasing the adoption of RESs. In this, raising consumer awareness of climate change issues positively impacts the adoption of renewable energy technologies. However, Kumar and Majid (2020) mentioned that the lack of awareness of RESs weakens the process of achieving the requirements, weakening the opportunity to provide jobs and the poor relationship between employment in the field of renewable energy.

1.6.8 Self-Efficacy

Self-efficacy perceptions affect consumer adoption of RESs technologies through knowledge of how easy or difficult it is to adopt technologies, ease of technology adoption is related to accessing resources to adopt renewable energy technologies, which is associated with ease of installation and utilization of RESs (Makki, 2020). Self-efficacy refers to the belief that individuals can utilize RESs to perform technological tasks if they believe they can do so. In other words, the concept of self-efficacy is not related to the skills of the person, but rather to their perceptions of how these newly developed technologies achieve the intended results. While, the more positive the perceptions of self-efficacy, the greater the adoption of these techniques, and vice versa (Thiangtam, 2016).

1.7 Policies of the Palestinian Government for Renewable Energy Sources

The role of government is very significant in the adoption of RESs, and in bridging the gap between traditional energy (fossil fuels), and RESs through promulgating many policies and financial incentives. The Palestinian government has introduced several policies to encourage the consumer to adopt it, but feed-in tariffs and net metering are still the most prominent policy today.

Net metering is the most common policy throughout the world. Net metering policy in Palestine states enables customers to obtain all their requirements from a solar system to feed the loads in the facility, and the surplus energy is exported to the grid when the load exceeds the facility's capacity (Lawson, 2019), where the consumer allows credit for surplus PV energy produced for one year. However, each country has different laws regarding this policy. Whereas feed-in-tariff (FIT) shows that, the facility consumes all its electrical energy needs from the electricity network against an approved purchase tariff. In this policy, electricity utilities are obligated to purchase RESs-generated electricity at a price determined by the PNA (Le et al., 2022). Then, wheeling is similar to net metering, but the location of the energy-producing solar system differs from the location of the energy-consuming facility. Moreover, direct offers or competitive bids are accepted for building energy substations. If the investor invests for less than 1MW, then the investor signs a power purchase agreement (PPA) with a power distributor, however if the investor invests for more than 1MW, then the investor signs a power purchase agreement (PPA) with Palestinian Electricity Transmission Company (PETC) in which the investor is acting as independent power producers (Tahboub, 2021). Finally, the Palestinian government provides financial incentives to investors to promote the adoption of RESs through low taxation and loans. Ultimately, these policies increase investment reliability and provide a stable foothold for solar PV and RESs in general.

1.8 Governmental Role as Moderator

Governments play an important role in the adoption of RESs by employing various financial (subsidies), informational, marketing, technical assistance, consulting, mentoring, and organizational strategies (Kata et al., 2022). Correspondingly, Yang and Danwana (2021)confirmed that the government provides many policies to foster the adoption of RES, such as feed-in tariffs and net metering included in their energy accounting methods, which are considered efficient ways to encourage PV adoption. Additionally, the Indonesian government gives loans for energy projects and fiscal incentives such as tax breaks (Asian Development Bank, 2020), As mentioned by, Cunningham and Eck (2021), among the policies adopted by the government are legislation, loans, grants, and energy efficiency programs, as well as sustainable research on the implementation of renewable energy. Similarly, Ministry et al. (2019), affirmed that the Egypt government facilitates the investment of renewable energy projects that

provide benefits in social and economic fields through tax exemptions. The Jordanian government supports adoption of RESs through competitive bidding, feed-in tariffs, international grants ,and assistance (Sandri et al., 2020). According to Economic and Social Commission for Western Asia ESCWA (2018), Jordanian governments implement fiscal policies that exempt renewable energy equipment from sales taxes, regardless of whether it is imported or manufactured locally. However, the adoption of RESs is reliant on these policies. Similar to Bamisile et al. (2021), the most effective stimulus policies include tax relief, loans, feed-in tariffs, awards, mandatory quotas, renewable portfolio standards, and substantial research and development. Furthermore, the government should initiate projects to develop innovative technologies for promoting green energy. These technologies can be smart grid installation within the energy sector (Nakapreecha et al., 2021).

The Palestinian government will use these mechanisms to encourage the adoption of RESs including net metering, Palestinian initiative system (PIS), and competitive bidding (Tahboub, 2021). Relating to Milhem (2020), the Palestinian Energy Authority presented several initiatives to adopt renewable energy by granting licenses to establish and operate solar energy projects, applying the policy of competitive bidding, feed-in tariffs, wheeling, and net metering. It is noteworthy that several studies have shown that government policies have been identified as an essential factor influencing willingness to adopt RESs (Gillingham and Sweeney, 2012). Referring to Akinwale and Adepoju (2019), a combination of political and legal frameworks that the government provides plays a vital role in German manufacturers adopting renewable energy technologies. Based on the literature reviewed above, this study took these policies (feed-in tariff, net-metering, competitive bid, financial incentives, and wheeling) to examine the government's role in adopting RESs for Palestine in the industrial and commercial sectors. As a result, this hypothesis are developed.

H2: The Palestinian government's role impact adoption of RESs in the Palestinian industrial and commercial sectors.

Most governments' strategic plans seek to enhance sustainability by promoting the use of RESs, by providing financial support, and encouraging the application of renewable

energy technologies in order to raise investment in RESs in the future (Lu et al., 2020), so H3 is supposed.

H3: The Palestinian government's role impact sustainable performance (economic, environmental, and social) in the Palestinian industrial and commercial sectors.

Meanwhile, the role and policy of governments are essential to the adoption of RESs, which is a wonderful chain that will guide together towards sustainability in social, economic, and environmental dimensions (Abu Hamed and Peric, 2020). The government's goals are to combat climate change by using RESs, and to meet energy requirements sustainably (Huayi et al., 2022). Governments may establish a conducive climate for the broad use of RESs and guarantee that contribute to sustainable development by setting policies and targets, focusing on research and development, tax support, raising public awareness, and fostering international cooperation (Hao, 2022). Hence, Based on the aforementioned justifications, the expected hypotheses (H4) as

H4: The Palestinian government’s role moderates the relationship between adopting RESs and the sustainable performance (economic, environmental, and social) in the Palestinian industrial and commercial sectors.

1.9 Industrial and Commercial Sectors

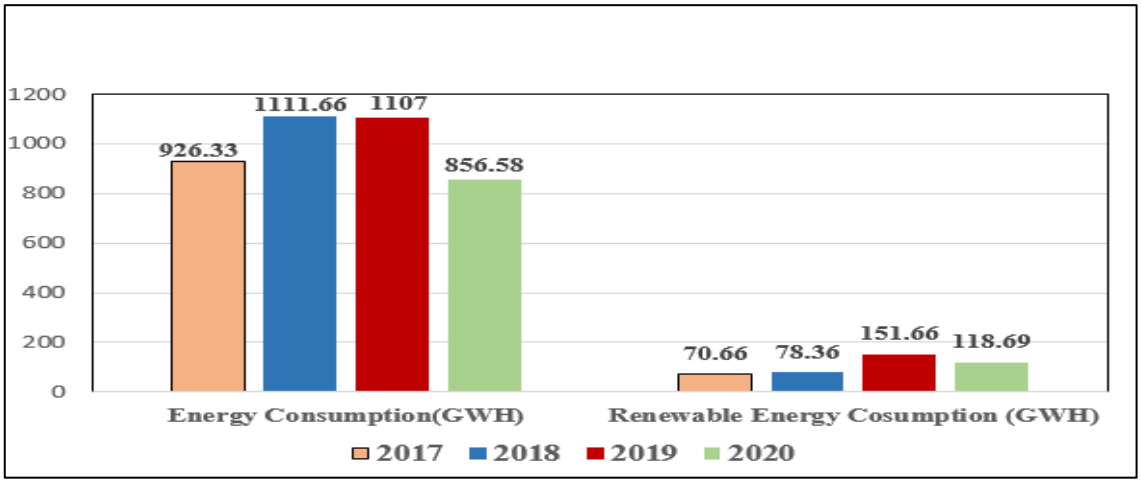
Palestine had several economic difficulties over the past few decades due to various circumstances including Israeli occupation, rising inflation, and an energy crisis. These circumstances have also negatively affected the industrial and commercial sectors that are essential to Palestine's economy. The industry and commercial sectors constitute an important factor in the growth of the economy, as it contributes to achieving economic and social growth, which in turn leads to raising energy consumption and may sometimes exceed the ability to supply energy due to their high cost (Federal Ministry for Economic Affairs and Energy (BMWi), 2019). This study focuses more on the industrial sector. For PCBs, the energy consumption for the industrial sector in 2020 is 865.63 GWH as shown in Figure 4.

Overall, the industrial and commercial sectors are among those that require the most RESs, the use of renewable energy also contributes to environmental protection and makes industry and commerce more energy-efficient as well as improves sustainable

industrial and commercial production (Li et al., 2022) . As that, the roofs of the industrial sector are large enough to accommodate solar photovoltaic (PV). This allows them to integrate renewable energy into their operations, and PV provides electricity during peak demand times. Increasingly, industrial and commercial institutions are looking for sustainable practices, and energy efficiency has become a focal point because of energy consumption's economic and environmental costs. Therefore, to evaluate the adoption of RESs in the commercial and industrial sectors, indicators are required to provide a benchmark for comparing the companies involved and monitoring performance. In addition to analyzing consumption rates, energy efficiency is also calculated at the production level for the industrial and commercial sectors (Barni et al., 2021). In Palestine, there is an adoption of renewable energy in these two sectors. In 2020, the consumption of renewable energy for the industrial sector was 118.69 GWH (refer to figure 4), and for the commercial and service sector 69.78 GWH, (PCBS, 2021).

Figure 4

Consumption of energy and renewable energy in industrial sector in Palestine (2017-2020)



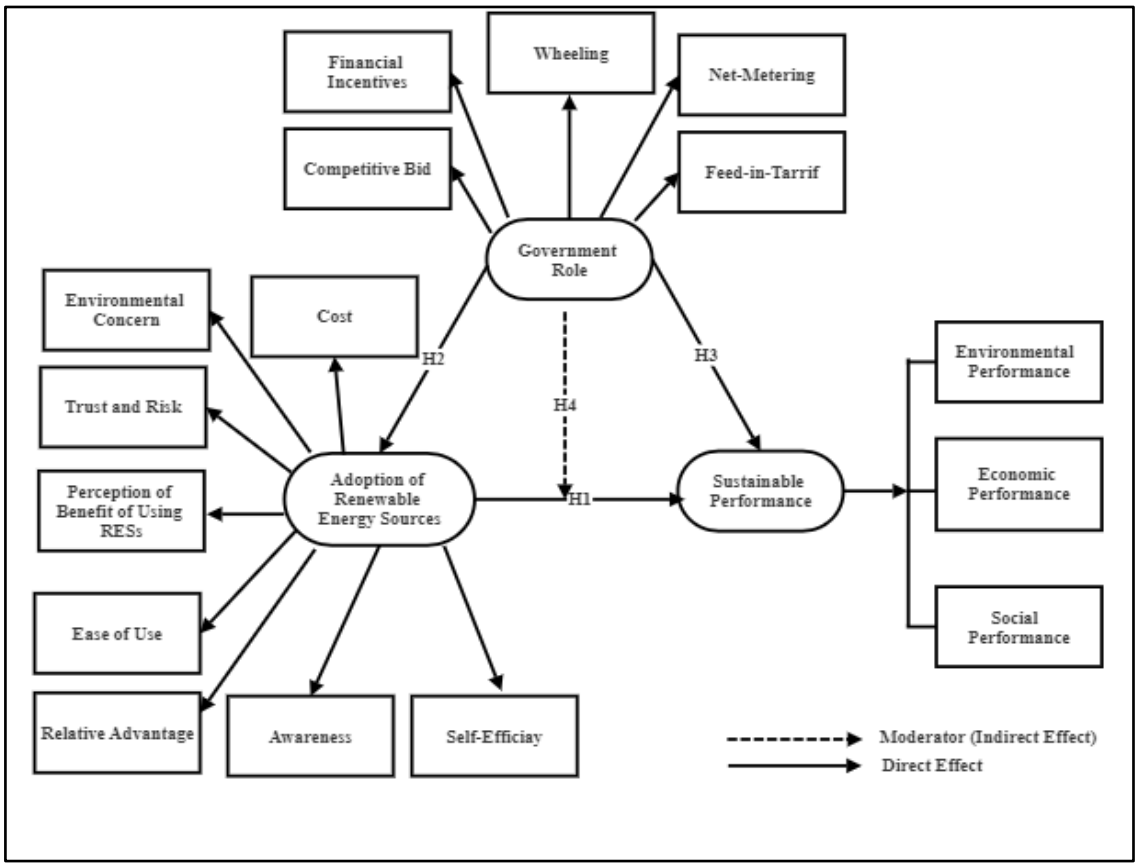
Source: (Palestinian Central Bureau of Statistics [PCBS], 2020).

1.10 Conceptualization of the Proposed Model

In accordance with the literature review that was introduced earlier, the proposed conceptual framework was developed. This model consists of four main hypotheses between three variables (adoption of RES, sustainable performance, government role) while also taking into consideration that adoption comprise 8 dimensions, sustainable performance captures 3 dimensions, and government role comprises 5 dimensions, each of which contains some indicators as can be seen in Figure 5.

Figure 5

Research Conceptual Model



Chapter Two
Methodology

2.1 Chapter Overview

In this chapter, a discussion of the methodology of this thesis is presented. As well as the research design, data collection, target population, sample size, questionnaire design, and measurement development, and the data analysis approach.

2.2 Research Type

The purpose of research is to find facts and analyze information, interpret data to understand phenomena and identify things that are difficult to understand (Boru, 2018). Along the same lines Pawar (2020) states that the process of research involves identifying problems, formulating hypotheses, and collecting data, Therefore, in order to achieve the desired results, it is essential that the research be systematic and logical. Research is divided into two main types: qualitative research and quantitative research, where quantitative research involves collecting numerical data and analyzing it, and qualitative research uses sampling methods to collect information about existing customers and leads, such as online surveys, online voting (Squires and Dorsen, 2018). In the present study, both qualitative and quantitative data were collected. Moreover, the research method is the method used by the researcher to choose a specific research strategy so that it is adopted in data collection, which is called the research tool (Smith and Hasan, 2020). In this research, the research method is a well-developed questionnaire.

