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Assessment of Innovation Policy Standards' Impact on Local Development of Renewable Energy in Palestinian Local Government Units

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Dedication

To the one which her hands wrinkles will not bless this work, but she kept praying many years for me until I accomplished it ...

To my grandmother soul.

إلى التي لن تبارك تجاعيد يديها هذا العمل، لكنها ظلت تصلي من أجلي لسنوات عديدة حتى أنجزته..

إلى روح جدّتي.

Acknowledgment

First of all, I praise and thank God for His grace, generosity, and blessings that surrounded me during my research work to complete this research successfully.

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الإقرار

أنا الموقع أدناه مقدم الرسالة التي تحمل عنوان:

Assessment of Innovation Policy Standards' Impact on Local Development of Renewable Energy in Palestinian Local Government Units

أقر بأن ما اشتملت عليه هذه الرسالة إنما هو نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه حيثما ورد، وإن هذه الرسالة ككل أو أي جزء منها لم يقدم من قبل لنيل أي درجة علمية أو بحث علمي أو بحثي لدى أي مؤسسة تعليمية أو بحثية أخرى.

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification

Student's Name: **اسم الطالب:**

Signature: **التوقيع:**

Date: **التاريخ:**

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Abbreviations

PA	Palestinian Authority
IEC	Israeli Electricity Company
PENRA	Palestinian Energy and Natural Resources Authority
PIF	Palestinian Investment Promotion Fund
PV	Photovoltaic
PETL	Palestinian Electricity Transmission Lines Company
DISCO	Electricity Distribution Company
RE	Renewable Energy
R&D	Research and Development
CGE	Computable General Equilibrium
GTAP	The Global Trade Analysis Project
GTAP-E	An Energy-Environmental Version of the GTAP Model
CES	Constant Elasticity of Substitution
GDP	Gross Domestic Product
CLD	Causal Loop Diagram
SFD	Stock and Flow Diagram
GETFiT	Global Energy Transfer Feed-in Tariff
FiT	Feed-in Tariff
RA	Revenue Authority
IPP	Independent Power Producer
WB	World Bank
DM	Data Management

ERA	Electricity Regulatory Authority
DB	Deutsche Bank
FGN	Federal Government of Nigeria
RES	Renewable Energy System
NDRC	National Development and Reform Commission
DE	Distributed Energy
NEA	National Energy Administration
PVPA	Photovoltaic Poverty Alleviation
MCDM	Multi-Criteria Decision Making
BOCR	Benefit, Opportunity, Cost and Risk
ANP	Analytical Network Process
REIC	Renewable Energy Initiative Council
SUNA	Renewable Energy Organization of Iran

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Abstract

Renewable Energy Systems (RESs) are a powerful component of local sustainability innovation strategies. This thesis uses a policy mix approach to study innovation policy criteria, which include municipalities' location factors, stakeholder collaboration activities, and local knowledge about renewable energy sources and projects, with the aim of knowing the impact of these factors on decision-makers and developing renewable energy projects and their local sources. This thesis aims to understand the impact of the mix of different policies on the energy sector and technological innovation systems, through the innovation policy criteria that have been identified, which constitute the policy mix, and which may affect the process of developing renewable energy sources in the Palestinian municipalities and local councils. In this thesis a sample of 216 Palestinian municipalities and local councils is analyzed. The results indicate the need for policymakers to promote cooperation between the public and private sectors, and to focus on location factors such as energy import reduction, incentives, emissions that directly affect renewable energy sources. Whereas, local knowledge does not have a direct impact on the process of developing renewable energy systems, as it can constitute indirect support at a later stage for the implementation of other policy criteria discussed in this study. Results show that increasing the potential for developing renewable energy sources takes place through policymakers adopting the role of facilitator and establishing a local innovation network in which different actors cooperate so that public and private stakeholders can provide support in order to develop local renewable energy systems.

Chapter One

Introduction

Chapter One

Introduction

1 Introduction:

Palestine will be facing an advanced serious energy crisis as a result of high population growth, scarcity of traditional energy sources, current political situation, and high energy prices (Abualkhair ,2007). The weakness of the infrastructure in terms of facilities and systems restricts the process of developing this sector, in addition to the restrictions imposed on Palestine in the use of its lands, which can be exploited in renewable energy (RE) (Khatib, et al., 2021). According to the Household Energy Survey conducted by the Palestinian Central Bureau of Statistics, the average electricity consumption of the Palestinian household increased from 275 kilowatt-hours to 306 kilowatt-hours between 2009 and 2015 (Palestinian Central Bureau of Statistics, 2015). Expectations indicate that a seasonal energy shortage will occur in the West Bank, in conjunction with demand growth of 3.5% until 2030 (Khatib, et al., 2021). The Palestinian Authority (PA) owes about $ 574 million to the Israeli Electricity Company (IEC) as a result of high energy imports (Juaidi, et al., 2016), as IEC covered about 92.6% of the total power demand in Palestine during 2018 (Palestinian Central Bureau of Statistics, 2018). On the other hand, Palestine suffers from the high cost of energy compared to neighboring countries, as it amounts to about 0.1828 USD/kWh for the residential sector (Juaidi, et al., 2016), despite its energy consumption is the lowest in the Middle East and

North Africa (Hamed and Peric, 2020). A change in this situation could happen depending on the renewable energy potential that Palestine possesses, which has an annual average of daily solar energy ranging between 5.4 kWh/ m2 - 6 kWh/ m2, and more than 3000 hours of brightness during the year (Khatib, et al., 2021). This is also subject to a proper electricity grid infrastructure in order to allow high renewable energy penetration as well as cooperation from IEC as it currently possesses the generation and transmission sector (Khatib, et al., 2021). Through the Palestinian Energy and Natural Resources Authority (PENRA), the Palestinian Authority developed policies that encourage investment in photovoltaic energy systems, and the Palestinian Investment Promotion Fund (PIF) considered photovoltaic energy systems as a major investment opportunity for local and international investors (PV Renewable Energy Booklet–PIPA). International programs also have been launched that encourage photovoltaic energy systems in Palestine by providing soft loans for this purpose. In addition, many countries have supported the development process by installing PV systems in Palestine (Khatib, et al., 2021). The imported energy is transported from the Israeli side through major transmission lines of 161 kV. These lines later turn into transmission lines of 33 kV or 22 kV, in the middle of which there is a coupling point that controls the amount of electricity that reaches the Palestinian side. This point is technically managed by the Israeli Electricity Company (IEC), but politically it is managed by the Israeli Civil Administration. The transmission lines until coupling points are owned by the Israeli Electricity

Company (IEC), while the remaining part of the transmission lines connecting to the low voltage power station is owned by the Palestinian Electricity Transmission Lines Company (PETL). After the low-voltage substation, the electricity networks are owned by local councils or private Palestinian electricity distribution companies (DISCOs).

Although the role of PETL is to regulate the relationship with the IEC and assume responsibility for the 161 kV and 33 kV transmission lines, it faces many challenges as the Israeli Government does not allow it to control the power lines supplied to the Palestinian areas, as these lines supply Israeli Settlements at the same time. It is assumed that the responsibility for providing electricity to the end-users' rests with the DISCOs, by making each DISCO in charge of a specific geographical area, however, the operators of private distribution networks owned by municipalities and local councils who buy electricity directly from IEC are still serving some areas, especially villages. The Palestinian Authority lacks the ability to unify and control the Palestinian distribution network operators, as some of them are not owned by the government, and the others are municipalities and councils, as the Energy and Resources Authority does not have any authority over them because they are affiliated with the Ministry of Local Government.

Energy development plans are gradually promoting electricity generation from renewable resources, due to the financial and technical constraints imposed on this technology in many countries. The framework of renewable energy policies faces many challenges, which are represented in the weakness of the political and administrative system, lack of coordination and cooperation between public and private sectors, shortage of manpower in this RE field, insufficient funding, and lack of local production of RE technologies. The development of the renewable energy sector is affected by economic growth, technological development, and its interaction with the market and society. The development process is also related to previous knowledge and experiences, and research and development (R&D) efforts. There are large efforts being made in exploiting RE sources to create sustainable development and economy, and to avoid the energy crisis and its future problems.

Several renewable energy projects have been implemented in Palestinian cities. 39 MW of photovoltaic systems have been installed, 93 MW of photovoltaic systems are under development, in addition to PV systems with a capacity of approximately 24 MW are formally proposed for approval. Despite this megawatt of photovoltaic systems, it is noted that energy production is lower than expected for most grid-connected systems, in addition to the absence of this large amount of photovoltaic systems effect in causing a significant reduction in energy demand from Israel. Renewable energy systems in Palestine suffer from many behavioral and structural problems that lead to the failure of most systems to work well and consequently the failure of these systems' investments (Khatib, et al., 2021). In order to reduce dependence on importing energy from Israel, Palestine aims to increase the share of renewable energy and raise its efficiency.

Palestine consumes electrical energy significantly compared to other types of energy, so this research focuses on electrical energy among all types of energy. Looking at Table 1.1, which compares the energy consumption of electricity, renewable energy and petroleum products for different sectors through 2018 and 2019 years, it is noticeable that the residential sector is the most consuming electricity as a result of the weakness of other sectors in Palestine ((PCBS, 2018), (PCBS, 2019)).

Table 1.1: Energy Consumption by Sector and Type of energy.

	Renewable Energy (1000TOE)		Oil Products (1000TOE)		Electricity (GWh)	
Sector	**2018**	**2019**	**2018**	**2019**	**2018**	**2019**
Industry	7	13	29	27	715	685.6
Transport	-		714	728	-	-
Households	158	178	154	165	3359	3662.4
Agriculture	-		9	14	29	37.4
Commerce & public services	4	6	25	31	1473	1827.8

(Note: 1 TOE = 0.0116 GWh)

1.1 Problem Statement

The transition to the use of renewable energy and the expansion of its use requires the adoption of an integrated set of procedures and legislation in line with national conditions and priorities. Effective policy planning is needed to steer the energy system toward a path of sustainability. The development of legislation and the adoption of plans, work programs, and incentive policies contribute to further technological progress, reducing costs and the rapid use of renewable energy. Deploying appropriate infrastructure and redesigning regulations in this sector are prerequisites for integrating electricity generation using renewable energy on a large scale and at an affordable cost. The development of technologies and the continuation of technical innovation play an important role in achieving the desired transformation in the energy sector, through the adoption of new methodologies in the operation of energy systems and the adoption of new business models. All this requires the formulation of effective and approved policies and the implementation of measures by the government, actors, and the private sector.