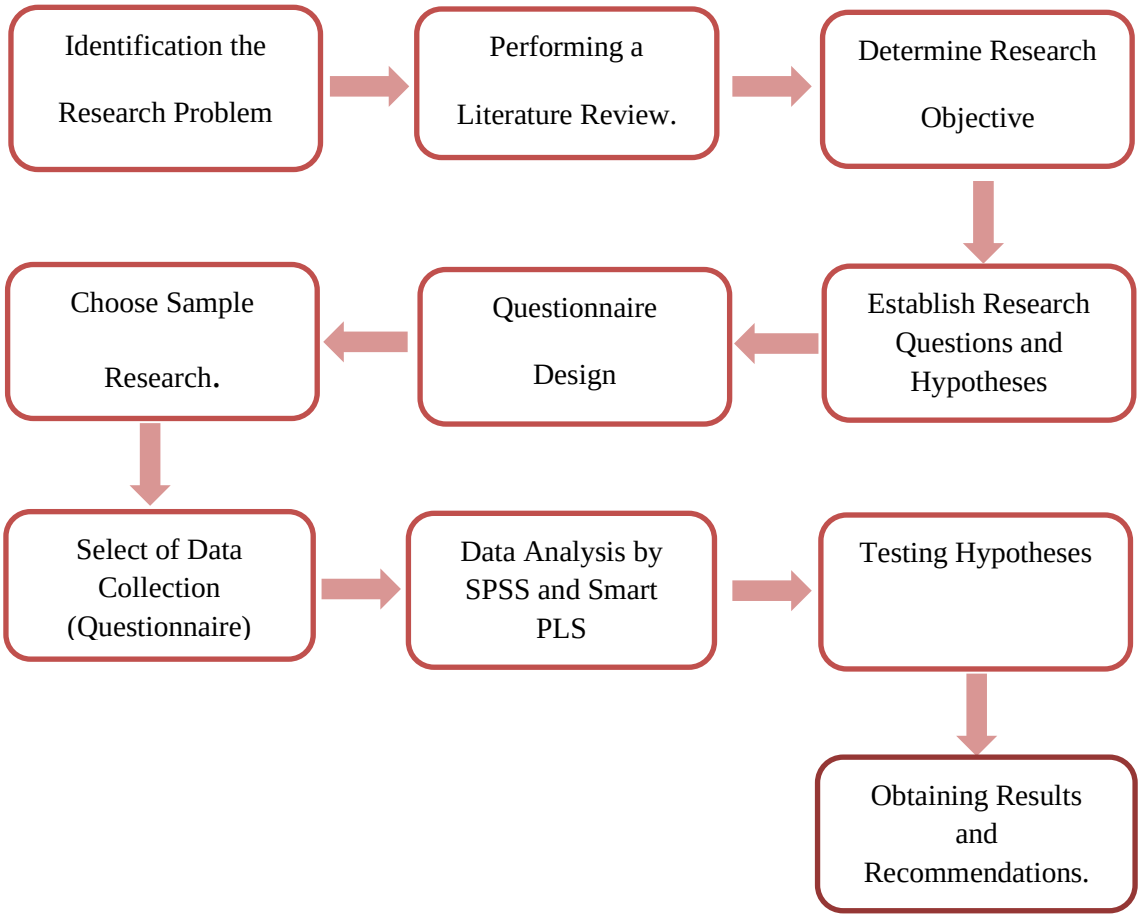
As witnessed the lack of studies about the government’s role as a moderator variable in adopting RESs and sustainable performance in Palestine's industrial and commercial sectors. This study adheres mainly to an explanatory approach, which seeks to identify causes and offers data that can be used to support or reject explanations. Besides that, explanatory research is the best choice for this research. Hence, its primary goal is to uncover and examine relationships between variables of this phenomenon (Boru, 2018).

2.3 Research Methodology

Renewable energy in the Palestinian industrial and commercial sectors is essential to meet the growing demand for energy. Nevertheless, the Palestinian government is working to promote the use of renewable energy through incentives, and policies and to develop infrastructure and technological capabilities to support this clean energy. According to the findings, there are a variety of determinants that affect the adoption of renewable energy (solar and biomass energy) in Palestine. There is also a lack of incentives and policies from the Palestinian government. The methodology of this research consists of three basic stages: formulation, implementation, and analysis. At the formulation stage, the current research begins with the identification of the research problem, followed by literature reviews regarding RESs, sustainable performance, and government role, and finally, the formulation of objectives, research questions, and hypotheses. While in the implementation stage, which starts with semi-structured interviews with representatives of top management of the Palestinian Energy and Natural Resources Authority (PEEA) to get some documents about the policies and regulations that follow to encourage the adoption of RESs. Then, designing the questionnaire and evaluating it by experts to ensure content validity, the questionnaire was filled out by specialists in the industrial and commercial sectors, such as general managers, electrical engineers, financial managers, and quality managers. This stage also involves selecting a sample of industrial and commercial firms. Additionally, questionnaires were distributed via e-mail or "What's App" in coordination with the company. A few questionnaires were filled out verbally over the phone as well. Then, in the analytical stage, after the data were collected from September 2022 to November 2022, which equates to roughly one month and three weeks. The Smart-PLS version 4.0.8.7 and SPSS software are used in data analysis, testing hypotheses, obtaining results and recommendations. Figure 6 presents an illustration of the methodology in this research.

Figure 6

Illustration methodology of this research



2.4 Target Population and Sample Size

Study participants were top managers of industrial and commercial sectors in Palestine that have used or intend to use RESs, including general managers, financial managers, and quality managers. One of the most significant stages in reducing time, effort, and costs is selecting the samples to study. The research sample in this study consists of a group of specialists and experts somewhat related to RESs in both industrial and commercial sectors.

The non-probability snowball method was used to find the sample size, where the snowball sampling method is one of the commonly used methods in qualitative research, non-probability snowballs are better suited if there is some difficulty in complying with and reaching the population lists (Anieting and Mosugu, 2017). Therefore, the population is unknown and it is difficult to choose subjects to be assembled as samples for this study. Relatively, the non-probability method of snowball sampling is applied once respondents

propose another respondent (Ayhan, 2011). Consequently, the study's sample size is equal to (100) valid responses from (145) questionnaires that were distributed and the response rate was 74.4%.

2.5 Questionnaire Design and Measurement Development

The questionnaire was used to collect data where designed to test the hypotheses of the research model, and it was distributed in both Arabic and English through a Google form. Appendix A includes the Arabic version while Appendix B includes the English one. To ensure validity and consistency, several university professors specializing in these field reviewed the questionnaire. (Names of professors are listed in Appendix C in Table C.1).

Research constructs were developed based on several previous studies. The questionnaire questions are highlighted in Table C.2 (see Appendix C), along with the origin of these questions. A questionnaire consists of two main sections; the first section contains the demographic factors of the respondents as gender, experience years, position job, and enterprise sector, and the second section is composed of three main constructs as factors influencing the adoption of RESs, sustainable performance, and government role.

Twenty-seven items were developed regarding the measurement of the adoption of RESs. Where three items were used to measure each of these factors (cost, trust and risk, awareness, relative advantage, and ease of use); four items were used for each perception of the benefit of using RESs, environmental concern, and self-efficacy), all of these were adopted from (Khalid et al., 2021). While the work of sustainable performance was adapted from (Makki and Mosly, 2020); Espíndola et al., 2022), then sustainable performance was measured through 11 items, four items measured economic and social sustainability; three items measured environmental sustainability. According to evaluate the role of government, 13 items were measured and divided five sub-groups, four that dealt with competitive bids, and financial incentives, two that dealt with net metering and wheeling, and one that dealt with feed-in tariffs. The total number of items in this model is 51. Furthermore, all items have been adopted with the five-point Likert scales, that range from 1-strongly disagree to 5-strongly agree.

2.6 Data Analysis Techniques

Data evaluation was the first phase in the data analysis process. Thus, the descriptive data of the respondents were analyzed through the statistical analysis program (SPSS) to calculate the mean and standard deviation for each factor as well as evaluated respondents' demographic characteristics. Then, the second phase assessed the reliability and validity. The reliability and validity of the questionnaire are very significant measures for maintaining its stability and consistency. To assess the reliability of the questionnaire through these Cornbrash's alpha coefficient, composite reliability, and average variance extracted (AVE) through Smart PLS software, while the content validity is assessed by submitting it to a committee for a thorough review of its content and components, as well as in Smart PLS to determine its construct validity and discriminant validity .

Chapter Three

Data Analysis and Results

3.1 Chapter Overview

The chapter gives the analysis finding based on the information gathered from the industrial and commercial sectors. This chapter assesses the factors influencing RES adoption , as well as sustainable performance, and government role. A descriptive analysis was conducted using SPSS software to determine response rates and implementation levels, and Smart PLS version 4.0.8.7 is used to test hypotheses and examine the moderator.

3.2 Analysis of Survey Responses

3.2.1 Response Rates

After completing data collection by the questionnaire, the data were analyzed using the SPSS statistical analysis program for all questionnaire items based on the respondents' responses. Among 145 questionnaires distributed throughout the industrial and commercial sectors, 105 had valid responses. However, five questionnaires were rejected due to incomplete data, indicating an overall response rate of 74.4%.

The data illustrates that is given in Table C.3 of Appendix C, the study sample consisted of males and females, with a response rate of 96% for males and 4% for females. Moreover, 91% of respondents had a bachelor's degree, and the remaining 9% had a master's degree. A further finding shows that approximately 38.0% of respondents are job experience of over 15 years. Another 24.0% are job experience ranging between 6–10 years, 5% less than 5 years and 15.0% of respondents are a job experience between 11 and 15 years. Concerning job positions, the statistical analysis also shows that 63.0% of respondents are general managers, 25.0% are from other sectors (electrical engineering, maintenance engineering, procurement and sales, and human resources managers), 6% are production managers, 3% are financial managers, and 3.0% are quality managers. According to the enterprise sector, 67.0% of respondents were from the industrial sector and 33.0% from the commercial sector. As can be seen from the analysis of respondents' locations, 31.0% were from Nablus. In addition, Jenin, Tulkarm, Hebron, Ramallah, Bethlehem, Jericho, Qalqilya, and Salfit followed this, with response rates of 21%, 15%, 12%, 6%, 4%, 3%, and 1%, respectively. Nevertheless, it is evident that the respondents

were asked about the average monthly energy consumption of traditional sources (in shekels), and the answers were different, ranging from (1000) to (500000). Furthermore, the vast majority of enterprises use renewable energy sources (RESs) to provide part of their energy needs at a rate of 92.0%. According to the respondents to a question asking about the extent to which renewable energy contributes to the enterprise's needs, 13.0% said it provides 100 % of their needs. With the question, "Where does your enterprise get its traditional energy sources?" 86.0% of the respondents answered that their establishment obtains energy from electricity, while 6.0% obtains it from gas, 5% obtains it from diesel, and 3% from petrol. Based on the results, 79.0% of the enterprise that produces renewable energy do not exceed their renewable energy needs. However, 14.0% indicates that the enterprise could exceed its renewable energy needs. Further, 82.0% of the respondents stated that their establishment has enough space that can be provided to produce renewable energy. Nevertheless, 16.0% responded that there is currently no space for implementation. And also, the statistical analysis reveals that 57.0% of the enterprises do not have any environmental or quality certificate, and 26.0% have environmental or quality certificates such as ISO (500001, 14001, 9001, 2000, 23000, 50000), ISO 22000 (ISO9001 + HACCAP), and FSFC. Therefore, 49.0% of the respondents indicated that the number of daily working hours in the enterprise is about 8.50 hours. In addition, 27.0% indicated that they worked approximately 20.00 hours per day. All data above is displayed in Table C.3 (see Appendix C) which represents the frequency analysis results using SPSS software.

3.2.2 Measurement of Implementation Levels of Constructs

It is the objective of this study to present a general picture of the level to which adoption of RESs, sustainable performance, and government role have been implemented in the industrial and commercial sectors in the West Bank of Palestine. To interpret the results of the study, five-point Likert scales vary between a minimum value of '1' and a maximum value of '5'. According to Table 1, the average response level was determined using the following level for the study sample.

Table 1

Degree of average response

Level	Interval of Mean	Description
1	1-2.33	Low
2	2.34-3.66	Moderate
3	3.67-5	High

Table 2 indicates that there are mean values and standard errors for all constructs. As for the adoption of RESs, the total average mean is 4.21 and the standard deviation is 0.753. In terms of sustainable performance, the total average mean is 4.16 and the standard deviation is 0.884. According to the government role, the total average mean is 3.85, and the standard deviation is 1.04. Each of these constructs (adoption of RESs, government roles, and sustainable performance) indicates that the overall level of implementation for these is high. (Refer to Appendix C in Table C.4, which shows the results of all items used in this study)

Table 2

The level of Implementation of RESs, Sustainable performance, and Government role

Construct	**Mean**	**Standard deviation**	**Implementation level**
Cost (CT)	4.36	0.714	High
Environmental Concern (EC)	4.29	0.732	High
Trust and Risk (TAR)	4.29	0.729	High
Perception of benefit RESs (PAB)	4.185	0.788	High
Ease of Use (EOU)	4.22	0.749	High
Relative Advantage (RA)	4.12	0.711	High
Awareness (AW)	4.23	0.706	High
Self-Efficacy (SE)	4.11	0.891	High
Total for Adoption of RESs(ARESs)	4.21	0.753	High
Economic Performance (ECP)	4.12	0.829	High
Environmental Performance (EP)	4.12	0.876	High
Social Performance (SP)	3.99	0.945	High
Total for Sustainable Performance	4.16	0.884	High
Competitive Bid	3.85	1.07	High
Net-Metering	3.91	1.01	High
Feed in tariff	3.94	1.08	High
Financial Incentives	3.81	1.01	High
Wheeling	3.81	1.03	High
Total for a Government Role	3.85	1.05	High

3.3 Analysis of Questionnaires

The PLS path modeling (PLS-SEM) technique used in an intelligent Smart PLS program was used to analyze the quantitative data gathered through a questionnaire. PLS-SEM is most appropriate for developing hypotheses . In addition, it can estimate highly complicated models and deal with small samples, whether the sample distribution is normal or not. In this study, all constructs are reflective. This study had some difficulties with data analysis, which necessitated deleting some items to maintain consistency. Seven out of 20 items related to the government's role have been deleted (feed-in-tariff: 2 items, net-metering : 1 item, and wheeling: 2 items) and three items deleted out of 30 regarding the adoption of RESs(relative advantage:2 items, and perception of benefit of using RESs :one item). This study utilized a PLS-SEM technique with a two-step analysis: firstly, assessing the variables using the measurement model, including validity and reliability; secondly, analyzing the path and estimating the model parameters that know the structural model.