Studies show that decisions made by policymakers have a significant impact on domestic energy conversion. These decisions may negatively affect the expansion and support of renewable energy sources ((Stokes, 2013), (Stokes, 2017)), as well as many questions regarding the impact of energy policies and their role in the development of renewable energy sources (Richter, 2013). Palestine suffers from weakness in the dynamics of developing renewable energy sources, lack of focus on the impact and role of energy policies, and lack of investigation into aspects of renewable energy systems at the local level. In addition to the lack of approved policy standards, as in neighboring countries.

1.2 Research Objective

The focus on innovation is important because it aims to create infrastructure and ecosystems that support renewable energy systems and thus provide the transition to renewable energy. This study provides empirical data for policy factors affecting renewable energy resources, which contributes to an understanding of the dynamics of developing renewable energy sources, and the extent to which domestic innovation systems policies contribute to the renewable energy sector. This research investigates the impact of innovation policy standards on the local development of renewable energy systems in Palestinian municipalities and councils, through the examination of the role of three major innovation policy standards in developing renewable energy sources, which are represented in decisions and tools that have common characteristics. The research focuses on three sets of innovation policy criteria: location factors, collaborative activities, and local knowledge. The strength and impact of the three criteria on Palestinian local government units were measured through sixteen tools.

1.3 Thesis Organization

This thesis is organized as follows: Chapter Two reviews the literature on renewable energy systems in multiple countries that address topics including energy strategies, renewable energy sources, plans and policies, sustainable transformations, and innovation policy. The third chapter provides an explanation about the development of policies and renewable energy, as it deals with an explanation of the three main criteria of the innovation policy. The fourth chapter explains the research method in terms of the target sample, the research hypotheses and the developed questionnaire, the measure definition, and the statistical analysis plan applied to the questionnaire. The fifth chapter deals with the results of the statistical analysis and the tests that were applied to the questionnaire using the SPSS program, and a detailed explanation of all the results. Finally, the discussion and conclusions are presented in the sixth Chapter.

Chapter Two

Literature Review

Chapter Two

Literature Review

2.1 Overview

This chapter presents the reviewed literature related to renewable energy (RE) development, as it discusses the experiences and attempts of several countries in the transition towards RE, and presents the policies they have adopted with the aim of developing renewable energy. The policies of different countries were reviewed as follows in order to reach an approved and global policies criterion.

- Energy policy and Strategy in Vietnam
- Distribution Policy of Renewable Energy Sources in Israel
- The Effect of Taiwan Electric Power Policies and Development
- Energy Policies role in Accelerating Sustainable Transitions
- Nigeria's Renewable Energy Policy Design
- Innovation Policy Criteria in Germany
- China's Distributed Energy Policies
- A Hybrid Multi Criteria Decision Making (MCDM) Policy in Iran

2.2 Literature Review

2.2.1 Energy policy and Strategy in Vietnam

In (Nong, et al., 2020), the author developed an economic electricity-detailed model to assess the expected impacts of the Vietnamese new power policy on the whole economy focusing on the electricity market and welfare, using global static electricity detailed Computable General

Equilibrium (CGE) model, an Energy-Environmental Version of the Global Trade Analysis Project (GTAP-E) Power model, which is the global economic GTAP-based model. CGE model includes most agents in the economy and their interactions within the commodity and income markets, as capital, labor, intermediate inputs, and other resources are used in production processes. Households and governments act as end-users in each region, provided with intermediate inputs from industries that represent producers, while industries use international transportation services to sell their commodities in other countries. The model considers trade flows a key component so that goods and services are traded along the lines of bilateral trade mechanisms. GTAP-E-Power developed model assumes that the producers supplying commodities based on cost-minimizing behavior with a constant rate of return in competitive markets when final consumers increase their utility based on budget limitations. It has been developed on the assumption that there is one representative household in each region, supplying labor for industrial production, receiving factor returns, and paying taxes to the government, including income tax and consumption tax. Private demand for various commodities is modeled depending on the Constant Difference of Elasticity's function, which includes changes in income and price, while the modeling of public demand depends on the Constant Elasticity of Substitution (CES) function. It also includes an advanced technology component, divides the electricity generation into several sources based on the base-load and peak-load technologies, as the electricity demand in Vietnam varies depending on the time of days, weeks, and seasons, making it fill the gap in previously applied models. The model includes 11 sources of electricity-generating commodities. At the upper level, industries used the endowment energy composite and non-energy commodities via the Leontief function, those are not substitutable. As for the lower levels, commodities are selected through the various CES functions to reduce their costs. Non-carbon dioxide emissions variables have been added to the model structures to increase its ability to assess energy and study environmental policy. non-carbon dioxide emissions result from the combustion of fossil fuels by the industrial and private sectors, are integrated, so that emissions levels change according to the change in fossil fuel consumption levels, and are also related to the actual level of production, and the levels of emissions resulting from the use of Land and livestock capital at different levels of use of these endowment factors.

Vietnam's energy development plan promotes electricity generation from renewable resources and as a result of financial and technical constraints on this technology for such a small developing country, the plan also boosts fossil-based power generation until 2030. The plan examined through three scenarios, taking into account the electricity target in 2020, 2025, and 2030, respectively.

As a result of this study, the large supply of electricity is likely to reduce electricity prices significantly, thus reducing production costs and lower prices for most commodities. Reducing dependence on fossil fuels in

Vietnam, as a result of lower electricity prices, gradually promotes the use of renewable energy as an alternative.

Lower price levels, especially electricity prices, greatly benefit households, as it raises the per capita share of the benefit, and the welfare increases compared to the level of income. It is also noted that the demand for electricity that depends on renewable energy is increasing compared to that produced by fossil fuels, and this encourages the development of the renewable energy sector and makes Vietnam a country capable of transforming into a cleaner production and sustainable economy depending on sustainable development of renewable energy. All these results are beneficial to the country's economy in general, as the real Gross Domestic Product (GDP) will increase, and the level of welfare will also be increased significantly. Although the aforementioned positive results, there are still some negative impacts on some sectors, such as coal mines, oil, and gas extraction, and petroleum products manufacturing sectors, as a result of the contraction of their production, which reduces their demand for primary factors, labor, and capital. The decline in demand for labor in particular will lead to unexpected and unpredictable social consequences. Nong suggests some policies that can be implemented simultaneously with the implementation of the energy development plan policy to support the workforce in the affected sectors, such as organizing training courses, opening support agencies, and in-kind or cash transfers to support households those affected until finding new jobs. Despite the advantages of this study, it can be developed to include some aspects that have not been taken into consideration, such as the environmental and other social impacts of implementing the energy development plan, as the new expansion and construction will affect forests, agricultural lands, food supplies, and water irrigation.

2.2.2 Distribution Policy of Renewable Energy Sources in Israel

In (Navon, et al., 2020), The author presents the congestion problem in the Israeli transmission network resulting from the integration of renewable energy sources, a gap that was found in previous studies that focused on the Israeli energy system, and he also discusses the necessary policies to correct this problem. This study is based on the electrical grid model planned for the year 2020 within the national expansion plans in transmission and generation, which was built in 2018. The model contains all current conventional power stations and all current renewable energy sources and those that are supposed to operate by the year 2020. The study focused on the Negev region, which has high potential for solar energy projects.

The simulations conducted by Navon showed that many key lines are overloaded through presenting the load of the key lines in the transmission system under different scenarios for generation and demand, which makes adding power sources risking the system’s reliability, it also appears that the additional photovoltaic systems violate emergency standards due to the high loads in these lines. While it appears that planning and implementing a transmission system upgrade required as a result of the rapid and unpredictable increase of solar systems will take 5 to 15 years, the proposed solutions focus on the short-term impacts of distributed generation integration. Transmission Congestion is a major obstacle to the integration of renewable energy in south Israel, given that it combined-cycle power plants and PV systems that operate at maximum capacity most of the year. While the problem of congestion occurs during the peak production period of PV energy systems, a solution to reducing the production of conventional energy during this period has been proposed, which in addition to reducing congestion, opens the way for adding more photovoltaic energy systems. The validity of this solution is tested by comparing three scenarios for unit commitment, where the first scenario describes a typical commitment for the unit during the peak period in which private power plants operate at maximum capacity, and public power plants at 60%, while other scenarios describe a decrease in the productivity of private plants to 70%. And public power plants to 45% in the second and 0% in the third. The system is also simulated several times in each scenario as PV systems increase.

The results indicate that placing new solar plants in the western Negev and reducing the conventional energy to about 50% will reduce the load of the Dimona Eitan line by 11%, which is the most heavily loaded line in the Negev region, and that the agreement with the traditional producers from the private sector to reduce production in the solar peak hour will greatly help in the integration of the PV systems.

The power flow regimes and network congestion are affected by the distribution of the solar systems, and to check the effect of the optimal distribution, three scenarios for new solar energy systems location and size were examined. 250 MW is distributed uniformly through the substations in the first scenario, while in the other two scenarios the distribution will be based on the solar PV technical potential on the rooftop of the substations. The results of the study showed that there is no specific distribution of renewable energy sources that works to reduce all loads, but there is an optimal distribution that reduces the maximum load in the system, which results in improved reliability, delaying the upgrade, and the possibility of adding new generation units and consumers. To ensure optimum use of transmission system capacity, a dedicated optimization algorithm can be used to find the optimum distribution based on the electrical system parameters, a location-based tariff could also be implemented to encourage private sector stakeholders to locate their facilities in appropriate locations in relation to network load. As a result of the decentralization of generation, the maximal load of power lines is not necessarily at the time of peak demand, as the results indicate that the maximal load in many regions is during the spring or autumn seasons, the seasons of low demand, while the load is within normal limits during peak demand in other regions. accordingly, the traditional assumption that the network load is highest during peak demand may not be valid, which required a reconsideration of maintenance projects that are scheduled according to that assumption, as well as work to update emergency standards that drive the system to withstand emergencies and breakdowns during peak demand.

2.2.3 The Effect of Taiwan Electric Power Policies and Development

Haiso (Hsiao, 2018) explored the development of policy-based electric power planning, analyzed the system's structure" sentence (Hsiao, 2018) explored the development of policy-based electric power planning, analyzed the system's structure, and the effect of energy source policies on Taiwan's energy supply was simulated according to different economic growth scenarios, using the system dynamics method. The system dynamics approach expresses the operation of systematic behavior through logic, the language of mathematics, and models, in addition to causal relation and feedback concept, as system behavior is affected by the structure of the system. In modeling system dynamics, causal loop diagrams (CLDs) are used to describe systematic behaviors to explore the operation of systematic structures and the interactions between components and between components and environments. Quantitative models are constructed by Stock and Flow Diagrams (SFDs) using volume and traffic concepts. The study simulates different economic growth scenarios with the aim of investigating the effects of economic growth on the development of electric power in Taiwan and the accumulation of capacities for various devices, where the rate of economic growth was determined, and the estimated power supply capacity changes of the electric power system were clarified, as well as the energy transition reflects the economic development requirements for stable power supply and generation costs.