3.4 Measurement Model Assessment: (Outer Model), Reliability and Validity Analysis

Reliability (composed of composite reliability) and validity have convergent and discriminant validity. Validity assessment is an essential component of evaluating items and variables using the following methods: (1) convergent validity and (2) discriminant validity.

3.4.1 Convergent Validity

Convergent validity refers to how closely the indicator relates to other indicators for the same variable. There are many measures to assess convergent validity. Convergent validity results are summarized in Table 3. The first measure is to evaluate individual item loading (factor loading). Item loading and internal consistency greater than 0.70 were considered acceptable (MacKenzie et al., 2011). As depicted in Figure 7 below demonstrates that every item loading complies the requirement in which all is above the minimum value. Second, the composite reliability (CR) should be significantly higher than 0.7. Third, the average variance extracted (AVE) is higher than 0.5 (Anderson et al., 1988).

Table 3

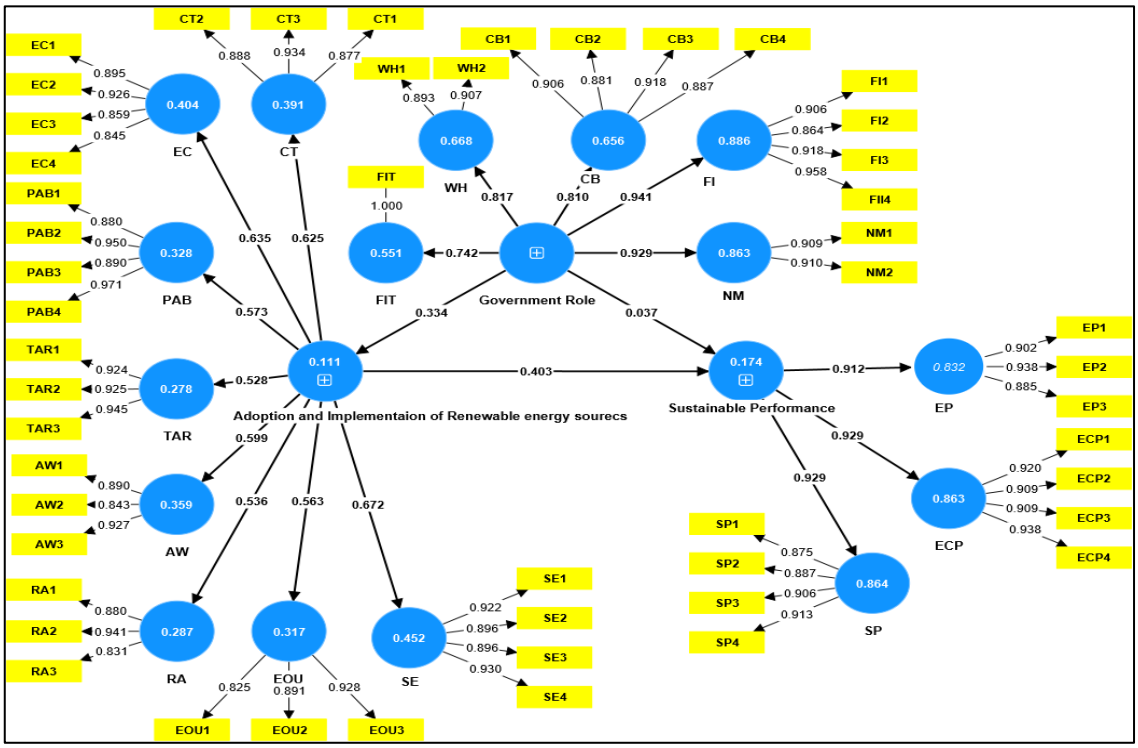
An analysis of reliability and validity

Construct	Number of items	Cronbach's Alpha	Composite Reliability	AVE
CT	3	0.883	0.927	0.810
EC	4	0.905	0.933	0.777
TAR	3	0.924	0.952	0.868
EOU	3	0.858	0.913	0.779
SE	4	0.932	0.951	0.830
PAP	4	0.942	0.959	0.853
AW	3	0.865	0.917	0.787
RA	3	0.863	0.916	0.784
ECP	4	0.863	0.916	0.784
SP	4	0.939	0.956	0.845
EP	3	0.917	0.942	0.802
FIT	1	0.894	0.934	0.826
WH	2	0.766	0.895	0.810
CB	4	0.920	0.943	0.807
FI	4	0.932	0.952	0.832
NM	2	0.792	0.906	0.828

Table 3 illustrates Cronbach's alpha and composite reliability were acceptable in terms of construct reliability and validity. As all values are above 0.7, this model is both valid and reliable. Cronbach's alpha is one of the most common measures of internal consistency. However, researchers have found that composite reliability measure are more consistent than Cronbach's alpha (Hair et al., 2011). Further, in Table 3, the AVE values are between 0.777and 0.868, which indicates that the results are acceptable. According to these results, all measurements are acceptable.

Figure 7

The Measurement Model



3.4.2 Discriminant Validity

Discriminant validity refers to how closely the indicator relates to another indicator for other variables. Examine discriminant validity can be done in several test, including the Fornell-Larcker, Heterotrait-Monotrait (HTMT) ratio of correlations and cross loading.

According to Fornell & Larcker (1988), the authors explain that this test is valid when the square root of the AVE of the correlation construct is larger than any other latent variable. It is evident from Table 4 that the square root of AVE of its own construct (as shown in diagonal values) is higher than the correlating models between variables, which demonstrates the establishment of discriminant validity. HTMT is another test performed on the model; an HTMT is an influential criterion because it measures the dis-attenuated correlation among variables. HTMT value less than 1 for an explanatory study indicates a good reliability rating, while a value of 1 indicates poor reliability (Ringle et al., 2012). As can be seen in Table 4 and Table 5, the results of the HTMT test were not significantly higher than one. Thus, discriminant validity is confirmed.

Table 4

Results of Fornell-Larcker Discriminant Validity tests

	CT	EC	TAR	EOU	SE	AW	PAB	RA	ECP	SP	EP	FIT	WH	CB	FI	NM
CT	**0.900**															
EC	0.858	**0.882**														
TAR	0.672	0.807	**0.932**													
EOU	0.741	0.785	0.770	**0.882**												
SE	0.735	0.758	0.730	0.754	**0.911**											
AW	0.717	0.757	0.713	0.790	0.770	**0.887**										
PAB	0.733	0.787	0.789	0.855	0.765	0.808	**0.924**									
RA	0.668	0.684	0.664	0.809	0.713	0.809	0.739	**0.886**								
ECP	0.542	0.629	0.777	0.605	0.591	0.604	0.629	0.569	**0.919**							
SP	0.529	0.576	0.564	0.614	0.598	0.664	0.671	0.666	0.774	**0.895**						
EP	0.597	0.645	0.486	0.525	0.524	0.583	0.520	0.542	0.777	0.790	**0.909**					
FIT	0.481	0.509	0.400	0.428	0.485	0.407	0.379	0.325	0.243	0.180	0.258	**1.000**				
WH	0.314	0.348	0.265	0.281	0.296	0.325	0.324	0.258	0.121	0.166	0.158	0.496	**0.900**			
CB	0.470	0.501	0.467	0.482	0.506	0.488	0.448	0.371	0.302	0.245	0.247	0.877	0.612	**0.898**		
FI	0.351	0.429	0.325	0.387	0.335	0.416	0.383	0.339	0.141	0.182	0.164	0.564	0.840	0.690	**0.912**	
NM	0.312	0.342	0.204	0.294	0.254	0.270	0.223	0.301	0.057	0.069	0.149	0.634	0.769	0.700	0.801	**0.910**

Table 5

Results of HTMT Discriminant Validity tests

	CT	EC	TAR	EOU	SE	AW	PAB	RA	ECP	SP	EP	FIT	WH	CB	FI	NM
CT																
EC	0.945															
TAR	0.742	0.896														
EOU	0.852	0.894	0.870													
SE	0.808	0.823	0.786	0.845												
AW	0.817	0.849	0.798	0.914	0.860											
PAB	0.801	0.861	0.847	0.956	0.817	0.893										
RA	0.755	0.768	0.741	0.944	0.797	0.938	0.818									
ECP	0.593	0.697	0.836	0.685	0.633	0.673	0.673	0.631								
SP	0.584	0.640	0.611	0.695	0.649	0.748	0.723	0.742	0.833							
EP	0.673	0.713	0.533	0.599	0.575	0.663	0.568	0.611	0.844	0.872						
FIT	0.512	0.527	0.416	0.452	0.502	0.436	0.389	0.352	0.250	0.187	0.273					
WH	0.384	0.418	0.323	0.343	0.354	0.405	0.385	0.318	0.182	0.202	0.197	0.568				
CB	0.520	0.544	0.507	0.533	0.547	0.543	0.480	0.422	0.325	0.267	0.273	0.913	0.732			
FI	0.389	0.459	0.349	0.434	0.360	0.462	0.407	0.376	0.153	0.197	0.188	0.584	0.949	0.745		
NM	0.374	0.393	0.238	0.346	0.296	0.324	0.257	0.364	0.100	0.089	0.179	0.712	0.958	0.819	0.932	

3.5 Structural Model Assessment

The next step is to build a structural model (inner model) to predict the hypothesized test based on the data. Additionally, after construct reliability and discriminant validity for the measurement model are verified, structural models are evaluated based on the following criteria:

3.5.1 Hypothesis Testing

The bootstrapping procedure involving 5000 sub-samples is used to test the path coefficients (hypotheses test) at a significant level of 5%, and the significance of the relationship between the endogenous and exogenous latent variables. The standard path coefficient (B values) is evaluated by observing that it exceeds or equals 0.1, and for a relationship to be considered statistically significant, the t-value is equal to or greater than 1.96. The results are displayed in Table 6 for each hypothesis in the path analysis, including path coefficients, t-values, and p-values. Additionally, the study examined the relationship between the adoption of RESs as an exogenous latent variable and sustainable performance as an endogenous variable in the industrial and commercial sectors. Furthermore, it examines specific factors that influence RES adoption. In addition, the government's role as a moderating factor is considered.

H1 tested if ARESs have a significant impact on SUP. The findings indicate that ARESs had a significant impact on SUP. (β =0.403, t=2.684, P =0.007 < .05), H1 was accepted. Hypothesis H2 in this study found that GR is positively and significantly associated with the ARESs (β =0.334, t=2.405, p =0.016 < 0.05), So, H2 was justified. Moreover. While H3 a further hypothesis test was performed to see if a GR has a significant impact on SUP. The finding confirmed that no significant relationship between GR and SUP. (β =0.037, t=0.314, p = 0.753 > .05). Then, H3 is not supported. The results are obtained through PLS bootstrapping procedures are as shown in Table 6 and Figure 8.

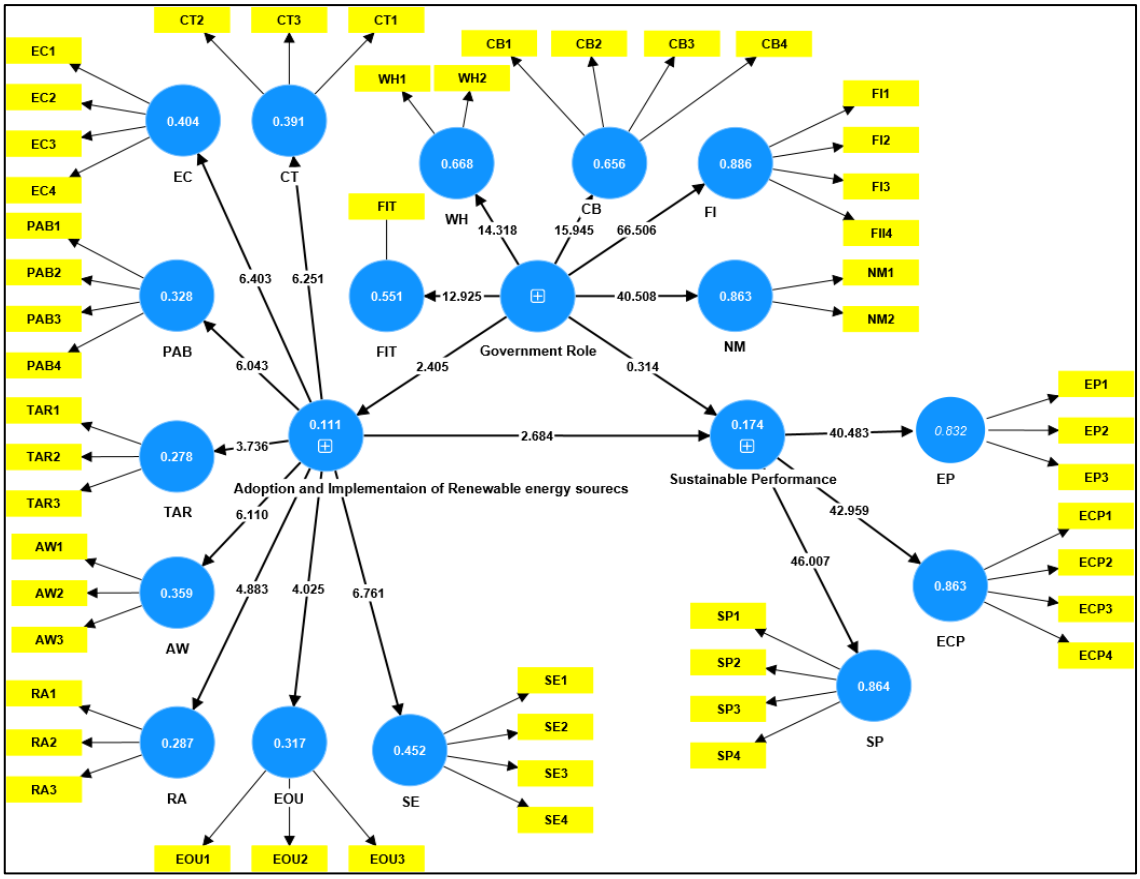
Table 6

Results of bootstrapping of a structural model (Hypothesis Test)

Relationship	Original Sample	Standard Error	Significance		Consequence
			T Statistics	P Value	
H1: ARESs → SUP	0.403	0.150	2.684	0.007	Supported
H2: GR → ARESs	0.334	0.139	2.405	0.016	Supported
H3: GR → SUP	0.037	0.119	0.314	0.753	Not supported

Figure 8

Results of bootstrapping of a structural model (Hypotheses Test)



3.5.2 Coefficient of Determination (R^2)

Coefficient of determination means the ability of the latent variable exogenous to explain the endogenous latent variable. Figure 7 demonstrates the strong predictive value of the inner model. This demonstrates that the percentage of the variance for the latent variables endogenous sustainable performance (17.4%) that interpret from the two independent variables adoption of RESs and government role. Within the inner model, 'adoption of

RESs' appears to have the highest effect on 'sustainable performance (0.403), followed by 'government role' (0.037).while the adoption of RESs (dependent variable) had a coefficient of determination is 11.3% explains by the independent variable government role. Table 7 illustrated the coefficient of determination of sustainable performance, and adoption of RESs.