The Taiwanese government considerations of the general situation of the international energy and economy were used to determine the limits of the model, and variables including economic growth, international fuel prices, and electricity rates were taken as external factors to build qualitative and quantitative models for the energy supply system. The structure of a qualitative power supply system is made of four basic loops, “the key loops of electric power development plans and power generation profits,” “the key loops of the electricity reserve rate and installed capacity accumulation,” “the key loops of the capacity construction cost and installed capacity accumulation,” and “key the loops of power supply capacity and power generation cost”, with three important level variables, including installed capacity for renewable energy, installed capacity for thermal power generation, and installed capacity for nuclear power generation, which are affected by power development planning and decision-making variables. The historical development of Taiwan's power supply system has been divided into five phases to track the accumulation capacity of power generating devices and to clarify the economic growth and development trend of the power supply system. The quantitative model was built consisting of 37 equations and 4 variables using Vensim software, based on the historical developments of the electric power system and related documents and data that helped to set the basic parameters of the variables, such as the economic growth rate, the international fuel price, and the electricity reserve rate. Where this model discusses the development of the power supply plan and the accumulation of the power generation capacity devices.

The study shows different levels of rising in the opposite direction in the face of the increasing demand for electricity and the delay in capacity building. Therefore, the government should plan to develop electric power in the near future to fill the gap of future energy supply. The study emphasized that the uncertainties related to nuclear power policy led to the accumulation of capacity of other power generating devices, which affects the overall capacity of power supply. Uncertainty in Taiwan's nuclear power policy has caused a problem in the capacity of other power generation devices; thus, the total power supply capacity was affected. As a result, the renewable energy suffers from the problem of intermittent generation of power, to dispatch the power generation there is a need to improve the capacity of thermal power generation devices. Therefore, the electric power development plan must give importance to delaying the installation of unit capacity and restricting the various power generation technologies to avoid electricity shortages and the risk of electricity limits. Moreover, the development of power generation based on renewable energy sources makes adjusting electricity prices a priority for the government. Finally, the simulation shows that the stable power supply in Taiwan will be affected by the 2025 Nuclear-Free Homeland energy policy.

Energy policies are considered to have an important role in accelerating "sustainable transformations" by stimulating investment in generating electricity dependent on renewable energy sources. Therefore, donor countries have recently directed projects funded towards transferring major energy policies to low-income countries.

2.2.4 Energy Policies role in Accelerate Sustainable Transitions

In (Bhamidipati, et al., 2019), The author addresses the detailed understanding of how a policy transfer process took place in the renewable energy sector via the Global Energy Transfer Feed-in Tariff (GETFiT) program implemented in Uganda, focusing on the impact of policies on social and technical change using a "policy translation" approach. The case study and qualitative research method were used by employing theoretical perspectives, archival data, and semi-structured interviews to create a framework for policy transfer. The paper focuses on developing countries, especially in the Global South, as a result of the challenges and complexities they face, which are represented in weak institutional arrangements, less efficient bureaucracies, political and economic instability, and social and economic inequality. The field of sustainability transformations analyzes how the interaction between technology, politics, institutions, markets, and society has evolved, their impact on each other, and their intertwining with political economy. Understanding policies and politics is key to shaping transition pathways as it provides an emerging research agenda in this field.

Uganda was the first African country to dismantle the generation, transmission, and distribution of electricity into separate facilities, provided special concessions and opened the sector to independent energy producers, and was among the first countries in Africa to introduce Feed-in Tariff (FiT)and Revenue Authority (RA) policies, and attracted many Independent Power Producer (IPP) investments. Small groups through the GETFiT program, all of this in addition to the specific actors' constellations, the peculiarities of the national context, and the positive policy outcomes made Uganda an important case. A strategy was developed to identify the main actors involved in transferring FiT and RA policies to Uganda, whereby the process of selecting participants or data sources according to their anticipated richness and relevance of information, where interviews were conducted with the actors directly involved, and with the actors supporting the program or participants in part of it, archival documents from journals, GETFiT annual reports, policy briefs, World Bank (WB) reports, and others were analyzed in order to verify the information. As a result of these semi-structured interviews, the timeline of historical events since 2005 is set to identify the main actors and analyze their roles, interests, and strategies.

Using the deductive and inductive approaches and relying on the previous literature, the data were analyzed, summarized and interpreted, in order to identify the emerging topics and patterns, and an analytical framework was drawn up that represents the main dimensions of the policy process inquiry according to the Data Management (DM) model. The paper proposes five strategies in which political entrepreneurs participate in monitoring policy change and its relationship to empirical data, including: coalition building, networking, venue shopping, idea generation, and using windows of opportunity. It also demonstrates the possibility of grouping these policies into three general categories that correspond to the method of forming policy processes, the first on the basis of scope, the second on the basis of meaning and the third on the basis of context, as these elements are combined in the progress of the policy process and the analysis within the dimensions of the structural DM model. The author reviews the history of FiT policy in Uganda, which was officially adopted in 2007, through several stages of reforms and restructuring that the electricity sector underwent, which witnessed events and political processes at the national level that contributed to shaping this policy environment. The FiT policy was adopted in two phases, but it failed to attract investors and license any projects under it due to several simultaneous economic problems, in addition to facing problems related to customs restrictions, high financing costs, project development, investor risks, and the length of regulatory procedures.

Looking at the problems of the two phases of FiT, Electricity Regulatory Authority (ERA) had the beginnings of a new idea to provide financial incentives that outweigh income FiT and address non-financial risks, as GETFiT was developed by the Deutsche Bank (DB) of the United Nations Secretary-General's Energy and Climate Change Advisory Group, which envisioned GETFiT "as a program." Globally, it includes public funds to support and expand information and communication technology in the developing world, and to adapt advanced best practices in information and communication technology to serve national goals for energy access and the expansion of renewable energy.”

The author analyzes the GETFiT policy translation process in Uganda between 2010 and 2015 through policy analysis using the modified DM framework, by discussing and answering the questions posed by the model, which are: Who are the key actors? How do they get involved? What motivates the actors to engage with policy transfer? Which policy objects do the actors choose to transfer? Why? From where do the actors draw their ideas, experiences, and lessons? Why are certain lessons drawn? How do actors translate the policy process? What outcomes do the actors envisage? And do they achieve them?

The paper explains how the sustainability transition can be practically directed by small but focused and strategic actors, as the strategies that the actors used, represented by building alliances, connecting, appeasement, led to the desired transformation. The role of transnational actors in the circulation of ideas and ideologies between places was also highlighted, and the complementary roles of transnational and national actors were crucial in shaping the outcome. Modernity in the coalition of actors and the role of national and transnational actors in strengthening their capacities and positions requires a better understanding of the processes of "co-creation". The study reveals the great importance of transnational networks, sharing of experiences, local integration and "co-creation" mechanisms as a cornerstone of policy translation. It is the interaction between global and local actors that has shaped and led the policy transfer process to provide economic support for renewable energy projects. As for the political implications, there are three considerations: the importance of working within an economic framework in line with the logic of advocating for donor-funded policies, the importance of clear goals and objectives led by the state, and finally the importance of trial and error along with the persistence of the key individuals who drive the policy translation process, locally and internationally.

2.2.5 Nigeria's Renewable Energy Policy Design

In (Gungah, et al., 2019), the author relied on a case study approach to assess the effectiveness and efficiency of the Nigerian RE legal and policy framework in light of international best practices with the aim of improvement, where a large gap was observed between supply and demand for energy, in addition to the challenges of climate change and migration from rural to urban areas, which makes traditional energy sources incompatible with, these challenges are pushing Nigeria to make unremitting efforts to increasingly and efficiently include renewable energy (RE) in its energy mix.

The author adopted the desk qualitative approach in reviewing renewable energy development policies, by reviewing relevant legislation, articles, and working papers in Nigeria. The research was not limited to Nigeria, but also included developed and developing countries that have succeeded in expanding the scope of renewable energy generation, by investigating their legal and political frameworks and comparing it to that found in Nigeria.

To achieve improvement, existing and unsuccessful renewable energy policies were also discussed. A set of dynamics is what determines a successful renewed policy, and these dynamics are made up of actors, politics, the organizational framework, and the policy process, in addition to the political factor, which is a dominant and important factor in the formation of effective and effective policies, while commitment is a dominant factor in Successful development and deployment of renewable energy. The study indicates that the reason for a defect in the political framework for renewable energy in Nigeria is the failure to address the challenges that are represented by the lack of technical manpower, lack of adequate financing, and the lack of local industries that produce renewable energy technologies. Therefore, extracting the success stories of other countries and identifying the factors that have a positive and negative impact is the starting point for building a successful legal and political framework for renewable energy. The factors of a successful renewable energy market in any country are effectiveness (the extent to which goals are achieved), efficiency (innovation with reduced costs), equity (equitable distribution of rents between renewable energy developers and the government), institutional viability (extent of political support for policy), and replicability (The extent to which the policy can be adopted in other countries), and by which one can judge the success of any renewable energy policy.

The author also points out that measuring policy performance is not sufficient. Rather, the policy must be designed to accommodate the institutional viability of the benefits of gaining social acceptance and seamless fulfillment of goals and to formulate policies in a way that can be replicated in other climes. He also explains and discusses the five steps of the policy design cycle which include: setting the RES objective (s), defining an appropriate strategy for achieving the goal (s), implementing strategy, enforcement and monitoring, and assessing compliance.

The author critically analyzes the legal and policy framework for renewable energy in Nigeria, where he begins by presenting an overview of the main time-bound policies and programs that Nigeria has put in place to stimulate renewable energy development and approved by the Federal Government of Nigeria (FGN) and started implementing them. These policies include Nigeria Vision 20, the National Renewable Energy and Energy Efficiency Policy, and Nigeria's nationally determined contribution. Subsequent to the definition and description of the aforementioned policies, the current conflict, gap, and asymmetry existing in the legal and political framework for renewable energy in Nigeria is presented through researching some case studies of the success of the renewable energy policy.

The results of the study show that there is a direct relationship between social and economic development and that the exploitation, development, and use of renewable energy resources has great results such as improving the quality of life, reducing poverty, and enhancing income, in addition to facing the challenges of the energy crisis and ensuring sustainable development in Nigeria, and This prompted the federal government to set appropriate policies for the effective exploitation of its abundant energy resources. Finally, the author addresses recommendations and proposals for short, medium, and long-term measures to address the gaps and inconsistencies discussed in the study.

2.2.6 Innovation Policy Criteria in Germany

With Renewable Energy Systems being a component of sustainable innovation strategies, the author in (Germán Fran, et al., 2018) using the policy mix to study the innovation policy criteria by analyzing a sample of local municipalities in German using instrumental variables regression in order to discover how innovation policy criteria benefits developing renewable energy systems. The study focuses on Germany as a result of the success it has achieved in moving towards the development of renewable energy, as it is distinguished by its strong constitutional position in the political and administrative system, which makes municipalities have the right to implement legal regulations for their local regions, as Germany seeks to achieve its climate goals by 2050, through Significantly increase the share of renewable energy in its total energy production.

Following the policy mix approach, the author study three main criteria for innovation policy that can be utilized in developing renewable energy systems, including: municipal location factors, cooperation among stakeholders, and the existence of local knowledge about RES. These three criteria were chosen as they cover most of the regional renewable’s innovation systems activities. The author explains the three criteria in detail and how they emerged from the study of the literature, and provides explanations for their supposed impact on the development of renewable energy sources. As a result of studying the effect of these criteria, the author suggests three hypotheses related to them. The study is based on the quantitative research that consists of a survey conducted by the German university research center, in which German municipalities were targeted in all sixteen states, out of 11300, 727 municipalities with a population of more than 1,000 people were selected because they systematically support innovation activities for the energy transition process. 20 interviews were conducted with mayors, senior policy makers in the municipality and managers in companies to discover the extent of understanding the conceptual framework, and accordingly the survey design was developed. It is worth noting that the final form of the survey included three control variables that include the size of the municipality, the municipalities 'development of their own renewable energy projects, and the promotion of their own renewable energy projects.

The results of the study are summarized in the fact that increasing municipalities 'interest in having a cooperative environment with stakeholders increases the level of developing renewable energy sources as a result of the availability of a better sustainable environment. This cooperative environment is achieved by developing cooperation between the public and private sectors, in addition to reducing political resistance and enhancing acceptance of industrial activities from the society.

In terms of current local knowledge, the municipalities that are most likely to show greater development of renewable energy are those that show interest in establishing a knowledge base based on previous experience related to renewable energy projects, and are also interested in characteristics such as having a long budget capacity, owning research and development activities, and intensive knowledge development in the agriculture and forestry sector. With regard to locating the municipality, the results indicate that there are no significant impacts on the development of the renewable energy system, while the municipalities that have a policy of special development and promotion of renewable energy projects as an alternative to using their policy as an enabler of innovation have shown the worst results in developing renewable energy sources. The author concludes his study by presenting some of the constraints he faced despite the novelty of the research and being one of the rare literatures discussing the basic innovation policy related to renewable energy sources. Among these restrictions is the author's use of cross-sectional surveys in municipalities all over Germany, which makes the results of an innovation effort and are not immediately obtained, in addition to the fact that the interviews were directed to senior policymakers in the municipalities only, and did not take into account other entities and society, and finally The context of the research was in Germany because it was a pioneer in the field of renewable energy, where the future studies could target developed and emerging countries.

2.2.7 China's Distributed Energy Policies

Distributed Energy (DE) is correlated with renewable energy and clean energy, it has the advantage of reducing energy loss during transmission due to its proximity to energy users, eliminates the need for additional high-voltage transmission lines which reduces time and cost, it also using more renewable energy, and its infrastructure can be established quickly and flexibly. As a result of these advantages, DE provides safe, reliable, and sustainable energy to users.

China has adopted a combination of promoting renewable energy and poverty alleviation in an innovative way (poverty alleviation by using photovoltaic energy), and the government has also introduced many policies related to distributed energy that help overcome market and regulatory barriers that prevent implementation, although from that the development of distributed energy has been slow.

Although the cumulative capacity of photovoltaic energy and wind energy ranked first in the world, the proportion of installed energy capacity is not high, and despite the subsidies and preferential policies provided by governments to build a DE infrastructure, the subsequent supply of energy from DE was not Sufficiently, these problems are caused by technology, economy, and market, in addition to the unsatisfactory political system. The distributed energy policy includes industrial development and a set of different policies and coordination of these policies at different levels. In (Zhang, et al., 2019), The distributed energy policies launched, at national, provincial, and municipal levels in China in the period 1989-2016 are tracked and compared based on the views of energy groups and policy tools, aiming to promote industrial development, helping to rationalize national energy consumption and reduce carbon emissions. The author relied on qualitative methods in analyzing the development of distributed energy policies and summarizing them at levels, where he applied time dimension analysis by visiting websites published by the Chinese government, the National Development and Reform Commission (NDRC), the National Energy Administration (NEA), and local governments. The author examines the development of China's distributed energy industry and policy development using energy types and policy instruments as a starting point. After reviewing their content, the policies were divided into categories according to policy tools that include economic support, technological innovation and administrative improvements. Policies were also organized on the basis of energy type and policy tool in order to clarify government policy preferences more at all levels. Most policies included solar energy, followed by wind energy. Natural gas and biomass energy. The study indicates a rapid increase in the number of solar energy policies, from the national level to the municipal level, there has been a rapid increase in the number of solar energy policies, and the economic support policies have gradually increased to equal the amount of administrative improvement policies, while the policies related to technological innovation appear. The smallest percentage in those policies.The study indicated that the main engine for implementing the policy is economic support, as it found that the percentage of economic support policies is higher than that in national policies. As for the implementation of the policy, the attempt to use the same response by local governments under different circumstances may not be effective and This is a result of the different resources available from one place to another. The author refers to the importance of subsidies and subsidies as an incentive policy in all policy instruments due to the difficulty of recovering investment and the high investment risks in distributed energy projects. Photovoltaic Poverty Alleviation (PVPA) is an important way to alleviate energy and economic poverty in rural areas, as people are encouraged to use their assets and work in exchange for a subsidy and income from photovoltaics. The study analyzes subsidies and PVPA being crucial to DE development efforts. Despite some successes, the development of distributed energy in China is still in its infancy, as it suffers from problems that impede this development. The paper discussed some of these major problems associated with current policies, lack of coordination, difficulties in connecting the network, and slow subsidy payments. Later on, analyzing Chinese policies, the paper proposes policy recommendations that may provide an important reference for all levels of government regarding the development of distributed energy, these recommendations include perfect the policy system, encourage comprehensive utilization, diversify subsidy types, and focus on technology research and development.

2.2.8 A Hybrid Multi Criteria Decision Making (MCDM) Policy in Iran

In (Alizadeh, et al., 2020), the author provides an improved framework for countries that intend to switch from fossil energy sources to renewable energy sources that enable them to plan renewable energy, make decisions based on multi-criteria decision making (MCDM) and harness their abundant resources of renewable energy more effectively, and it also helps identify and remove barriers to the use of renewable energy sources. The paper examines the case of Iran as one of the countries whose economy and economic development depend on fossil fuels, as Iran has the fourth largest oil reserves and the second largest natural gas reserves in the world. The complexity of the decision-making process increases when many multiple decision-makers, multiple interrelated criteria, and uncertainties are included. in order to evaluate the best renewable energy planning policy. A hybrid model based on two models namely Benefit, Opportunity, Cost and Risk (BOCR) and Analytical Network Process (ANP) is used, where the BOCR represents a strategic management framework frequently used for decision analysis, evaluating alternatives, decisions, options and potential actions using four indicators. Whereas, ANP is a practical method for calculating priorities taking into account interconnections. whereby the BOCR analysis is used to determine the energy situation in Iran and the criteria for assessing renewable energy, and Then ANP analysis is applied to prioritize renewables against the selected criteria. The paper begins with a brief presentation of Iran's renewable energy potential and its policy framework for renewable energy, as it reviews the administrative structure and policy-making in the field of renewable energy in which the Renewable Energy Initiative Council (REIC) and the Renewable Energy Organization of Iran (SUNA) are the two leading institutions of administrative organizations and operational policy-making. In renewable energy, together with the Ministry of Energy. Principal institutions and ministries (Ministry of Science, Ministry of Energy, Ministry of Industry, Ministry of Petroleum) and administrative bodies participate in REIC.The paper also presents the methods and criteria for decision-making as it forms an essential part of the decision-making framework and process, which enables knowledge and understanding of the strengths and weaknesses in energy planning and policy, as the literature review shows that ANP is the most common method in decision-making processes regarding Sustainable energy. The results of the review of studies are summarized and the criteria are included under the BOCR Elements and Factors of Strategic Importance. As a result of these reviews, it has become clear that the decision-making framework in renewable energy policy in Iran appears incomplete, and the strategic and political analysis in decision-making regarding renewable energy resources is not strong.

The proposed conceptual framework is applied to prioritize renewable energy resources and formulate policies to improve social and economic benefits. The decision-making process goes through seven steps: Setting up the expert team of decision-makers ,determining the hierarchical structure of the problem including goals, strategic, criteria and alternatives, determining the weights of the strategic criteria with respect to the goals, determining the weights of the BOCR with respect to the criteria, determining the weights of the BOCR sub-network, Prioritization of the alternatives, sensitivity analysis and policy consequences.

The results show that technology is the criterion of major importance in decision-making, compared to economics, energy, security, global impact and human well-being. Experts also believe that Iran's energy security will be increased in the best way if top priority is given to the technological and economic aspects of renewable energy. Iran's alternative renewable energy plan includes six future alternative sources of renewable energy. As the proposed model gives priority in future investments for solar, wind and biomass, where solar energy ranks first, providing less cost and risk and with high opportunity and benefit. The sensitivity analysis indicates that solar energy and wind energy will remain the priority in case of disruptive events.

Chapter Three

Policy and Renewable Energy Development

Chapter Three

Policy and Renewable Energy Development

3.1 Overview

The renewable energy system is a socio-technical system that consists of a set of rules and actors that affect the use of renewable energy sources (Reichardt, et al., 2016). Renewable energy systems can form part of a technological innovation system, but they differ from traditional systems for energy innovation in structure, organizational features, density, and management practices, therefore, developing renewable energy systems include changes in institutional structures, user practices, technological dimension, and infrastructure development (Alizadeh, et al., 2020).

The transitions of the sustainability of the development of renewable energy systems are receiving scientific and political attention, and they are growing to form a major development strategy (Chachuli, et al., 2021). Innovation policies are necessary for this sustainability and for the development of renewable energy sources (Germán Fran, et al., 2018). Public support is the most important factor in developing renewable energy sources (Mouraviev, 2021). However, it should not hinge on a single innovation policy for developing renewable energy sources, but rather on a mix of sustainable transformation policies that constitute a mix of policy tools (Reichardt, et al., 2016). In this chapter, we will discuss the supposed impact of policy criteria in making renewable energy systems more developed, and we will also refer to the level of RES development through the adoption of technology and the intensity of renewable energy systems activities.

3.2 Municipal Locating Factors

The municipal location is one of the criteria for the innovation policy, which provides the structural conditions for the development of renewable energy sources (Kutschke, et al., 2016). Through municipal location criterion, municipalities/councils have the ability to participate and contribute to the development of renewable energy sources, as municipalities and councils can form accelerators for the development of renewable energy systems (Kostevšek, et al., 2015). Efforts to reduce carbon dioxide emissions, relying on traditional energy sources, tariffs, and taxes are part of the regulatory and promotional policy tools, in addition to the municipalities and councils' role in searching for local investors, creating legal economic conditions that support entrepreneurship in the field of renewable energy, and strengthening R&D activities in this area (Gürtler, et al., 2019).