Table 7

Variance clarified in the dependent variable

Construct/Variable	R^2
SUP	17.4 %
ARESs	11.1 %

3.5.3 Effect Size (f^2)

Effect size analyzes the contribution of each of the independent variables individually to explain a dependent variable in terms of R^2. According to the following equation, it can be calculated as follows:

$$f^2 = \frac{R^2 included - R^2 excluded}{1 - R^2 included} \quad \text{……..……..(3.1)}$$

According to Cohen (1988), a 0.05 effect size is considered to be small, a 0.15 effect size is considered medium, and a 0.35 effect size is considered high, Table 8 provides a summary of effect size. The effective size of adoption of RESs is medium and the government role is small.

Table 8

Effect size recommendations derived from latent variables

R^2	R^2 Excluded	f^2	Result
1.ARESs 0.174	0.029	0.176	Medium
2.GR 0.174	0.173	0.001	Small

3.5.4 Predictive Relevance (Q^2)

The predictive relevance of the model relates to how well the independent variable predicts the dependent variable (endogenous variable). Blindfolding is proposed as a method to test predictive relevance. A rule of thumb for this procedure is greater than 0.00 as illustrated in Table C.5 (refer to Appendix C). Each of the dependent variables

exceeded zero in all cases, meaning the model is considered sufficient in terms of prediction quality.

3.5.5 Model Fit Measures

Goodness of Fit of the model (GoF) can be calculated using the equation below, which represents the square root of the average of (AVE) and (R^2) which GoF, measures the extent of the reliance on this study model for the inner and outer model. A study by Wetzels et al. (2009), a GoF less than 0.1 is considered there is no fit; (0.1-0.25) is considered a small fit; (0.25-0.36) is considered a medium fit; and more than 0.36 there's a large fit. The GoF is computed as shown below:

$$\text{GoF} = \sqrt{\text{avg. R}^2 \times \text{avg. AVE}} \quad \text{……..……..(3.2)}$$

$$\text{GoF} = \sqrt{14.25\% \times 0.814}$$

$$\text{GoF} = 0.341$$

As a result, the validity of this global PLS model is sufficient according to the GoF model value is 0.341 (medium) for this model.

Another measure to validate a model is a standardized root mean square residual (SRMR), which represents the root square discrepancy between the observed and implied correlation. Generally, a value of SRMR below 0.08 is considered acceptable and a good fit (Henseler et al., 2014). Based on the results of this study, the SRMR for this model is less than 0.08, which is considered a good fit.

3.5.6 Moderator Analysis (Interaction Term)

In essence, a moderating factor affects the relationship between independent and dependent variables by enhancing or dampening it. This study examined the moderating effect of the government role (GR) on the relationship between ARESs and SUP. In the absence of a moderator variable (ARESs*GR), the value of R^2 for SUP was 0.174. That also ARESs and GR explained a 17.4% change in SUP. A higher R^2 was obtained by including the moderator variable (30.3%) as shown in Figure 9. Based on this analysis, there has been an increase of 12.9% in the explanation of the endogenous latent variable (SUP).

It was also determined that GR moderating effect on the relationship between ARESs and SUP was negative and significant (β =-0.220, P value= 0.025, and t-value= 2.178), confirming H7. Therefore, with increased GR, the relationship between ARESs and SUP weakens. Table 9 provides a summary of the moderation analysis.

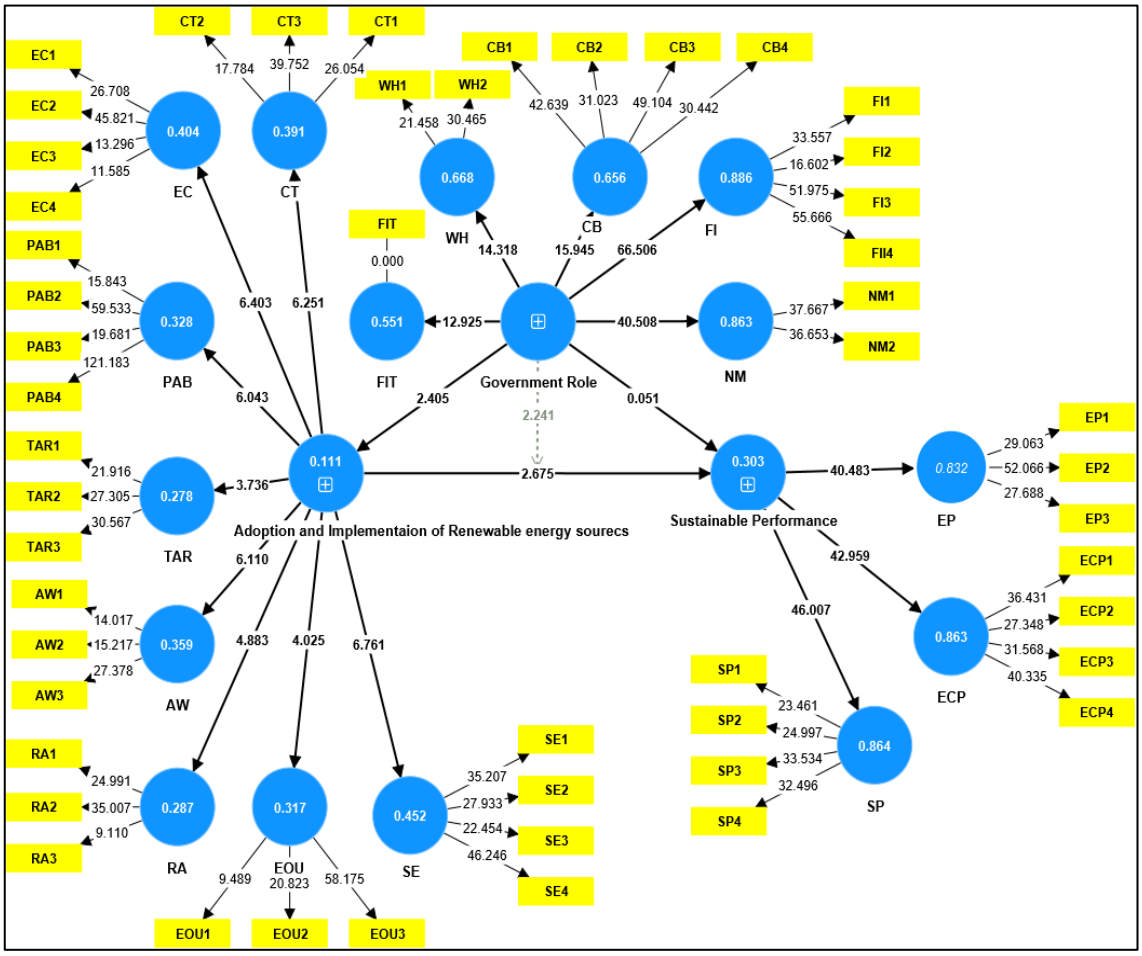
Table 9

Boot Strapping for Moderator

Relationship	Original Sample	Standard Error	Significance T Statistics	P Value	Result
H7:Moderating effect (GR*ARESs → SUP)	-0.220	0.098	2.241	0.025	Supported

Figure 9

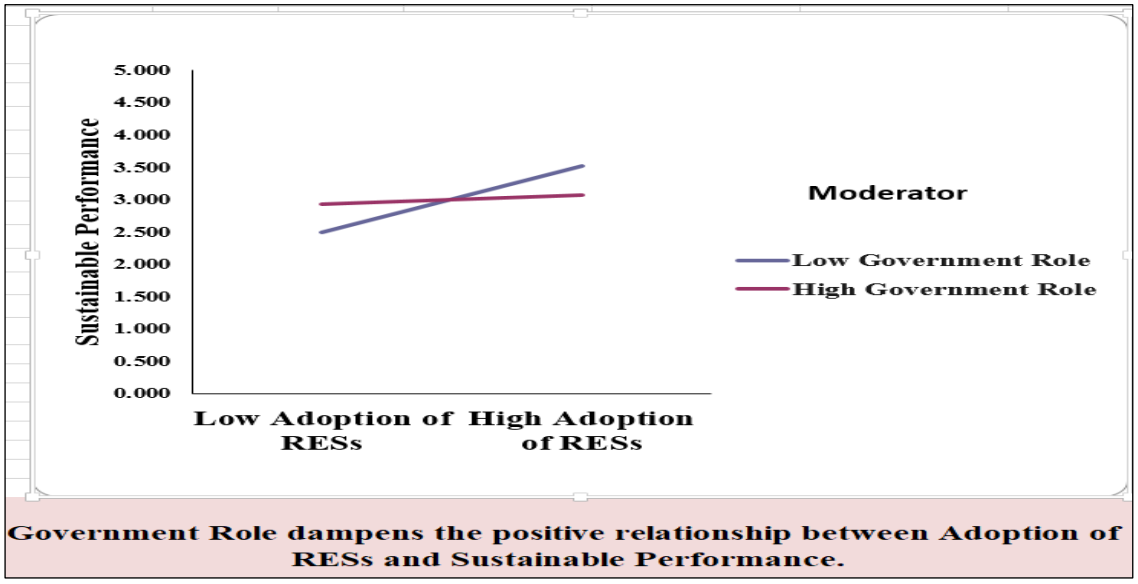
Results of bootstrapping of moderator



Additionally, an investigation of the moderating effect is completed in this study by examining the slope analysis. This shows that at low levels of GR, the impact of ARESs is greater on SUP as shown in Figure 10, compared to high levels of GR. With higher GR, ARESs fail to affect SUP, since the line tends to become straighter. This means GR reduces the impact of ARESs on SUP.

Figure 10

Slope Analysis



Effect size is an assessment of the strength of the government role's moderating effect on the adoption of RESs and sustainable performance. According to Henseler & Fassott (2010), computing the strength of the relationship in the effects of moderation depends on the coefficient of determination (R^2) by the main effect model. Thus, the f^2 was determined using the equation described below.

$$f^2 = \frac{R^2 model\ with\ modrator - R^2 model\ without\ moderato}{1 - R^2 model\ with\ modrator} \quad \text{……..(3.3)}$$

This implies that the moderation effect size (f^2) on the endogenous latent variable was 0.185 (0.303-0.174/1-0.303) (Cohen, 1988). In addition, the results confirmed that the effect size of the moderation effect was moderate. Consequently, the negative moderation effect is confirmed, as well as the weakening of the relationship between ARESs and SUP due to the GR. Table 10, refers to a summary of the results of the strength analysis of the moderating effects.

Table 10

Strength of interaction term (moderator effect)

Dependent Latent Variable	R^2		f^2	Effect Size
	Included	Excluded		
Government Role	0.303	0.174	0.185	Medium

Chapter Four
Discussion, Conclusion and Recommendations

4.1 Chapter Overview

This chapter summarizes the results of the research that regarded to adoption of RESs (solar energy and biomass), sustainable performance and government role in the Palestinian industrial and commercial sectors. Moreover, the chapter discusses the results of hypotheses testing, as well as the implications for both theoretic and practice. In addition, some recommendations are offered for the government and industrial and commercial sectors in the summary and conclusion of the chapter. At the end of the chapter, the limitations and some suggestions for future directions are discussed.

4.2 Discussion of Results

This study examines the factors influencing the adoption of RESs and their impact on sustainable performance (environmental, economic, and social) as well as the effect of the government's role as a moderator between the adoption of RESs and sustainable performance in the industrial and commercial sectors. Eight factors influence the adoption of RESs, namely (cost, ease of use, relative advantage, perception of benefit of using RESs, awareness, self-efficacy, and environmental concerns, and trust and risk. Additionally, government policies include feed-in tariffs, net metering, wheeling, competitive bids, and financial incentives. In addition, the pillars of sustainable performance include environmental, economic, and social.

4.2.1 Discussion on Level of Adoption of RESs

The first objective of this thesis is to assess the current level of RESs adoption in the Palestinian industrial and commercial sectors. This objective is accomplished by computing the arithmetic average mean and standard deviation of all factors related to the adoption of RESs based on the sample responses from the questionnaire. As a result, the level of adoption of RESs is high with an arithmetic mean of 4.21, and a standard deviation of 0.753.

Further details are observed in the current study for the factors that influence the adoption of RESs, which shows the total arithmetic mean for cost is 4.36 indicating that cost is the most significant factor contributing to RESs adoption; followed by environmental

concern, with an arithmetic mean of 4.29. After that, trust risk, awareness, ease of use, and perception of the benefits of using RESs, relative advantage, and self-efficacy have an arithmetic mean of 4.29, 4.23, 4.22, 4.19, 4.12, and 4.11, respectively.