3.3 Cooperation Activities

Innovation is a collective process and relationships involving governments, universities, and industries, and thus cooperation is the heart of innovation research. Cooperation between municipalities, financial and service companies, industry, citizens, and policymakers is an important factor in designing energy strategies in the development stage (Gustafsson, et al., 2015). Cooperation activities include: defining common goals, defining legislation, drafting implementation plans. The participation of interest groups in the development of specific goals generates future commitment, and community participation re-evaluates the pattern of consumption, increases the transparency of decision-making processes, and stimulates social learning.

However, collective participation may also pose challenges, and the complexity of effort and coordination may be a hindrance to the implementation of supply chains and the implementation of sustainable business. The challenges of coordination between stakeholders in developing renewable energy sectors are related to each of the functions of entrepreneurship activities, knowledge development, knowledge exchange, research orientation, market formation, resource mobilization, and countering resistance to change, which are called technological innovation systems functions (Kim, 2021).

3.4 Existence of Local Knowledge about Renewable Energy Systems

Stocks of previous knowledge have a positive impact on the level of innovation of renewable energy projects, as policymakers can use this knowledge gained by municipal actors from previous projects for development and learning (Hildén, 2011). Studies indicate that areas with great knowledge of the agricultural sector tend to develop policies promoting renewable energies.

Governments use policy tools to focus on knowledge generation, research, and development (Cantner, et al., 2016). Researchers have also noted that policymakers' initiatives renewable energy projects in the event that there are specific subsidies for research and development. Therefore, governments can allocate effective investments for development and research programs and empower the private sector in terms of energy technology innovation (Mowery, et al., 2010). There is an aspect of local knowledge linked to the perceptions of local stakeholder groups and influencers. Successful policymakers can frame a policy to encourage innovation in renewable energy development projects. This focus on public policy can provide support for future development (Hoang, et al., 2021). Investments are also generated in university research, which enables basic and applied development, especially those focusing on the production and use of renewable energy, as municipal actors cooperate with traditional and applied for universities in joint research. Due to the widespread of university research, the areas in which these institutions are abundant have better performance in innovation and renewable energy projects and are vulnerable to own more innovative renewable energy projects (Rösler, et al., 2013).

Chapter Four

Research Method

Chapter Four

Research Methods

In this research a questionnaire is used to assess the development of RE systems, evaluate innovation policies, infrastructures and control variables. This questionnaire was previously tested and used in Germany and other countries (Germán Fran, et al., 2018). It consists of four parts. The first part assesses the development of renewable energy systems in the target municipalities and councils, while the second part evaluates the three main innovation policy criteria that can be taken into consideration in making decisions to develop renewable energy projects. The third part includes automatic variables (infrastructure) that explain the possibility of investment in renewable energy innovation activities, the last part includes control variables that explain the role of municipalities and local councils in promoting and developing renewable energy sources.

4.1 Sampling

This research targeted Palestinian municipalities and local councils in all governorates of the West Bank, where we obtained a list of 406 municipalities and local councils from the Palestinian Central Bureau of Statistics (Palestinian Central Bureau of Statistics, 2019). The survey was launched in January 2021. Representatives of municipalities and councils (municipalities' and councils' heads, or the workers in the energy and electricity departments) were contacted by phone to obtain approvals for participation and to fill out the questionnaire. One respondent approach was used for each municipality/council due to the difficulty of reaching several respondents. According to Morgan tables, 216 responses were obtained with a response rate of 53.2%, an accuracy rate of 94.57%, and a confidence level of 98%. Table 4.1 indicates the demographic distribution of the surveyed sample. To ensure that the response is not biased in terms of regions, it has been qualitatively verified that the respondents represent all West Bank governorates.

Table 4.1: Demographic distribution of the Palestine municipalities of the sample

Sample Categories	Classification	Number of municipalities	Percentage of municipalities
Distribution by size	< 10000	179	82.90%
	from 10000 to 50000	34	15.70%
	> 50000	3	1.40%
	Total	**216**	
Distribution by region	Tulkarem	25	11.60%
	Tubas	5	2.30%
	Nablus	32	14.80%
	Ramallah And Al-Bireh	50	23.10%
	Qalqilya	11	5.10%
	Jericho	8	3.70%
	Jerusalem	17	7.90%
	Jenin	30	13.90%
	Salfeet	11	5.10%
	Bethlehem	8	3.70%
	Hebron	19	8.80%
	Total	**216**	

4.2 Research Hypotheses

Given the problem of not understanding the impact of innovation policies and the lack of investigation of aspects of renewable energy systems at the local level, this research examines the following research question: What is the impact of innovation policy standards on the development of local renewable energy systems in Palestinian municipalities and councils? As a result of this question, the three main criteria of the innovation policy and their supposed impact on the development of renewable energy sources were analyzed in section 2. Each of these criteria leads to a specific hypothesis related to the impact of innovation policy, as follows:

Hypothesis 1: There are more advanced renewable energy systems than others in the municipalities/councils that contribute to local innovation policies and are concerned with site factors.

Hypothesis 2: There are more advanced energy systems than others in the municipalities/councils that contribute to local innovation policies and are interested in cooperation between stakeholders.

Hypothesis 3: Municipalities/councils that contribute to local innovation policies and possess knowledge and experience in the renewable energy sector have the most advanced energy systems than others.

The hypotheses are tested through the questionnaire questions shown in Table 4.2 which were specially developed for this purpose. This questionnaire investigates the existence of large number of renewable energy innovative activities, as they are predictive factors for the development of renewable energy systems. Any decision related to innovative activity taken by municipal policymakers plays a major role in the transition process towards renewable energy systems and makes innovation activities more susceptible to investment. Knowing the level of innovation activities in the field of renewable energy is related to the inputs of the innovation policy standards that we seek to analyze.

The questionnaire consists of four main parts, the first part investigates the development of renewable energy systems in the region, while the second part, which is the most important, examines the three hypotheses of innovation policy criteria impact through five indicators for each. The third part, consisting of six questions, examines the most important infrastructure elements for each region and its characteristics. The final part consists of two important questions constitute the control variables that determining the nature of the work of each municipality or council and its role in the process of transition towards renewable energy and its development.

Table 4.2: Developed questionnaire Items

Hypotheses	Item	Question
	Q1.1	There is a large number of renewable energy innovation activities
	Q1.2	There is heavy dependence on renewable energies
	Q1.3	There is a high number of promoters that actively contribute to the development of renewable energies
	Q1.4	There is a high number of local companies in the field of renewable energy

H 1.		**Importance of the municipal locational factors [LOCATION]**
	Q2.1.1	Balancing and reduction of CO_2
	Q2.1.2	Reducing dependence on power supplies from Israeli grid
	Q2.1.3	Related incentive entrepreneurship activities
	Q2.1.4	Related entrepreneurial activities
	Q2.1.5	Fostering cooperation with electricity distribution companies
H 2.		**Importance of the cooperation activities [COOPERATION]**
	Q2.2.1	Developing public-private cooperation
	Q2.2.2	Limiting energy consumption from the Israeli grid and providing opportunities for direct investment
	Q2.2.3	Increasing transparency in renewable energy policy
	Q2.2.4	The ability to increase industrial activities by the local community
	Q2.2.5	Fostering support from foreign donor institutions
H 3.		**Importance of the local knowledge about RES [KNOW]**
	Q2.3.1	Building long-term knowledge about renewable energy projects
	Q2.3.2	Using previous project experience in renewable energy projects
	Q2.3.3	Existence of in-house R&D activities on renewable energy
	Q2.3.4	Existence of relevant universities and research institutes
	Q2.3.5	Existence of regional knowledge for the development of the agriculture and forestry sector

		How strong are the following characteristics in your region
	Q3.1	Public support to renewable energy
	Q3.2	Proximity to technology suppliers for renewable energy
	Q3.3	Wage level of the municipality/council
	Q3.4	Labor availability in the municipality/council
	Q3.5	Access to research and development infrastructure for the municipality/council
	Q3.6	Received public funds to invest in renewable energy projects recently
	Q4.1	Does your municipality develop its own renewable energy projects?
	Q4.2	Is your municipality promoting projects for renewable energy adoption?

4.3 Measure Definition

The proposed hypotheses suggest three basic criteria for innovation policy, which decision-makers can take into account in any decision related to the development of renewable energy projects. These criteria include: [location], referring to the local factors of the municipality, [cooperation], referring to cooperation activities between stakeholders, and local knowledge about renewable energy sources [know].

These three criteria can have an impact on the level of developing renewable energy systems in municipalities [development]. Therefore, these criteria were measured by five components for each criterion, and development within municipalities and councils was measured with four components. All questionnaire elements were evaluated using a Likert Scale consisting of 7 points. Development components were measured using a scale ranging from 1 - Strongly disagree to 7 - Strongly agree. As for the three innovation policy criteria, they were measured using the municipality importance scale, which ranges from Between 1- not important at all to 7- very important (Germán Fran, et al., 2018).

Control variables were included in the questionnaire form. First, the size of the municipality, given that larger municipalities are more likely to invest in sustainability projects, this variable was measured based on the area's population using three criteria: less than 10,000 people, between 10,000 and 50,000 people, And more than 50,000 people. The other two control variables determine whether municipalities and councils develop their own renewable energy projects, or promote these projects (and they are measured as yes or no), and this is done by contributing with their partners and stakeholders such as non-governmental institutions and universities in the introduction of requests for financing local renewable energy projects, thus municipalities and councils can be effective actors rather than facilitators, as they role to contribute the development and not limited only to facilitating development.

Some of the infrastructure contextual characteristics were included in the questionnaire that have a role in making municipalities and councils devote their efforts to developing renewable energy sources. These characteristics make municipalities and councils more vulnerable to investment in the renewable energy field (Mowery, et al., 2010). The following variables were used to measure the characteristics of the infrastructure: 1- general support for renewable energy, which indicates the level of support for politics and society, 2-Proximity to technology suppliers for renewable energy, 3- the level of wages, which constitute a positive condition for technology investment and creates conditions for the consumption of more energy, 4-availability of workers, which constitutes an indicator of the labor market activity in the municipality and has an impact on the standards of the municipal positioning factor, 5-access to research and development infrastructure for the municipality/council, and access to public funds for sustainable projects.

4.4 Statistical Analysis Plan

A statistical analysis plan for the proposed questionnaire was implemented, including Chi-square test, T-test, ANOVA test, post-test, and Tukey HSD test (Assali, et l., 2019). At first, the representative sample size calculated based on Morgan tables, then the collected data were tabulated, evaluated, and converted into values. SPSS program was used in the statistical analysis and testing.