For cost, the results highlighted that the cost has a most significant impact on the intention of the consumer to adopt of RESs, which cost comprises many sides as the cost of purchasing equipment and installation of renewable energy, cost of maintenance of renewable energy as well as the cost of investments. Several studies confirmed the finding of this study by (Bandara et al., 2020). In contrast, the high costs have been a major barrier to their adoption of RESs (Kowalska-Pyzalska, 2018). Another factor is environmental concern has a role to play in adopting renewable energy by protecting the environment to reduce global warming, climate change, and pollution. The findings of this study have a considerable and positive influence on the adoption of RESs in the industrial and commercial sectors. These results are consistent with this study (Elmustapha and Hoppe, 2018). In line with the factor of trust and risk, the result shows that it is significant for a consumer to adopt RESs. The consumer adoption of RESs when renewable energy poses a lower risk than other sources and that trust is essential and a catalyst to the adoption of RESs. This result supports the claims of that (Dóci and Gotchev, 2016a).

Similar to previous studies, as found in the study awareness is an influential and significant in the adoption of RESs in the industrial and commercial sectors. The adoption of RESs increase when consumers are aware of the benefits and efficiency of RESs compared to traditional energy sources and other related issues. Further, the outcomes of the study are supported by (Kumar and Majid, 2020), suggesting that renewable energy adoption is positively related to awareness. Additionally, ease of use is an influential factor that influences consumers' willingness to adopt RESs positively and significantly in the commercial and industrial sectors. Ease of use consists of many dimensions such as how the customer understands that this technology is easy to maintain, recycle, and install. In line with this study agreed by (Yang et al., 2021).

After that, the finding from this study showed that consumers' perceptions and beliefs of the benefits of using RESs are positive and significant for the adoption of RESs in the industrial and commercial sectors. The perception and beliefs associated with RESs comprise several aspects, such as improved energy supplies, increased job opportunities,

decrease consumption of conventional sources, and global warming. This study is supported by Senpong & Wiwattanadate (2019), which confirm the perception and belief that the benefit of using RESs affects adopting RESs. As well as, the findings of this study indicate that relative advantage is a positive and smaller role in the adoption of RESs in industrial and commercial sectors. Consumers will actually be willing to pay more for renewable energy if they understand its benefits in terms of reducing the demand on energy production as well as reducing carbon footprints. This study agrees with Khalid et al., (2021). Analogous to that, self-efficacy is significant and has little impact on the consumer to adopt of RESs in Palestinian industrial and commercial sectors. As well, there are many aspects of self-efficacy, such as "providing the enterprise with the quantities it needs for consumption", "having all the resources and conditions to use renewable energy", “possessing the knowledge necessary for utilizing renewable energy”, and "meeting the energy needs of the Palestinian industrial and commercial sectors", which are all key aspect for consumers to adopt RESs. This is in agreement with this study (Thiangtam, 2016).

4.2.2 Discussion on Level of Sustainable Performance in Palestine

The second objective of this thesis is to investigate the relationship between RESs adoption and sustainable performance in Palestinian industrial and commercial sectors.

These results confirmed a strong and positive relationship between the adoption of RESs and sustainable performance in the economic, environmental, and social dimensions. In addition, the results showed a high level of implementation for sustainable performance with an arithmetic mean of 4.16. In particular, three pillars (economic, environmental, and social) were highly influential on the sustainable performance for adopting RESs in the industrial and commercial sectors. According to these results, environmental and economic dimensions have the largest and the same arithmetic mean effect on sustainable performance in the industrial and commercial sectors with a score of 4.12. Accordingly, the arithmetic mean for social performance is 3.99.

For environmental performance, the results show that the statement that reads "The use of renewable energy sources (solar and biomass) in Palestine leads to the conservation from wastage and loss" has an average response score of 4.18. Followed by, “The use of RESs in Palestine reduces greenhouse gas emissions “with an average response score of

4.10, and "The use of RESs in Palestine reduces and limits the leakage of hazardous chemical waste" with an average response score of 4.07. In terms of economic performance, there are many aspects, including "The use of RESs in Palestine improves the infrastructure of industries and makes them more sustainable." which represented the highest average response of 4.19. Then, using RESs increases economic growth, with an average response of 4.15. In addition, the average response was 4.09, which states that the use of RESs reduces the cost of consuming conventional energy and the least average response is 4.03, which refers to the use of RESs leading to independence from obtaining energy from Israel. Moreover, the finding indicates that enterprises are reporting significant progress in the context of both economic and environmental performance in the industrial and commercial sectors for adopting this technology. As well as adoption of RESs have a vital role in improving sustainability performance in the industrial and commercial sectors. The results support previous studies' claims, (Sunday et al., 2022; Xu & Liu, 2019 ;Garrido et al., 2020). Regarding social performance, the findings revealed that the following statement received the highest average response: "The use of RESs in Palestine creates job opportunities and reduces poverty "with 4.060. Additionally, the statement states that the use of RES in Palestine helps meet the basic needs of the industrial and commercial sectors, with an average response rate of 3.99. Furthermore, the average response rate to this statement was 3.97, indicating that the use of renewable energy improves the health and safety of the community. After that, the aspect of increasing the consumption of clean renewable energy had an average response of 3.95. Therefore, these findings warrant more attention to enhance social performance from policymakers and top management in the enterprise. The result is supported by, (Botelho et al., 2016).

4.2.3 Level of Government Role in Palestine

Based on the result demonstrated the government's role had an antecedent effect on the adoption of RESs. The findings showed the overall level of implementation of the government role is high with an arithmetic mean of 3.85. Further, the Palestinian government's policies that encourage the adoption of renewable sources such as feed-in tariffs, net metering, competitive bid, and financial incentive have a mean of 3.94, 3.91, and 3.85 respectively. While the lowest implementation levels are wheeling and financial incentive with a mean of 3.81.

In the context of the government's role, the feed-in tariff is largely seen as the most significant policy that affects the adoption of renewable energy from the viewpoint of industrial and commercial enterprises, in which the Palestinian government purchases the renewable energy produced by the enterprise at a fixed price. Besides, net metering is also a mechanism influential for consumers to adopting of RESs. The result showed that the statement of "The Palestinian government is developing a system that controls the rate of energy consumption" with a mean of 3.76 and "The Palestinian government supports small-scale renewable energy projects" with a mean of 4.06. Both of these policies are the strongest and most effective policies applied in Palestine to encourage the adoption of RESs in the industrial and commercial sectors. These policies are effective ways to encourage renewable energy in all countries (Yang et al., 2021).

Another government policy applied in Palestine is a competitive bid; a competitive bid involves many aspects, such as establishing laws and specifications to regulate and monitor competitive bids. In addition, it provides submits offers a list of renewable energy prices to achieve competitiveness in the industrial and commercial sectors. Also, the process of issuing licenses and certificates in Palestine is somewhat smooth, and the Palestinian government provides smart grid installation methods in order to encourage investments in smart grids. Where all indicators of the competitive bid have an average response between (3.74) and (4.010). Furthermore, the striking findings are that financial incentives and wheeling have the lowest level of implementation in the Palestinian industrial and commercial sectors.

On the side of financial incentives, this study contains several factors as the Palestinian government facilitates the import of renewable energy sources within a specified range of tax exemptions. As well, supports and finances renewable energy projects in industrial and commercial sectors through loans and grants. Additionally, the Palestinian government is increasing the mandatory quotas for RESs to meet the needs of the industry and commercial sectors. Finally, the Palestinian government is developing renewable portfolio standards to increase renewable energy production. Because of the results, this call for the Palestinian government to provide more incentives to encourage industrial and commercial institutions to use renewable energy that the average response of all indicator between (3.78-3.83).

Accordingly, the policy of wheeling is significant and has the least effect on consumers adopting RESs in the industrial and commercial sectors. In turn, the government identifies the quantities of conventional energy consumption and also abides by maintaining, monitoring, and operating RESs systems. Overall, all indicators received an average response mean of 3.77 to 3.82.

4.2.4 Summary of Results

This research aims to investigate the relationship between ARESs, SUS, and GR through the testing of four hypotheses. The results of the study are presented in Table C.6 in Appendix C., which indicates the hypothesized findings. The following discussion will provide a comprehensive analysis of these findings.

The data analysis outcome indicated a strong and positive relationship between the adoption of RESs and sustainable performance. Several previous studies have revealed similar results (Troldborg et al., 2014). Hence, H1 is supported. The result also confirmed that the adoption of RESs positively significant on three pillars environmental, economic, and social performance, where each of these pillars directly impacts on the adoption of RESs in industrial and commercial sectors in Palestine. However, many empirical studies have come to the same conclusions (Sunday et al., 2022 ; Xu and Liu, 2019). Furthermore, this study demonstrated that many factors influence the adoption of RESs. The most significant factor influencing the adoption of RESs in the industrial and commercial sectors is cost, and the least influential factor is self-efficacy.

Normally, the government supports is the main driver and influential role for the adoption of RESs, thereby, the result confirmed that the government's role positively and significantly impacts on adoption of RESs, which adoption of RESs will be facilitated for industrial and commercial sectors by policies and regulation that reduce cost. This result is in agreement with (Makki and Mosly, 2020),H2 is proved. Our research provides a discussion of the policies of the Palestinian government that encourage the adoption of RESs, such as competitive bidding, wheeling, net metering, feed-in tariffs, and financial incentives. The result of this study proved that these policies positively and significantly impact the adoption of RESs in the Palestinian industrial and commercial sectors. Even so, feed-in tariff and net metering are the most critical policy that influences consumers to adopt renewable energy in the industrial and commercial sectors, whereas financial

incentives and wheeling have the least effect. Meanwhile, the outcomes from the hypotheses suggest that the government's role is not significant for sustainable performance. Consequently, the target group for the Palestinian government in this study is the energy sector as Electricity Regulatory Council, which indicates the energy sector contributes little and is not directly related to improving sustainable performance. On the other, the study findings may suggest that government policies and initiatives promoting the adoption of RESs may not be effective at achieving sustainable performance. It can be clear that the policies or initiatives are not comprehensive enough, lack clear targets, or lack the necessary funding or incentives. The findings may suggest also that the government lacks control over external factors, such as market demand, technological innovation, or consumer behavior. Moreover, it is implied that the government might not be as significant as previously assumed in promoting sustainable performance through the adoption of RESs, and that other factors may be more important on the energy sector such as improving the regulatory environment or promoting energy efficiency. While this study, Bamgbade et al. (2017) proves that government policy improves both organizational and business performance in a holistic way. Then, H3 is not supported. The findings also confirm the government's role as a moderator in the relationship between the adoption of RESs and sustainable performance. However, it can also be concluded that a moderator dampens the influence of their relationship. Therefore, Palestinian governments must change their strategies and increase incentives to encourage the use of RES. Therefore, H4 proves that objective five is achieved.

4.3 Theoretical and Practical Implications

From a theoretical perspective, an important contribution of this research is to better understand concepts related to RESs adoption , the role of government, and sustainable performance. Also, this study provides insight into the relationship between the adoption of RESs and sustainable performance, which this study considers the most significant topic searched in the industrial and commercial sectors in the context of Palestine and has not previously been carried out. Finally, the study also evaluated the government's role in moderating the relationship between RES adoption and sustainable performance. The subject of this study in Palestine was also the first to be conducted in this manner and uncommon in prior studies.

In practical perspective, this study provides useful insights into the factors influencing the adoption of RESs. These insights inform policymakers, government, manufacturers, and suppliers of renewable energy appliances about the most influential factors that affect decisions about the adoption of RESs, which helps shape more targeted legislation, regulations, policies, and strategies to meet public needs and facilitate adoption. Moreover, this study provides the Palestinian government with useful information about the challenges facing the private sector (industrial and commercial sectors) when adopting RESs, as well as how to design strategies and policies to encourage the private sector to increase the adoption of RESs. As well as that, this study helps enterprises in the industrial and commercial sectors to understand how RESs will influence and improve sustainable performance in three pillars (environmental, social, and environmental).

4.4 Conclusions

Renewable energy has displaced fossil fuels as the dominant energy source worldwide. Due to this, enterprises have adopted these sources to reduce their energy consumption and the pollution that results from conventional sources. This study, therefore, determines the factors influencing consumer adoption of RESs in Palestine's industrial and commercial sectors. Also, examine the effects of the adoption of RESs on sustainable performance as well as explore the moderating effects of the government’s role on the relationship between the adoption of RESs and sustainable performance. Additionally, this study also assessed the level of implementation of RESs adoption, government role, and sustainable performance.

The current study shows a high level of implementation of renewable energy, sustainable performance, and the government's role. In addition, this study established that the following factors significantly influence adopting RESs: cost, environmental concern, trust and risk, perception of the benefit of using RESs, awareness, ease of use, self-efficacy, and relative advantage. While the most significant factor affecting the adoption of RESs is cost, self-efficacy is less influential. Furthermore, in Palestine, it is anticipated that the adoption of RESs will increase in the commercial and industrial sectors if factors affecting consumers' decisions are considered. Additionally, the results found there is a strong and positive relationship between the adoption of RESs and sustainable performance in three dimensions (environmental, economic, and social).

Regarding the results, it is also found that the government's role is significant and positive in RESs adoption. However, the government's role is not related to sustainable performance. Moreover, the results indicated that the government's role is the moderator between the adoption of RESs and sustainable performance. Nonetheless, this study found that Palestinian government policies did not sufficiently encourage renewable energy adoption. Due to the high cost of RESs technologies, the Palestinian government should implement more incentives and policies to encourage the industrial and commercial sectors. Then, the government and the enterprise of industrial and commercial should increase the collaborative effort to improve the adoption of renewable energy. Even with guidelines and incentives provided by the Palestinian government, the political and economic conditions make it difficult for enterprises to obtain adequate funding. Therefore, the Palestinian government should pay more attention to private enterprises and increase support to encourage the adoption of RESs. Moreover, this is the first empirical study to examine how the role of governments affects the adoption of RESs and sustainable performance in the industrial and commercial sectors. Along with this, findings will be immensely helpful in understanding the overall policies of the Palestinian government that are applied in the industrial and commercial sectors as well as gaining a deeper understanding of how the role of government influences the relationship between renewable energy and sustainable performance.