The Cronbach alpha test was performed to ensure the reliability of the measurement. Descriptive statistics was also used to clarify the relationships between the results, and thus obtain the distribution of samples according to location, type, and size. The Chi-square test was applied to compare more than two variables to verify that they are independent variables or not. The averages of the groups were compared and the statistically significant differences were determined between them using the T-test, and ANOVA was used to find out how the independent variables interact and analyze the effect of these interactions on the dependent variable. Finally, Tukey test was used to reveal the governorate that is a source of difference.

Chapter Five

Results

Chapter Five

Results

In this research, the reliability of the developed questionnaire used was tested. According to the analysis, the Cronbach's Alpha value is 0.788, which indicates an acceptable level of reliability. As Figure 5.1 shows, 82.9% of the sample are small-sized councils (serving less than 10,000 people), while 15.7% of them are medium-sized councils (serving a population between 10,000 and 50,000), and 1.4% are large councils (serving over 50,000 people).

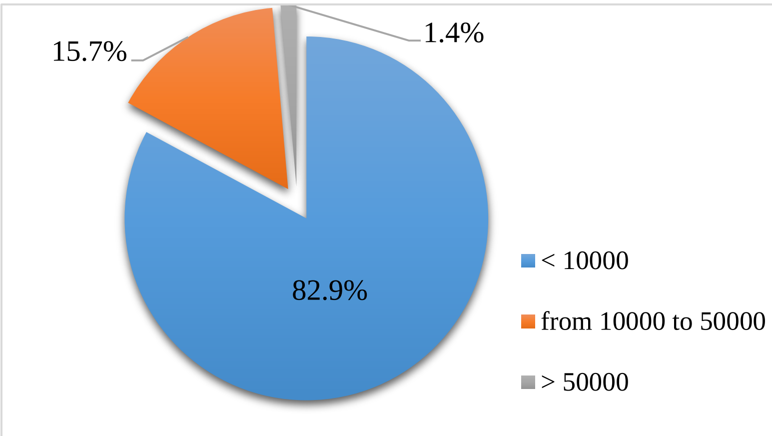

Figure 5.1: The distribution of municipalities/ councils according to size

The sample was distributed as shown in Figure 5.2. Village councils formed 64.8% of the sample, while the share of municipalities was 35.2%.

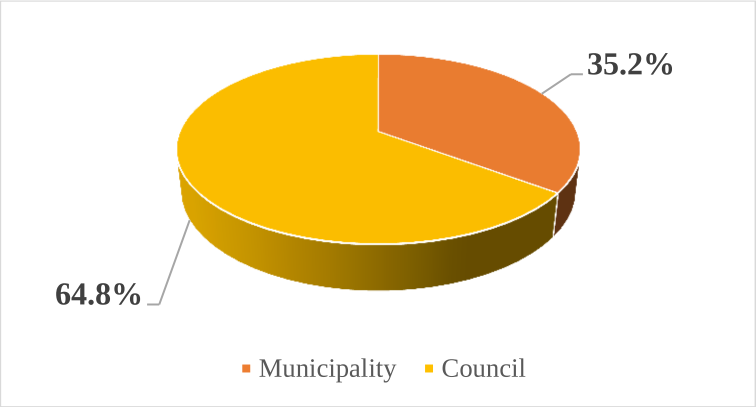

Figure 5.2: The distribution of municipalities/ councils according to the type

There were differences in the participation rates of the governorates in the questionnaire, as shown in Figure 5.3, which is due to the difference in the percentage of councils and municipalities between these governorates. The largest percentage of respondents is concentrated in RAMALLAH and AL-BIREH governorates (23.1%), this is due to the fact that it includes the largest number of local government units, while the lowest percentage is concentrated in TUBAS governorate (2.3%), because it is the second smallest governorate in terms of the number of local government units. One of the main reasons for the difference in response for research between the governorates is the interest of the municipalities and councils, and taking the topic of research seriously, as a result of the role that municipalities and councils play.

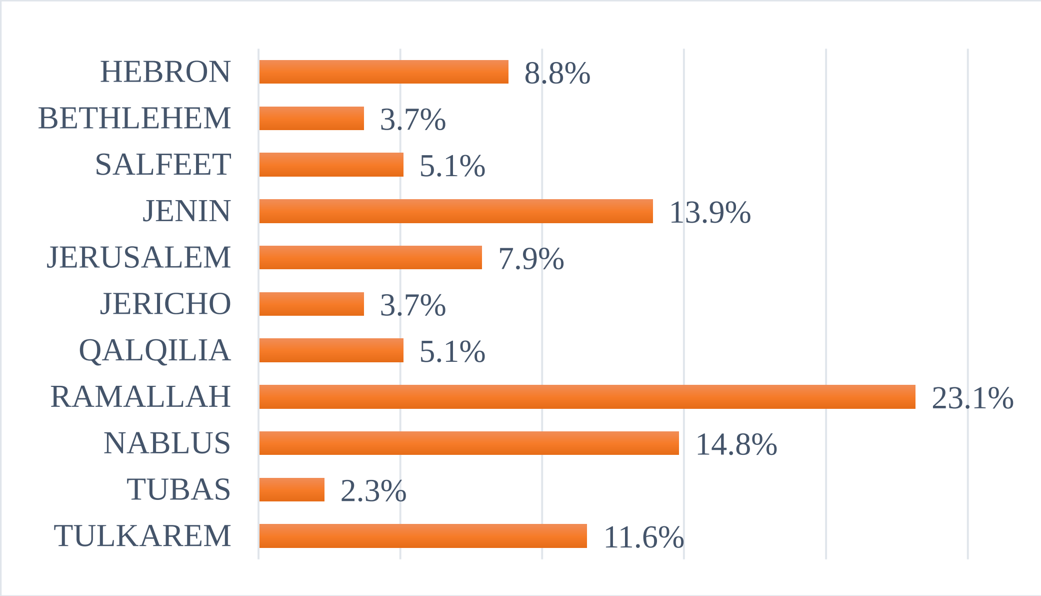

Figure 5.3: The distribution of municipalities/ councils according to governorate

5.1 Indicators of Innovation Criteria Importance

Table 5.1 summarizes the answers to the questionnaire. The answers show that the development of renewable energy systems is somewhat weak as assessed by the local councils, as there is a dearth in the regions' dependence on renewable energy and its activities, where 31% of the councils strongly opposed the phrase "there is a great dependence on renewable energies.”. There is also a lack of availability of local promoters and companies in this field. This may be due to the fact that renewable energy projects are applied in special areas, such as remote areas and some governmental schools.

The answers indicate that locational factors are important criteria for developing renewable energy projects, as participants see reducing carbon dioxide emissions and enhancing cooperation between electricity companies as important factors of 41.7% and 31.5% respectively, while

27.7% are believed that reducing dependence on energy imported from the Israeli network is a very important factor. 38% respond with the great importance of reducing energy consumption from the Israeli network and providing an opportunity for direct investment, while 29.2% answered the importance of support from foreign donor institutions and 28.2% agreed with the importance of the local population's ability to increase industrial activities. This indicates that cooperation activities are the most important basic criterion for innovation policy.

The results indicate that local knowledge about renewable energy systems is the least important factor for the participants, as long-term knowledge won the interest of 35.6% of the participants, while research and development activities received the attention of 25.9% of them. 21.8% of the participants see the existence of regional knowledge for the development of the agriculture and forestry sector as not an important factor, while no one of the local knowledge criteria received extreme importance.

The infrastructure variables explain the results that indicate the weak presence and development of renewable energy systems resulting from the lack of investment in renewable energy innovation activities, as 38.9% of the respondents answered that there is a lack of general support for renewable energy in their regions, while 80.1% answered that they did not receive any money to invest in renewable energy projects, in addition to the weak availability of labor according to the opinion of 26.9% of the participants. The results also indicate the weak role of municipalities and councils in promoting and developing renewable energy sources, as 71.3% replied that they did not develop any renewable energy projects of their own, and 58.3% indicated that they did not promote any projects to adopt renewable energy.

Table 5.1: Responses to the questions asked to determine the development of renewable energy systems

Item	**Percent**						
	1	2	3	4	5	6	7
Responses to the questions asked to determine the development of renewable energy systems							
	Strongly disagree	**Disagree**	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Agree**	**Strongly agree**
Q1.1	26.4%	19.9%	29.2%	7.9%	12.5%	4.2%	0.0%
Q1.2	31.0%	25.5%	27.8%	4.2%	9.7%	1.4%	0.5%
Q1.3	17.6%	19.9%	24.1%	15.7%	17.6%	4.6%	0.5%
Q1.4	22.2%	22.7%	26.4%	12.5%	13.9%	1.9%	0.5%
Responses to the questions asked to determine the main sustainability innovation policy criteria							
	1	2	3	4	5	6	7
Item	**Not at all important**	**Not important**	**Somewhat not important**	**Moderately important**	**Somewhat important**	**Important**	**Extremely important**
Q2.1.1	2.3%	0.9%	2.3%	7.4%	19.4%	41.7%	25.9%
Q2.1.2	0.5%	1.9%	1.4%	6.0%	16.2%	26.4%	27.7%
Q2.1.3	0.9%	2.8%	13.0%	16.2%	31.9%	28.2%	6.9%

Q2.1.4	0.9%	5.6%	15.3%	24.5%	27.3%	22.2%	4.2%
Q2.1.5	4.6%	9.3%	9.7%	13.4%	27.8%	31.5%	3.7%
Q2.2.1	2.3%	6.0%	12.5%	18.5%	31.0%	23.1%	6.5%
Q2.2.2	50.0%	2.3%	4.2%	10.2%	14.4%	30.6%	38.0%
Q2.2.3	2.3%	4.2%	8.8%	17.1%	30.1%	23.6%	13.9%
Q2.2.4	0.0%	3.7%	8.3%	19.4%	25.0%	28.2%	15.3%
Q2.2.5	4.2%	3.2%	6.9%	12.5%	22.2%	29.2%	21.8%
Q2.3.1	1.9%	5.6%	7.4%	13.0%	24.5%	35.6%	12.0%
Q2.3.2	4.2%	8.3%	13.4%	23.1%	25.5%	18.1%	7.4%
Q2.3.3	7.9%	11.1%	11.1%	11.1%	20.4%	25.9%	12.5%
Q2.3.4	11.6%	15.7%	13.4%	17.6%	17.1%	15.3%	9.3%
Q2.3.5	16.7%	21.8%	17.6%	19.9%	13.4%	9.7%	0.9%
Responses that determine the infrastructure in the region and assess the probability to investment in the renewable energy innovation activities.							
	1	**2**	**3**	**4**	**5**	**6**	**7**
Item	**Very weak**	**Weak**	**Somewhat weak**	**Medium**	**Somewhat strong**	**Strong**	**Very strong**
Q3.1	16.2%	38.9%	25.7%	25.3%	9.7%	3.2%	0.9%