4.5 Recommendations

Based on the results of this study and given the prevailing situation regarding the adoption of renewable energy in the Palestinian industrial and commercial sector. These recommendations were developed for the Palestinian government and the industrial and commercial sectors. The Palestinian government's policies and incentives to encourage the adoption of RESs in the industrial and commercial sectors are insufficient. Therefore, the government should take the following steps to increase the adoption of RESs:

- Monitoring laws and regulations for the implementation of renewable energy issued by the Energy and Natural Resources Authority, and enforcing electricity companies to abide by these laws and regulations. As well, the government should also develop a strategy and generalize all laws, regulations, and procedures related to renewable energy for all electricity companies and municipalities.

- Providing more incentives and facilities for various renewable energy projects, whether tax exemptions, loans, grants and exempting the value of the additional tariff.
- Facilitating licensing and approvals and monitor renewable energy products so that consumers do not receive substandard products.
- Informing consumers about renewable energy's economic and environmental benefits through marketing campaigns and programs. Particularly, increasing public awareness about the dangers of using conventional energy. As a result, renewable energy could be adopted in a positive manner.
- Putting dedicated teams responsible for monitoring renewable energy projects periodically. Moreover, increase research and development in the field development of alternative energy technologies, taking into account the latest technologies used globally and the use of international practices.
- Reconsidering the net metering law, which in turn contributes to enhancing economic development, especially since net metering systems are widely spread in the industrial sector. Further, the Palestinian government should eliminate the monthly deduction of 10% from energy exported to the network. In addition, increase the capacity for net metering projects without limiting them to less than 1 MW, also, submit a clear mechanism for the process of accounting with the beneficiaries, and subject some renewable energy technologies to net metering law, not just solar energy. Akin to that, eliminate the 12% rate that the Electricity Company takes from produced energy in the wheeling law.
- Giving more attention to investors and create a strong regulatory framework to encourage private sector investments, as well as financial guarantees for investors.

Finally, the government and the private sector must cooperate to improve adoption of renewable energy. Therefore, it is clearly recommended that the industrial and commercial sectors consider social aspects when adopting renewable energy as a means of improving sustainable performance.

4.6 Limitations and Future Research Directions

There are a few limitations that should be addressed in future research. Firstly, there is a lack of literature about the relationship between RESs and sustainable performance. Also, the sample size is small, which makes it difficult to generalize the findings, so more samples are recommended to obtain more strong results. Besides that, the lack of a comprehensive list of industrial and commercial companies with accurate contact details. For future studies, this study provides a solid foundation for subsequent research toward improving these findings. Furthermore, the data in this study is limited to the industrial and commercial sectors. This study can be extended to a variety of sectors, including the service sector, to draw comprehensive conclusions. Similarly, the results of the study can also be confirmed by testing it in other developing countries. Even though this study also identified several factors that affect the adoption of RESs in the Palestinian commercial and industrial sectors. However, additional factors such as perceived usefulness, a payback period for RES, and the negative impact of RES may have been uncovered and added to this model. Also, the current research did not consider variables such as industry type, firm experience, size, and other moderating variables with RESs and sustainable performance, and whether this may influence the relationships of the coexisting paradigms is an interesting research question to explore in the future.

List of Abbreviations

Abbreviations	Definition
ARESs	Adoption of renewable energy sources
AVE	Average Variance Extracted
AW	Awareness
CB	Competitive Bid
CR	Composite Reliability
CT	Cost
EC	Environmental Concern`
ECP	Economic Performance
EOU	Ease of Use
EP	Environmental Performance
FI	Financial Incentives
FIT	Feed-in Tariff
GR	Government role
NM	Net-Metering
OPT	Occupied Palestinian Territories
PAB	Perception of the benefit of using RESs
PEEA	Palestinian Energy and Natural Resources Authority
PNA	Palestinian National Authority
PV	Photovoltaic
RA	Relative Advantage
SE	Self-efficacy
SP	Social Performance
SUP	Sustainable performance
TAR	Trust and Risk
TBL	Triple bottom line
WH	Wheeling

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Appendices

Appendices A

الاستبانة

جامعة النجاح الوطنية

كلية الدراسات العليا

برنامج ماجستير الإدارة الهندسية

استبيان حول تقييم تبني الطاقة المتجددة (الطاقة الشمسية والكتلة الحيوية)

والأداء المستدام في القطاعات الصناعية والتجارية الفلسطينية: الدور الحكومي كمتغير

عزيزي القارئ/ عزيزتي القارئة:

تحية طيبة،

شكراً لك على وقتك في الإجابة على هذا الاستبيان. تستهدف هذه الدراسة قطاعي الصناعة والتجارة في فلسطين ، بهدف تقييم تبني الطاقة المتجددة والأداء المستدام. إن الاستبيان هو وسيلة لجمع المعلومات للبحث العلمي لاستكمال متطلبات الحصول على درجة الماجستير في الإدارة الهندسية من جامعة النجاح الوطنية.

يتكون الاستبيان من قسمين رئيسيين:

القسم الأول: يهدف إلى جمع معلومات عامة عن المجيب.

القسم الثاني: يتكون من ثلاثة أجزاء، تهدف إلى تقييم تبني الطاقة المتجددة والأداء المستدام في القطاعات الصناعية والتجارية الفلسطينية: الدور الحكومي كمتغير.

سوف تستغرق الإجابة على الاستبيان 10 دقائق. يرجى قراءة جميع الأجزاء بعناية واختيار الإجابة المناسبة بدقة وحيادية، مع التقدير الكامل لمشاركتك.

لجنة تحكيم الإستبيان:

د. يحيى الصالح ، د. محمد السيد ، د. أيسر ياسين ، د. عماد بريك، د. أيهم جعرون ، د. رامز عساف

وتفضلوا بقبول وافر التقدير والاحترام

الطالبة: اسراء سالم، جوال رقم: 0597329464

القسم الثاني: معلومات عامة

يرجى التكرم بالإجابة على الأسئلة التالية بوضع إشارة × في المكان المناسب:

1- الجنس: ذكر ( ) أنثى ( )

2- الدرجة العلمية: ( ) بكالوريوس ( ) ماجستير ( ) دكتوراه

3- سنوات الخبرة: ( ) 0-5 سنوات ( ) 6-10 سنوات ( ) 11-15 سنة ( ) أكثر من 15 سنة

4- الموقع الوظيفي الحالي في المؤسسة: ( ) مدير عام ( ) مدير مالي ( ) مدير إنتاج

( ) مدير جودة ( ) غير ذلك (يرجى التحديد) .....

5- قطاع المؤسسة: ( ) التجاري ( ) الصناعي

6- الموقع:

( ) جنين ( ) طولكرم ( ) نابلس ( ) رام الله ( ) القدس ( ) الخليل ( ) بيت لحم ( ) سلفيت ( ) قلقيلية ( ) أريحا ( ) طوباس والأغوار الشمالية

7- معدل الاستهلاك الشهري من مصادر الطاقة التقليدية (بالشيكل):_____

8- هل تستخدم مؤسستك مصادر الطاقة المتجددة للمساهمة في توفير جزء من احتياجتها للطاقة؟

( ) نعم ( ) لا

إذا كان الجواب (نعم)

أ- فكم تقريباً النسبة التي تساهم الطاقة المتجددة في توفيرها من احتياجات المؤسسة؟_____

ب-يرجى ذكر هذه المصادر؟ _____

( ) كهرباء ( ) ديزل ( ) بنزين ( ) غاز ( ) غير ذلك (يرجى التحديد):_____

10- اذا كانت مؤسستكم تنتج طاقة متجددة، هل يزيد إنتاج الطاقة المتجددة للمؤسسة عن حاجتها؟

( ) نعم ( ) لا ( ) احيانا

11- هل تمتلك مؤسستك مساحة كافية يمكن توفيرها لأغراض انتاج الطاقة المتجددة؟

( ) نعم موجود حاليًا ( ) حاليًا لا توجد مساحة للتنفيذ ( ) لست متأكدًا

12- هل تمتلك الشركة أية شهادات بيئية أو جودة؟

( ) نعم موجود حاليًا ( ) حاليًا لا توجد خطط للتنفيذ ( ) يوجد خطة للتنفيذ في غضون 12 شهرًا

( ) يوجد خطة للتنفيذ في غضون فترة تزيد عن 12 شهرًا

إذا كان الجواب نعم يرجى ذكر اسماء هذه الشهادات؟ _____

13- كم يبلغ معدل عدد ساعات العمل اليومية في المؤسسة؟ _____

القسم الثالث:

(الجزء الأول: العوامل المؤثرة في تبني واعتماد مصادر الطاقة المتجددة)

(تبني واعتماد مصادر الطاقة المتجددة يتضمن مجموعة من العوامل مثل التكلفة، القلق البيئي، الثقة والمخاطر، التصور حول الفائدة، سهولة الاستخدام، الميزة النسبية، الوعي، والكفاءة الذاتية).

يهدف هذا القسم إلى الكشف عن العوامل المؤثرة في تبني واعتماد مصادر الطاقة المتجددة.

لكل جملة من الجمل التالية يرجى اختيار درجة التأثير المناسبة حسب وجة نظرك.

الرقم	التكلفة الجملة	أعارض بشدة	أعارض	محايد لا أعارض	موافق	موافق بشدة
1	تتطلب مصادر الطاقة المتجددة تكاليف الشراء والتركيب العالية جداً					
2	تكاليف الصيانة لمصادر الطاقة المتجددة مرتفعة جدا					
3	ارتفاع تكاليف الاستثمار في الطاقة المتجددة					
	القلق البيئي					
4	يؤدي استخدام الطاقة المتجددة إلى التقليل والحد من التلوث					
5	يساهم استخدام الطاقة المتجددة في التخفيف من استخدام الوقود الأحفوري					
6	يساعد استخدام الطاقة المتجددة في تحسين جودة البيئة					
7	يؤدي استخدام الطاقة المتجددة إلى تقليل حدوث تغيرات في المناخ					
	الثقة والمخاطر					
8	يرافق الاستثمار في مجالات الطاقة المتجددة بعض المخاطر السياسية والتنظيمية					
9	استخدام الطاقة المتجددة لا يشكل خطراً على البيئة					
10	الطاقة المتجددة هي مصدر امن وموثوق للطاقة					
	التصور حول الفائدة					
11	يقلل استخدام مصادر الطاقة المتجددة من نسبة استهلاك الطاقة					
12	يؤدي استخدام الطاقة المتجددة إلى تحسين الشبكة الكهربائية					
13	يقلل استخدام الطاقة المتجددة من انبعاثات غاز ثاني أكسيد الكربون					
14	يؤدي استخدام الطاقة المتجددة إلى زيادة فرص للعمل في تنفيذ مشاريع الطاقة المتجددة					
	سهولة الإستخدام					
15	تركيب مواد الطاقة المتجددة سهلة وواضحة					
16	تعتبر عملية التشغيل لمصادر الطاقة المتجددة سهلة					
17	تعتبر عملية الصيانة لمصادر الطاقة المتجددة سهلة					
	الميزة النسبية					
18	يساهم استخدام الطاقة المتجددة إلى تقليل الطلب على إنتاج الطاقة في القطاعات الصناعية والتجارية					
19	يساهم استخدام الطاقة المتجددة في تعزيز الميزة التنافسية للقطاعين الصناعي والتجاري الفلسطيني					
20	سيقلل استخدام الطاقة المتجددة من آثار الكربون					
	الوعي					
21	لدى شركتنا الوعي بالفوائد تنفيذ مصادر الطاقة المتجددة					
22	تدرك شركتنا ان السوق الفلسطيني يقدم تطبيقات لحلول تعتمد على تقنيات الطاقة المتجددة					
23	لدينا في شركتنا الوعي باستخدام واحتياجات الطاقة المتجددة					
	الكفاءة الذاتية					
24	يؤدي استخدام الطاقة المتجددة إلى توفير الكميات المتاحة اللازمة للاستهلاك في المؤسسة					
25	يساهم استخدام الطاقة المتجددة في تلبية جزء من احتياجات قطاعي الصناعة والتجارة من الطاقة في فلسطين					
26	لدينا في مؤسستنا المعرفة اللازمة لاستخدام مصادر الطاقة المتجددة					
27	تتوفر الظروف لاستخدام مصادر الطاقة المتجددة في مؤسستنا					

الرقم	مؤشرات اعتماد وتبني مصادر الطاقة المتجددة الجملة	أعارض بشدة	أعارض	محايد (لا أعلم)	موافق	موافق بشدة
1	تعتبر مصادر الطاقة المتجددة موفرة للطاقة					
2	هناك سهولة في الحصول على مصادر الطاقة المتجددة في فلسطين					
3	تعتبر مصادر الطاقة المتجددة طبيعية ومتوفرة بشكل دائم في فلسطين					

(الجزء الثاني: دور الحكومة الفلسطينية في تبني واعتماد مصادر الطاقة المتجددة

(تقوم بعض الدول على وضع سياسات متبعة في تبني واعتماد مصادر الطاقة المتجددة مثل العطاءات التنافسية ، تعريفة التغذية ، القياس الصافي ، ونظام العبور ، وتقديم حوافز مالية مثل الإعفاءات الضريبية ، القروض ، الحصص الإلزامية ، ومعايير المحفظة المتجددة).

يهدف هذا القسم إلى الكشف عن السياسات المتبعة في تبني واعتماد مصادر الطاقة المتجددة.

لكل جملة من الجمل التالية يرجى اختيار درجة التأثير المناسبة حسب وجة نظرك.