Q3.2	6.0%	15.7%	25.0%	27.3%	15.7%	8.8%	1.4%
Q3.3	2.3%	8.8%	19.9%	41.7%	21.8%	5.6%	0.0%
Q3.4	8.8%	15.3%	26.9%	20.4%	12.0%	12.5%	4.2%
Q3.5	0.9%	5.1%	3.7%	7.9%	34.3%	31.5%	16.7%
	Yes			**No**			
Q3.6	19.9%			80.1%			
Responses to the questions asked to explain municipalities and council's role in promoting and developing the renewable energy sources.							
Item	**Yes**			**No**			
Q4.1	28.7%			71.3%			
Q4.2	41.7%			58.3%			

5.2 Factors Affecting the Level of Renewable Energy Systems Development and Innovation Policy Criteria

As shown in Table 5.2, all questionnaire parts are subjected to ANOVA test to investigate the significance of the region, institution type, and institution size on the RE systems development, sustainability innovation policy criterion, and the infrastructure. Regarding the development of renewable energy systems, the results indicate that the significance of both region and institution size is 50% (2 out of 4), while the significance of institution type is 25% (1 out of 4). For the innovation policy criteria, the significance of the institution size comes first with 20% (3 out of 15), followed by the significance of the region at 13.3% (2 out of 15), while the significance for institution type is found to be 0%. This indicates that there is some difference between Palestinian cities in the level of development of renewable energy systems and the standards of innovation policy affecting decision-making, whether the source of this difference is population density or place of residence. In terms of infrastructure characteristics, the significance of both institution type and size is 50% (3 out of 6), while there is no significance for the region 0%, which means that the infrastructure has clear differences between the city and the village. The overall scale for the three parts of the questionnaire indicates all previous factors were insignificant.

From Table 5.3, the overall average score for the development of renewable energy systems is 2.767 out of 7, which means a low level of RE system development. While the overall average scores for the main sustainability innovation policy criteria are: 5.156 out of 7 for the locational factors, 5.142 out of 7 for the cooperation activities, and 4.244 out of 7 for the local knowledge about RES. That means municipalities/councils give a moderate level for the importance of the locational factors and the cooperation activities, but they give a low level for the importance of the local knowledge about RES. The overall average score for region characteristics is 3.849 out of 7, which means municipalities/councils have a low level of infrastructure.

In all questions, the standard deviation was more than 1, which means there are dispersion and a lack of focus in answering the questionnaire questions, due to a lack of understanding of their importance and lack of faith by respondents

Table 5.2: ANOVA test (p-value)

Sig.			
Item	**Region**	**Institution Type**	**Institution size**
Q1.1	0.642	0.215	0.190
Q1.2	0.554	0.290	0.090
Q1.3	0.022	0.149	0.022
Q1.4	0.009	0.004	0.000
Overall part 1	**0.307**	**0.164**	**0.075**
Q2.1.1	0.021	0.635	0.070
Q2.1.2	0.010	0.701	0.295
Q2.1.3	0.098	0.669	0.107
Q2.1.4	0.845	0.186	0.065
Q2.1.5	0.373	0.088	0.047
Overall	**0.269**	**0.456**	**0.117**

Q2.2.1	0.666	0.888	0.258
Q2.2.2	0.141	0.082	0.840
Q2.2.3	0.111	0.990	0.217
Q2.2.4	0.182	0.897	0.371
Q2.2.5	0.553	0.275	0.916
Overall	**0.330**	**0.627**	**0.521**
Q2.3.1	0.091	0.428	0.026
Q2.3.2	0.593	0.419	0.429
Q2.3.3	0.646	0.594	0.023
Q2.3.4	0.399	0.188	0.125
Q2.3.5	0.552	0.072	0.224
Overall	**0.456**	**0.340**	**0.165**
Overall part 2	**0.352**	**0.474**	**0.268**
Q3.1	0.742	0.036	0.080
Q3.2	0.059	0.299	0.029
Q3.3	0.556	0.000	0.000
Q3.4	0.316	0.000	0.000
Q3.5	0.810	0.933	0.092
Q3.6	0.818	0.169	0.988
Overall part 3	**0.550**	**0.240**	**0.198**

Table 5.3: Questionnaire responses

Item	Mean	Std. Deviation
Q1.1	2.727	1.464
Q1.2	2.421	1.341
Q1.3	3.116	1.501
Q1.4	2.806	1.417
Overall Part 1	**2.767**	
Q2.1.1	5.694	1.265
Q2.1.2	6.056	1.192

Q2.1.3	4.880	1.277
Q2.1.4	4.551	1.304
Q2.1.5	4.597	1.552
Overall	**5.156**	
Q2.2.1	4.653	1.406
Q2.2.2	5.792	1.325
Q2.2.3	4.949	1.438
Q2.2.4	5.116	1.323
Q2.2.5	5.199	1.580
Overall	**5.142**	
Q2.3.1	5.079	1.437
Q2.3.2	4.412	1.525
Q2.3.3	4.528	1.835
Q2.3.4	3.958	1.854
Q2.3.5	3.245	1.611
Overall	**4.244**	
Overall Part2	**4.847**	
Q3.1	2.769	1.405
Q3.2	3.630	1.388
Q3.3	3.884	1.091
Q3.4	3.657	1.600
Q3.5	5.306	1.315
Overall Part 3	**3.849**	

In order to compare the differences in municipalities/councils' responses according to their size, a t-test was performed, the results related to size yielded meaningful results for 8 questions. In the RE systems development assessment questions, a significant difference noticed between the small-size and medium sizes municipalities/councils' replies, where promoters' availability in medium-size municipalities (3.353) is more than in small-size municipalities (3.034), similar results obtained for the question of the availability of the local company. In the main sustainability innovation policy criteria assessment questions, there is also a significant difference noticed between the small-size and medium sizes municipalities/councils' replies, where it is found that coordination activities, building long term knowledge, and existence In-house R&D Activities in medium-size municipalities are more than in small-size municipalities. Also, with regard to the infrastructure of municipalities/councils, it was found that the strength of the characteristics in a region with a population ranging between 10,000 and 50,000 is higher than in those with a population of less than 10,000. Table 5.4 shows the results of T-test according to size.

Table 5.4: T-test Results according to municipality / council size

Item	Institution size	N	Mean	Std. Deviation	T	df	Sig.
Promoters Availability (Q1.3)	<10000	179	3.034	1.502	-1.149	211.000	0.022
	from 10000 to 50000	34	3.353	1.390	-1.212	48.824	
Local Companies Availability (Q1.4)	<10000	179	2.659	1.366	-2.850	211.000	0.000
	from 10000 to 50000	34	3.382	1.303	-2.943	47.832	
Coordination Activities (Q2.1.5)	<10000	179	4.492	1.563	-2.269	211.000	0.047
	from 10000 to 50000	34	5.147	1.438	-2.402	49.004	
Building Long Term Knowledge (Q2.3.1)	<10000	179	4.978	1.472	-2.180	211.000	0.026
	from 10000 to 50000	34	5.559	1.133	-2.602	56.479	
Existence In-house R&D Activities (Q2.3.3)	<10000	179	4.402	1.847	-2.005	211.000	0.023
	from 10000 to 50000	34	5.088	1.730	-2.097	48.415	
Proximity to technology Suppliers (Q3.2)	<10000	179	3.520	1.408	-2.790	211	0.029
	from 10000 to 50000	34	4.235	1.156	-3.188	53.410	
Wage Level (Q3.3)	<10000	179	3.760	1.072	-3.569	211	0.000
	from 10000 to 50000	34	4.471	1.022	-3.688	47.855	
Labor Availability (Q3.4)	<10000	179	3.302	1.377	-7.506	211	0.000
	from 10000 to 50000	34	5.265	1.504	-7.070	44.149	

5.3 The Relations between Innovation Policy Criteria and the Renewable Energy Systems Development

A Chi-square test implemented to determine the relation between innovation policy criteria and the development of renewable energy systems as Table 5.5 illustrates. The results indicated that there is a significant association between the availability of promoters that actively contribute to the development of renewable energies and each of the ability to increase industrial activities by the local community, building long-term knowledge about renewable energy projects, and the Existence of relevant universities and research institutes. There is also a relation between renewable energy innovation activities and related Incentive entrepreneurship activities and between the availability of local companies in the field of renewable energy and limiting energy consumption from the Israeli grid and providing opportunities for directly investing.

Table 5.5: Chi-square test between innovation policy criteria and the development of renewable energy systems

		value	**Asymptotic Significance (2-sided)**
The relation between renewable energy innovation activities and related Incentive entrepreneurship activities	**Pearson Chi-Square**	52.863	0.035
	Cramer's V	0.202	0.035
The relation between promoters that actively contribute to the development of renewable energies and the ability to increase industrial activities	**Pearson Chi-Square**	29.937	0.011
	Cramer's V	0.217	0.011

by the local community			
The relation between the availability of local companies in the field of renewable energy and limiting energy consumption from the Israeli grid and providing opportunities for directly investing	**Pearson Chi-Square**	54.744	0.023
	Cramer's V	0.206	0.023
The relation between the availability of promoters that actively contribute to the development of renewable energies and building long-term knowledge about renewable energy projects	**Pearson Chi-Square**	29.937	0.01
	Cramer's V	0.212	0.01
The relation between the availability of promoters that actively contribute to the development of renewable energies and the Existence of relevant universities and research institutes	**Pearson Chi-Square**	52.094	0.04
	Cramer's V	0.2	0.04

A Chi-square test is also implemented to determine the relation between the role of municipalities and councils in promoting and developing renewable energy sources and the development of renewable energy systems. The results in Table 5.6 show that there is a significant association between the municipality’s development of its renewable energy projects and each of the existence of renewable energy innovation activities, the region's dependence on renewable energies, the availability of promoters who actively contribute to the development of renewable energies, and the availability of local companies in the field of renewable energy.

Cramer's value V is used to measure the strength of relationships from the chi-square test. The results indicate that all the previous relationships range in strength from weak to average, where Cramer's V values do not exceed 0.33. It means that renewable energy innovation activities have a small to moderate effect on the related Incentive entrepreneurship activities. Also, the effect of the availability of promoters that actively contribute to the development of renewable energies has a small to moderate effect on the ability to increase industrial activities by the local community, building long-term knowledge about renewable energy projects, and the Existence of relevant universities and research institutes. The same applies to the rest of the relationships shown by the chi-square test.