السياسات						
الرقم	**العطاءات التنافسية** الجملة	أعارض بشدة	أعارض	محايد (لا أعلم)	موافق	موافق بشدة
1	تعمل الجهات الحكومية الفلسطينية على عرض قائمة أسعار الطاقة لتحقيق التنافسية بين القطاعات الصناعية والتجارية					
2	تقوم الجهات الحكومية الفلسطينية بوضع القوانين والمواصفات لمراقبة وتنظيم المناقصات التنافسية					
3	تشجع الجهات الحكومية الفلسطينية على الإستثمار في الشبكات الذكية من خلال توفير تقنيات التركيب الذكي للشبكات					
4	اصدار الشهادات والرخص في فلسطين سلسا نوعا ما					
	تعريفة التغذية					
5	ت تقوم الجهات الحكومية الفلسطينية بشراء الطاقة المنتجة من مصادر الطاقة المتجددة بأسعار ثابتة.					
	صافي القياس					
6	تعمل الجهات الحكومية الفلسطينية على تطوير نظام يعمل على ضبط معدل استهلاك الطاقة					
7	تعمل الجهات الحكومية الفلسطينية على دعم مشاريع الطاقة المتجددة صغيرة الحجم					
	نظام العبور					
12	تعمل الجهات الحكومية الفلسطينية على تحديد كميات الطاقة المستهلكة التقليدية					
13	تعمل الجهات الحكومية الفلسطينية على الإلتزام بإجراءات التشغيل والصيانة والمحافظة على أنظمة مصادر الطاقة المتجددة					
	الحوافز المالية					
14	تشجع الجهات الحكومية الفلسطينية على استخدام مصادر الطاقة المتجددة ضمن نطاق محدد من الإعفاءات الضريبية					
15	تعمل الجهات الحكومية الفلسطينية على تقديم القروض والمنح لدعم وتمويل مشاريع الطاقة المتجددة					

16	تعمل الجهات الحكومية الفلسطينية على زيادة الحصص الإلزامية لمصادر الطاقة المتجددة بما يفي باحتياجات قطاعي الصناعة والتجارة					
17	تعمل الجهات الحكومية الفلسطينية على توفير معايير المحفظة المتجددة لزيادة إنتاج مصادر الطاقة المتجددة					

القسم الثالث :(الأداء المستدام يتكون من ثلاثة ركائز أساسية هي الأداء البيئي والاقتصادي والاجتماعي، حيث أن كل ركيزة تعتبر بمثابة مؤشر ولها تأثيرها المباشر على تبني واعتماد مصادر الطاقة المتجددة).

يهدف هذا القسم إلى الكشف عن أثر الأداء المستدام في تحسين ركائز الاستدامة (البيئية والإقتصادية والاجتماعية).

لكل جملة من الجمل التالية يرجى اختيار درجة التأثير المناسبة حسب وجه نظرك.

الرقم	الأداء البيئي / الجملة	أعارض بشدة	أعارض	محايد (لا أعلم)	موافق	موافق بشدة
1	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى تقليل انبعاثات غازات الدفيئة (الإحتباس الحراري)					
2	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى الحفاظ على مصادر الطاقة المتجددة (الطاقة الشمسية وطاقة الكتلة الحيوية) من الهدر والضياع					
3	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى التقليل والحد من تسرب مخلفات المواد الكيميائية الخطرة					
	الأداء الإقتصادي					
4	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى الإستقلال عن الحصول على الطاقة من إسرائيل					
5	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى زيادة النمو الاقتصادي					
6	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى انخفاض تكلفة استهلاك الطاقة التقليدية					
7	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى تحسين البنية التحتية للصناعات وجعلها أكثر استدامة					
	الأداء الإجتماعي					
8	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى زيادة استهلاك الطاقة المتجددة النظيفة					
9	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى المساعدة في تلبية احتياجات قطاعي الصناعة والتجارة					
10	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى توفير فرص العمل والحد من الفقر					
11	يؤدي استخدام مصادر الطاقة المتجددة في فلسطين إلى تحسين صحة المجتمع وسلامته					

أية ملاحظات تودون إضافتها:

.....

شكراً لتعاونكم

Appendix B

Questionnaire

An-Najah National University

Faculty of Graduate Studies

Engineering Management Program

Questionnaire Regarding Assessing the Adoption of Renewable Energy and Sustainable Performance in Palestinian Industrial and Commercial Sectors: The Governmental Role as a Moderator

Dear respondent

Thank you for completing this questionnaire. This study examines the adoption of renewable energy in Palestine's industrial and commercial sectors. This questionnaire aims to collect information about scientific research to complete the requirements for the Master in Engineering Management degree offered by An-Najah National University. The questionnaire is divided into two main sections: The first section of the questionnaire collects general information about the respondent. In addition, the second section is composed of three parts, aiming to assess the adoption of renewable energy (RESs) and sustainable performance in the Palestinian industrial and commercial sectors: the role of government as a moderator.

Answering the questionnaire will take approximately 10 minutes. I appreciate your participation, so please read all parts carefully and select the appropriate answer accurately and impartially.

Thank you for accepting the abundance of appreciation and respect

Student: Israa Salem

Mobile number: 0597329464

First section: General information

Please mark the (X) that corresponds to the answer you prefer to the following questions.

1. Gender

( ) Male ( ) Female

2. The level of your education

( ) Bachelor's degree ( ) Master's degree ( ) PhD

3. Job Experience

( ) Less than 5 Years ( ) from 6 to 10 Years ( ) from 11to15 Years ( ) Over 15 years

4. Position Job

( ) General Manager ( ) Financial Manager ( ) Production Manager

( ) Quality Manager ( ) other

5. Sector of your enterprise

( ) industrial sector ( ) Commercial sector

6. Your location

( ) Jenin ( ) Tullkarm ( ) Nablus ( ) Ramallah ( ) Jerusalem ( ) Hebron ( ) Bethlehem ( ) Salfit

( ) Qalqilya ( ) Jericho ( ) Tubas

7. Average monthly consumption from traditional energy sources (in shekels):

……..

8. Does your enterprise use renewable energy sources to contribute to providing part of its energy needs?

( ) Yes ( ) No

If the answer is yes

1. Approximately how much does renewable energy contribute to providing from the needs of the enterprise? ……

Please list these sources. …….

9. Where does your enterprise get its traditional energy sources? (You can choose more than one option)

( ) Electricity ( ) Diesel ( ) Petrol ( ) Gas ( ) Other

10. If your establishment produces renewable energy, does the establishment's production of renewable energy exceed its needs?

( ) Yes ( ) No ( ) Maybe

11. Does your enterprise have enough space that can be provided for producing renewable energy?

( ) Yes, it currently exists.

( ) currently, there is no space to execute

( ) I am not sure

12. Does the enterprise's institution have any environmental or quality certificates?

( ) Yes, it is available now.

( ) Currently, no plans are in place to implement this.

( ) Implementation will take place within one year,

( ) Implementation will take place within two year.

12. A If the answer is yes, please mention the names of these certificates

……

13. What is the average number of daily working hours in the enterprise?

……

Second section:

Part one: factors affecting for Adoption of RESs (Adoption of RESs consist of a group of factors as cost, environmental concern, trust and risk, perception of benefit of using RESs, ease of use, relative advantage, awareness, and self-efficacy).

A key objective of this section is to identify factors that affect renewable energy adoption.

Select the correct (x) sign for each column that represents how much your enterprises uses that item.

No.	Cost / Statement	Strongly disagree	Disagree	Neutral (don't know)	Agree	Strongly agree
1	There is a high cost is associated with the purchase and installation of RESs					
2	There is a high maintenance cost associated with RESs.					
3	There is a high investment cost for renewable energy sources.					
	Environmental Concern					
4	The use of renewable energy reduces pollution and limits it.					
5	The use of renewable energy reduces the use of fossil fuels					
6	The use of renewable energy helps to improve the environment					
7	The use of renewable energy reduces the climate changes or crises.					
	Trust and Risk					
7	There are some political and regulatory risks associated with renewable energy investments.					
8	Using renewable energy does not threaten the environment.					
9	Renewable energy is a safe and reliable source of energy					
	Perception of the benefit of using RESs					
10	The use of RESs reduces the consumption of conventional energy					
11	The use of RESs improves the electrical grid					
*I*2	The use of renewable energy reduces carbon dioxide emissions					
13	The use of renewable energy increases employment opportunities in the implementation of renewable energy projects.					

	Ease of Use					
14	Installation of renewable energy equipment is easy and clear.					
15	The operation of RESs is easy.					
16	Maintenance of RESs is easy.					
	Relative advantage					
17	The use of renewable energy will decrease the demand on energy production in the industrial and commercial sectors					
18	The use of renewable energy will enhance the Palestinian industrial and commercial sectors' competitive advantage					
19	The use of renewable energy will reduce carbon footprints					
20	Our enterprise has awareness of the benefits of implementation of RESs.					
21	Our enterprise recognizes that the Palestinian market offers applications for renewable energy technologies-based solutions					
22	Our enterprise has awareness of renewable energy use and needs .					
	Self-efficacy					
23	Using renewable energy provides the enterprise with the quantities that need for consumption.					
24	Using renewable energy helps to meet the energy needs of the Palestinian industrial and commercial sectors.					
25	Our enterprise possesses the necessary knowledge to utilize renewable energy.					
26	Our enterprise has all resources and conditions for using RESs.					

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No.	Indicators of adoption of renewable energy sources. Statement	Strongly disagree	Disagree	Neutral (don't know)	Agree	Strongly agree
1	Energy saving can be achieved with RESs.					
2	There is easy access to RESs in Palestine.					
3	There is always renewable energy available in Palestine because it is natural.					

Section 2: Government role

(Some countries are establishing policies to adopt renewable energy such as competitive bidding, feed-in tariffs, net metering, wheeling, and financial incentives such as tax exemptions, loans, compulsory quotas, and renewable portfolio standards). This section aims to reveal the policies followed in adopting RESs. (Please select the appropriate degree of influence for each of the following sentence.)

No.	Competitive bid Statement	Strongly disagree	Disagree	Neutral (don't know)	Agree	Strongly agree
1	The Palestinian government submits offers a list of renewable energy prices to achieve competitiveness in the industrial and commercial sectors					
2	The Palestinian government established laws and specifications to regulate and monitor competitive bids					
3	The Palestinian government provides smart grid installation methods in order to encourage investments					
4	The process of issuing licenses and certificates in Palestinian industrial and commercial is somewhat smooth					
	Feed-in-Tariff					
5	The Palestinian government purchases the renewable energy produced by the enterprise at a fixed price					
	Net-Metering					
6	The Palestinian government is developing a system that controls the rate of energy consumption					
7	The Palestinian government supports small-scale renewable energy projects					
	Wheeling System					
8	The Palestinian government is committed to operating, maintaining, and preserving the systems of renewable energy					
9	The Palestinian government is determining the amount of conventional energy used					
	Financial Incentives					
10	The Palestinian government facilitates the import of renewable energy within a specified range of tax exemptions					
11	The Palestinian government supports and finances renewable energy projects in industrial and commercial sectors through loans and grants					
12	The Palestinian government is increasing the mandatory quotas for renewable energy sources to meet the needs of the industry and commercial sectors					
13	The Palestinian government is developing renewable portfolio standards to increase renewable energy production					

Section 3: Sustainable performance

Three main pillars measure sustainable performance: environmental, economic, and social, each of which is an indicator and influences the adoption of RESs. This section aims to reveal the impact of sustainable performance on improving the pillars of sustainability (environmental, economic, and social). The appropriate columns with (x) should be marked based on your agreement that the item contributes to achieving the following goals for your enterprises.

No.	Environmental performance Statement	Strongly disagree	Disagree	Neutral (don't know)	Agree	Strongly agree
1	The use of RESs in Palestine reduces greenhouse gas emissions(global warming)					
2	The use of RESs (solar and biomass) in Palestine leads to the conservation from wastage and loss.					
3	The use of RESs in Palestine reduces and reduces the leakage of hazardous chemical waste					
	Economic performance					
4	The use of RESs leads to independence from obtaining energy from Israel.					
5	The use of RESs increases economic growth.					
6	The use of RESs reduces the cost of consuming conventional energy.					
7	The use of RESs in Palestine improves the infrastructure of industries and makes them more sustainable.					
	Social performance					
8	The use of RESs in Palestine leads to an increase in the consumption of clean renewable energy.					
9	The use of RESs in Palestine helps satisfy the basic needs of the industrial and commercial sectors					
10	The use of RESs in Palestine creates job opportunities and reduces poverty.					
11	The use of RESs in Palestine improves the health and safety of the community					

Any notes

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Thank you

Appendix C

Tables

Table C.1

Experts and Arbitrators Reviewing Questionnaire

Number	Name	Position
6	Dr. Yahya Al-Saleh, Dr. Mohammed Alsayed, Dr. Imad Brik, Dr. Aysar Yasin, Dr. Ayham Jaaron, Dr. Ramiz Assaf	Teaching staff at An-Najah university

Table C.2

Operationalization Of Model Constructs

Construct	Item	Reference
Cost (CT)	CT1: There is a high cost associated with the purchase and installation of renewable energy. CT2: There is a high maintenance cost associated with renewable energy. CT3: There is a high investment cost for renewable energy.	(Fatima et al., 2021) (Khalid et al., 2021)
Environmental Concern (EC)	EC1: The use of renewable energy reduces pollution and limits it. EC2: The use of renewable energy reduces the use of fossil fuels. EC3: The use of renewable energy helps to improve the environment. EC4: The use of renewable energy reduces the climate changes or crises.	(Elmustapha & Hoppe, 2018) (Kowalska-Pyzalska, 2018)
Trust and Risk(TAR)	TAR1: There are some political and regulatory risks associated with renewable energy investments. TAR2: Using renewable energy does not threaten the environment. TAR3: Renewable energy is a safe and reliable source of energy.	Wall et al., (2021) (Dóci & Gotchev, 2016a
Ease of Use (EOU)	EOU1: Installation of renewable energy equipment is easy and clear. EOU2: The operation of RESs is easy. EOU3: Maintenance of RESs is easy.	(Alam et al., 2014) (Bandara & Amarasena, 2020)
Self- efficacy (SE)	SE1: Using renewable energy provides the enterprise with the quantities that need for consumption SE2: Using renewable energy helps to meet the energy needs of the Palestinian industrial and commercial sectors SE3: Our enterprise possesses the required knowledge to implement renewable energy SE4: Our enterprise has all resources and conditions for using RESs.	(Alam et al., 2014) (Thiangtam, 2016)

Awareness	AW1: our enterprise has awareness of the benefits of implementation of RESs. AW2: Our enterprise recognizes that the Palestinian market offers applications for renewable energy technologies-based solutions. AW3: our enterprise has awareness of renewable energy use and needs.	(Shen et al., 2015).
Perception of using benefits of RESs	PAB1: The use of RESs reduces the consumption of conventional energy.. PAB2: The use of RESs improves the electrical grid. PAB3: The use of renewable energy reduces carbon dioxide emissions PAB4: The use of renewable energy increases employment opportunities in the implementation of renewable energy projects.	(Fatima et al., 2021) (Komendantova & Yazdanpanah, 2017)
Relative Advantage	RA1: The use of renewable energy will decrease the demand for energy production in the industrial and commercial sectors RA2: The use of renewable energy will enhance the Palestinian industrial and commercial sectors' competitive advantage. RA3: The use of renewable energy will reduce carbon footprints.	(Alam et al., 2014) (Kuik et al., 2019).
Environmental Performance	EP1: The use of RESs in Palestine reduces greenhouse gas emissions. EP2: The use of RESs (solar and biomass) in Palestine leads to the conservation from wastage and loss. EP3: The use of RESs in Palestine reduces and limits the leakage of hazardous chemical waste.	(Arroyo & Miguel, 2020) (Espíndola et al., 2022)
Economic Performance	ECP1: The use of RESs leads to independence from obtaining energy from Israel. ECP2: The use of RESs increases economic growth ECP3: The use of RESs reduces the cost of consuming conventional energy. ECP4: The use of RESs in Palestine improves the infrastructure of industries and makes them more sustainable.	(Bhuiyan et al., 2022)
Social Performance	SP1: The use of RESs in Palestine leads to an increase in the consumption of clean renewable energy. SP2: The use of RESs in Palestine helps satisfy the basic needs of the industrial and commercial sectors SP3: The use of RESs in Palestine creates job opportunities and reduces poverty SP4: The use of RESs improves the health and safety of the community.	(Espíndola et al., 2022)
Feed-In-Tariff	FIT: The Palestinian government purchases the renewable energy produced by the enterprise at a fixed price.	(Le et al., 2022)

Competitive Bid	CB1: The Palestinian government submits offers a list of renewable energy prices to achieve competitiveness in the industrial and commercial sectors. CB2: The Palestinian government established laws and specifications to regulate and monitor competitive bids. CB3: The Palestinian government provides smart grid installation methods in order to encourage investments. CB4: The process of issuing licenses and certificates in Palestinian industrial and commercial is somewhat smooth.	(Tahboub, 2021)
Net Metering	NM1: The Palestinian government is developing a system that controls the rate of energy consumption. NM2: The Palestinian government supports small-scale renewable energy projects.	(Lawson, 2019)
Wheeling	WH1: The Palestinian government is committed to operating, maintaining, and preserving the systems of renewable energy. WH2: The Palestinian government is determining the amount of conventional energy used.	(Milhem,2020),
Financial Incentives	FI1: The Palestinian government facilitates the import of renewable energy within a specified range of tax exemptions. FI2: The Palestinian government supports and finances renewable energy projects in industrial and commercial sectors through loans and grants. FI3: The Palestinian government is increasing the mandatory quotas for renewable energy sources to meet the needs of the industry and commercial sectors. FI4: The Palestinian government is developing renewable portfolio standards to increase renewable energy production.	(Fowler & Breen, 2014) (Doner, 2007).

Table C.3

Respondents profile summary

No.	Items	Option	Frequency (n=100)	Percentage
1.	Gender	Male	96	96.0%
		Female	4	4.0%
2.	Educational level	Bachelor	91	91.0%
		Master	9	9.0%
3.	Experience Years	Less than 5 Years	23	23.0%
		From 6 to 10 Years	24	24.0%
		From 11 to15 Years	15	15.0%
		over 15 years	38	38.0%
4.	Position Job	General manager	63	63.0%
		financial manager	3	3.0%
		Production manager	6	6.0%
		Quality manager	2	2.0%
		Others	26	26.0%
5.	Enterprise sector	Commercial	33	33.0%
		Industrial	67	67.0%
6.	Location	Jenin	21	21.0%
		Tullkarm	15	15.0%
		Nablus	31	31.0%
		Ramallah	6	6.0%
		Jerusalem	1	1.0%
		Hebron	12	12.0%
		Bethlehem	6	6.0%
		Salfit	1	1.0%
		Qalqilya	3	3.0%
		Jericho	4	4.0%
7.	Average monthly consumption from traditional energy sources (in shekels):	(1000-40000)	75	75.0%
		(50000-90000)	10	10.0%
		(100000-140000)	4	4.0%
		More than 150000	11	11.0%
8.	Enterprises use renewable energy sources to meet part of their energy needs.	Yes	92	92.0%
		No	8	8.0%
9.	The percentage of renewable energy that meets part of the needs of the enterprise.	19%	37	37%
		61%	25	25%
		85%	25	25%
		100%	13	13%
10.	Type of traditional energy sources that the enterprise get it.	Electricity	86	86.0
		Diesel	5	5.0
		Petrol	3	3.0
		Gas	6	6.0
		Other	0	0.0
11.	Enterprise produce more renewable energy than it needs.	Yes	14	14.0%
		No	79	79.0%
		Sometimes	7	7.0%

12.	Enterprise have enough space available to produce renewable energy.	Yes, Currently Existing	82	82.0%
		Currently, there is no space to execute	16	16.0%
		I'm not sure	2	2.0%
13.	Enterprises have any environmental or quality certificates.	Yes, it is available now	26	26.0%
		Currently, no plans are in place to implement this.	57	57.0%
		Implementation will take place within one year,	11	11.0%
		Implementation will take place within two year.	6	6.0%
14.	Number of daily working hours in the enterprise.	8.50	49	49.0%
		14.00	24	24.0%
		20.00	27	27.0%

Table C.4

The level of implementation of all items in the Questionnaire

Indicator	Items	Mean	Standard deviation
CT1	There is a high cost associated with the purchase and installation of renewable energy.	4.360	0.686
CT2	There is a high maintenance cost associated with renewable energy.	4.400	0.748
CT3	There is a high investment cost for renewable energy.	4.340	0.710
EC1	The use of renewable energy reduces pollution and limits it.	4.270	0.746
EC2	The use of renewable energy reduces the use of fossil fuels.	4.420	0.695
EC3	The use of renewable energy helps to improve the environment.	4.250	0.740
EC4	The use of renewable energy reduces climate changes.	4.240	0.750
TRA1	There are some political and regulatory risks associated with renewable energy investments	4.300	0.728
TRA2	Using renewable energy does not threaten the environment.	4.250	0.740
TRA3	Renewable energy is a safe and reliable source of energy	4.320	0.719
PAB1	The use of RESs reduces the consumption of conventional energy	4.140	0.872
PAB2	The use of RESs improves the electrical grid	4.200	0.787
PAB3	The use of renewable energy reduces carbon dioxide emissions	4.130	0.730

PAB4	The use of renewable energy increases employment opportunities in the implementation of renewable energy projects.	4.270	0.746
EOU1	Installation of renewable energy equipment is easy and clear.	4.160	0.758
EOU2	The operation of renewable energy sources is easy.	4.260	0.687
EOU3	Maintenance of RESs is easy.	4.240	0.801
RA1	The use of renewable energy will decrease the demand on energy production in the industrial and commercial sectors.	4.200	0.663
RA2	The use of renewable energy will enhance the Palestinian industrial and commercial sectors' competitive advantage.	4.090	0.680
RA3	The use of renewable energy will reduce carbon footprints	4.070	0.791
AW1	The use of renewable energy will decrease the demand on energy production in the industrial and commercial sectors.	4.190	0.717
AW2	Our enterprise recognizes that the Palestinian market offers applications for renewable energy technologies-based solutions.	4.340	0.751
AW3	Our enterprise has awareness of renewable energy use and needs.	4.170	0.649
SE1	Using renewable energy provides the enterprise. with the quantities that need for consumption	4.100	0.975
SE2	Using renewable energy helps to meet the energy needs of the Palestinian industrial and commercial sectors	4.120	0.840
SE3	Our enterprise possesses the required knowledge to implement renewable energy	4.170	0.813
SE4	Our enterprise has all resources and conditions for using RESs.	4.060	0.936
ECP1	The use of RESs leads to independence from obtaining energy from Israel.	4.030	0.854
ECP2	The use of RESs increases economic growth.	4.150	0.805
ECP3	The use of RESs reduces the cost of consuming conventional energy.	4.090	0.850
ECP4	The use of RESs in Palestine improves the infrastructure of industries and makes them more sustainable.	4.190	0.809
EP1	The use of RESs in Palestine reduces greenhouse gas emissions.	4.100	0.866
EP2	The use of renewable energy (solar energy and biomass energy) in Palestine leads to the conversation from wastage and loss.	4.180	0.899
EP3	The use of RESs in Palestine reduces and limits the leakage of hazardous chemical waste.	4.070	0.863
SP1	The use of RESs in Palestine leads to an increase in the consumption of clean renewable energy.	3.950	1.023
SP2	The use of RESs in Palestine helps satisfy the basic needs of the industrial and commercial sectors	3.990	0.943

SP3	The use of RESs in Palestine creates job opportunities and reduces poverty.	4.060	0.947
SP4	The use of RESs improves the health and safety of the community.	3.970	0.866
CB1	The Palestinian government submits offers a list of renewable energy prices to achieve competitiveness in the industrial and commercial sectors.	4.010	1.063
CB2	The Palestinian government established laws and specifications to regulate and monitor competitive bids.	3.890	1.076
CB3	The Palestinian government provides smart grid installation methods in order to encourage investments.	3.770	1.076
CB4	The process of issuing licenses and certificates in Palestinian industrial and commercial is somewhat smooth.	3.740	1.092
FIT1	The Palestinian government purchases the renewable energy produced by the enterprise at a fixed price	3.94	1.085
WH1	The Palestinian government is committed to operating, maintaining, and preserving the systems of renewable energy.	3.770	0.978
WH2	The Palestinian government is determining the amount of conventional energy used.	3.820	1.052
FI1	The Palestinian government facilitates the import of renewable energy within a specified range of tax exemptions.	3.780	1.073
FI2	The Palestinian government supports and finances renewable energy projects in industrial and commercial sectors through loans and grants.	3.830	0.960
FI3	The Palestinian government is increasing the mandatory quotas for renewable energy sources to meet the needs of the industry and commercial sectors.	3.820	1.052
FI4	The Palestinian government is developing renewable portfolio standards to increase renewable energy production.	3.830	0.970
NM1	The Palestinian government is developing a system that controls the rate of energy consumption.	3.760	1.011
NM2	The Palestinian government supports small-scale renewable energy projects.	4.060	1.018

Table C.5

Q^2 Values

Construct	SSO	SSE	Q^2 (=1-SSE/SSO)
ARESs	300.000	280.980	0.063
SUP	1100.000	989.182	0.101

Table C.6

Summary of result

Hypothesis	Results
H1: The adoption of RESs has a significant impact on sustainable performance (economic, environmental, and social) in the Palestinian industrial and commercial sectors.	Supported
H2: The Palestinian government's role impact adoption of RESs in the Palestinian industrial and commercial sectors.	Supported
H3: The Palestinian government's role impact sustainable performance (economic, environmental, and social) in the Palestinian industrial and commercial sectors.	Supported
H4: The Palestinian government's role moderates the relationship between adopting RESs and the sustainable performance (economic, environmental, and social) in the Palestinian industrial and commercial sectors.	Not Supported

جـامعـــة النجاح الوطنية
كليـــة الدراســـات العليـــا

تقييم تبني الطاقة المتجددة والأداء المستدام: الدور الحكومي كمتغير

إعداد
اسراء وحيد محمود سالم

إشراف
د. محمد السيد
د. يحيى صالح

قدمت هذه الرسالة استكمالاً لمتطلبات الحصول على درجة الماجستير في الإدارة الهندسية من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس- فلسطين.

2023

تقييم تبني الطاقة المتجددة والأداء المستدام: الدور الحكومي كمتغير

إعداد

اسراء وحيد محمود سالم

إشراف

د. محمد السيد

د. يحيى صالح

الملخص

حظيت الطاقة المتجددة باهتمام كبير في السنوات الأخيرة بسبب استنفاد بعض موارد الطاقة، والتلوث الناجم عن الوقود الأحفوري. في نفس الوقت، فإن تبني مصادر الطاقة المتجددة عملية معقدة تتأثر بعوامل متنوعة.

لذلك تهدف هذه الدراسة هو التحقيق في العوامل التي تؤثر على المستهلكين لتبني الطاقة المتجددة في القطاعين الصناعي والتجاري الفلسطيني، وتأثير ذلك على الأداء المستدام من خلال الدور الحكومي كمتغير. بالإضافة الى ذلك تساهم هذه الدراسة في تقييم مستوى التنفيذ لاعتماد مصادر الطاقة المتجددة ودور الحكومة والأداء المستدام. تم استخدام طريقة كمية لجمع البيانات من خلال استبيانات من 100 من كبار المديرين. بالإضافة إلى ذلك، تم إجراء تحليل البيانات باستخدام برنامج Smart PLS لاختبار الفرضيات.

فقد كشفت النتائج في هذه الدراسة أن تبني مصادر الطاقة المتجددة والأداء المستدام والدور الحكومي يتم تنفيذها على مستوى عالٍ في القطاعات الصناعية والتجارية الفلسطينية. بالإضافة إلى ذلك، تدعم النتائج العلاقة بين تبني مصادر الطاقة المتجددة والأداء المستدام، وكما تدعم العلاقة بين تبني مصادر الطاقة المتجددة ودور الحكومة. بينما لم يتم دعم العلاقة بين دور الحكومة والأداء المستدام. كما تدعم النتائج دور الحكومات كمتغير بين تبني مصادر الطاقة المتجددة والأداء المستدام.

وعلاوة على ذلك، نعتقد أن نتائج هذه الدراسة قد تكون ذات معلومات مفيدة لتوجيه الحكومات وصناع القرار وأولئك الذين يوفرون منتجات الطاقة المتجددة بالعوامل الهامة التي تؤثر على المستهلكين لتبني مصادر

الطاقة المتجددة والاخذ بعين الاعتبار هذه العوامل والمحاولة في معالجتها واعتمادا على نتائج البحث فان معرفة اكثر واقل السياسات الحكومية التي لها تأثير على المستهلكين لتشجيع تبني هذه التكنولوجيا في القطاعات الصناعية والتجارية في مجملها يوجه الحكومة الفلسطينية إلى تحسين جزء من استراتيجيتها من حيث اللوائح والإعانات القانونية وتقديم الدعم والتسهيلات لتشجيع الاستثمار في الطاقة المتجددة.

الكلمات المفتاحية: الطاقة المتجددة؛ الأداء المستدام؛ الدور الحكومي.