Table 5.6: Chi-square test between municipalities and council's role in promoting and developing the renewable energy sources and the development of renewable energy systems

		value	Asymptotic Significance (2-sided)
The relationship between the municipality's development of its renewable energy projects and the existence of renewable energy innovation activities	**Pearson Chi-Square**	23.735[a]	0
	Cramer's V	0.331	0
The relationship between the municipality's development of its	**Pearson Chi-Square**	18.003[a]	0.006

renewable energy projects and the region's dependence on renewable energies	**Cramer's V**	0.289	0.006
The relationship between the municipality’s development of its renewable energy projects and the availability of promoters who actively contribute to the development of renewable energies	**Pearson Chi-Square**	16.600[a]	0.011
	Cramer's V	0.277	0.011
The relationship between the municipality’s development of its renewable energy projects and the availability of local companies in the field of renewable energy	**Pearson Chi-Square**	18.344[a]	0.005
	Cramer's V	0.291	0.005

5.4 The Statistical Differences

In further analysis as shown in Table 5.7, a statistically significant difference regarding the region significance was found for all items except the CO2 Balancing and reduction, related Incentive entrepreneurship activities, and foreign donor institutions support. For most of the proposed items, no significant differences depending on the institution type were found, except five items include the existence of RE local companies, the foreign donor institutions support, municipality/council wage level, labor availability in municipality/council, and developing municipal / council own projects. No institution size-dependent significant differences were found for most of the proposed items, except five items include the existence of a high number of renewable energy innovation activities, the existence of renewable energy promoters, the existence of renewable energy local companies, municipality/council wage level, and labor availability in municipality/council.

Table 5.7: Results of Chi-square test for region, institution type and institution size

Item	Region	Institution Type	Institution size
Q1.1	0	N.S	0.018
Q1.2	0.006	N.S	N.S
Q1.3	0	N.S	0.028
Q1.4	0	0.04	0
Q2.1.1	N. S	N.S	N.S
Q2.1.2	0.003	N.S	N.S
Q2.1.3	N.S	N.S	N.S
Q2.1.4	0.004	N.S	N.S
Q2.1.5	0.000	N.S	N.S
Q2.2.1	0.000	N.S	N.S
Q2.2.2	0.001	N.S	N.S
Q2.2.3	0.042	N.S	N.S
Q2.2.4	0.030	N.S	N.S
Q2.2.5	N.S	0.041	N.S
Q2.3.1	0.000	N.S	N.S
Q2.3.2	0.001	N.S	N.S
Q2.3.3	0.000	N.S	N.S
Q2.3.4	0.000	N.S	N.S
Q2.3.5	0.000	N.S	N.S
Q3.1	0	N.S	N.S
Q3.2	0	N.S	N.S
Q3.3	0.002	0	0.012
Q3.4	0	0	0
Q3.5	0	N.S	N.S
Q3.6	0.04	N.S	N.S
Q4.1	0.01	0.004	N.S
Q4.2	0.031	N.S	N.S

Table 5.8 shows the result of ANOVA according to the region, the result shows a meaningful difference regarding most of the proposed statements

(p<0.05), except the increasing of local community industrial activities, the foreign donor institutions' support, and municipality/council research and development infrastructure access.

Table 5.8: The result of ANOVA according to the region

		Sum of Squares	Df	Mean Square	F	Sig.
Q1.1	Between Groups	122.187	10	12.219	7.395	0.000
	Within Groups	338.697	205	1.652		
	Total	460.884	215			
Q1.2	Between Groups	55.549	10	5.555	3.439	0.000
	Within Groups	331.113	205	1.615		
	Total	386.662	215			
Q1.3	Between Groups	87.495	10	8.749	4.522	0.000
	Within Groups	396.612	205	1.935		
	Total	484.106	215			
Q1.4	Between Groups	103.065	10	10.306	6.426	0.000
	Within Groups	328.769	205	1.604		
	Total	431.833	215			
Q2.1.1	Between Groups	39.905	10	3.991	2.692	0.004
	Within Groups	303.928	205	1.483		
	Total	343.833	215			
Q2.1.2	Between Groups	60.882	10	6.088	5.106	0.000
	Within Groups	244.451	205	1.192		
	Total	305.333	215			
Q2.1.3	Between Groups	32.310	10	3.231	2.079	0.028
	Within Groups	318.560	205	1.554		
	Total	350.870	215			
Q2.1.4	Between Groups	45.451	10	4.545	2.912	0.002
	Within Groups	319.989	205	1.561		
	Total	365.440	215			

Q2.1.5	Between Groups	72.929	10	7.293	3.359	0.000
	Within Groups	445.029	205	2.171		
	Total	517.958	215			
Q2.2.1	Between Groups	74.652	10	7.465	4.369	0.000
	Within Groups	350.306	205	1.709		
	Total	424.958	215			
Q2.2.2	Between Groups	65.750	10	6.575	4.322	0.000
	Within Groups	311.875	205	1.521		
	Total	377.625	215			
Q2.2.3	Between Groups	62.159	10	6.216	3.333	0.000
	Within Groups	382.281	205	1.865		
	Total	444.440	215			
Q2.3.1	Between Groups	145.012	10	14.501	9.954	0.000
	Within Groups	298.650	205	1.457		
	Total	443.662	215			
Q2.3.2	Between Groups	52.566	10	5.257	2.407	0.010
	Within Groups	447.762	205	2.184		
	Total	500.329	215			
Q2.3.3	Between Groups	252.519	10	25.252	10.983	0.000
	Within Groups	471.315	205	2.299		
	Total	723.833	215			
Q2.3.4	Between Groups	212.143	10	21.214	8.260	0.000
	Within Groups	526.482	205	2.568		
	Total	738.625	215			
Q2.3.5	Between Groups	122.417	10	12.242	5.761	0.000
	Within Groups	435.578	205	2.125		
	Total	557.995	215			
Q3.1	Between Groups	85.215	10	8.522	5.150	0.000
	Within Groups	339.211	205	1.655		
	Total	424.426	215			
Q3.2	Between Groups	52.421	10	5.242	2.969	0.002
	Within Groups	361.950	205	1.766		
	Total	414.370	215			
Q3.3	Between Groups	31.908	10	3.191	2.918	0.002
	Within Groups	224.198	205	1.094		

	Total	256.106	215			
Q3.4	Between Groups	67.516	10	6.752	2.865	0.002
	Within Groups	483.132	205	2.357		
	Total	550.648	215			
Q3.6	Between Groups	3.032	10	0.303	1.979	0.037
	Within Groups	31.408	205	0.153		
	Total	34.440	215			
Q4.1	Between Groups	4.736	10	0.474	2.460	0.009
	Within Groups	39.468	205	0.193		
	Total	44.204	215			
Q4.2	Between Groups	4.828	10	0.483	2.076	0.028
	Within Groups	47.672	205	0.233		
	Total	52.500	215			

In Table 5.9 the results of ANOVA according to the type show there is a meaningful difference regarding the renewable energy local companies' existence (p=0.004), public support to renewable energy (p=0.036), municipality/council wage level (p=0.00), Labor availability in the municipality/council (p=0.00), and developing municipal / council own projects (p=0.004).

Table 5.9: The result of ANOVA according to the type

		Sum of Squares	Df	Mean Square	F	Sig.
Q1.4	Between Groups	16.812	1	16.812	8.669	0.004
	Within Groups	415.021	214	1.939		
	Total	431.833	215			
Q3.1	Between Groups	8.609	1	8.609	4.430	0.036
	Within Groups	415.817	214	1.943		
	Total	424.426	215			
Q3.3	Between Groups	19.253	1	19.253	17.396	0.000
	Within Groups	236.853	214	1.107		
	Total	256.106	215			

Q3.4	Between Groups	59.278	1	59.278	25.817	0.000
	Within Groups	491.370	214	2.296		
	Total	550.648	215			
Q4.1	Between Groups	1.713	1	1.713	8.626	0.004
	Within Groups	42.491	214	0.199		
	Total	44.204	215			

For ANOVA results according to the institution size shown in Table 5.10, there is a meaningful difference regarding the existence of renewable energy promoters (p=0.018), renewable energy local companies' existence (p=0.001), the proximity to the renewable energy technology suppliers (p=0.020), municipality/council wage level (p=0.001), Labor availability in the municipality/council (p=0.00).

Table 5.10: The result of ANOVA according to the size

		Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Q1.3	Between Groups	17.876	2	8.938	4.083	0.018
	Within Groups	466.230	213	2.189		
	Total	484.106	215			
Q1.4	Between Groups	29.592	2	14.796	7.835	0.001
	Within Groups	402.242	213	1.888		
	Total	431.833	215			
Q3.2	Between Groups	14.904	2	7.452	3.974	0.020
	Within Groups	399.466	213	1.875		
	Total	414.370	215			
Q3.3	Between Groups	16.299	2	8.149	7.238	0.001
	Within Groups	239.808	213	1.126		
	Total	256.106	215			
Q3.4	Between Groups	137.654	2	68.827	35.497	0.000
	Within Groups	412.994	213	1.939		
	Total	550.648	215			

Post hoc analysis in respect to the region was done and summarized in Table 5.11. The results show that many pairs of governorates are significantly different with regard to all the statements that assess the development of renewable energy systems. Regarding renewable energy innovation activities, the governorates of SALFEET and QALQILYA scored the highest scores (4.54 and 4.18), respectively, this is due to the fact that the municipality of QALQILYA is responsible for the electricity works and its distribution in the area. With regard to the region's high adoption of renewable energies, SALFEET, and QALQILYA had the highest scores (3.72 and 3.18), respectively. As for the great availability of renewable energy promoters, TULKAREM and SALFEET scored high scores of (4.32 and 4.09), respectively, while TULKAREM scored the highest scores in the high availability of local renewable energy companies (4.32). JERICHO scored the lowest in terms of RE innovation activities (1.75), and the region's adoption of renewable energies adoption (1.62), this is a result of the JERICHO municipality's lack of interest in the electricity works in the governorate, as JEDCO is the responsible party.

Many pairs of governorates were also significantly different with respect to all the statements that assessing the main sustainability innovation policy criteria. In the locational factors criteria, the governorates of QALQILYA and SALFEET scored the highest scores (7 and 6.91), respectively, for reducing dependence on energy supplies from the Israeli grid, with regard to stimulating entrepreneurial activities, JERICHO scored the highest (5.32). As for fostering cooperation with electricity distribution companies, QALQILYA and HEBRON scored the highest (5.45 and 5.37) respectively.

Regarding the criteria that determine the importance of cooperation activities, QALQILYA, HEBRON, and NABLUS scored the highest scores for the developing public-private cooperation (5.73, 5.37, and 5.25 respectively), while QALQILYA and JENIN scored the highest in terms of limiting energy consumption from the Israeli grid and providing opportunities for directly investing (6.91 and 5.37) respectively, as for increased transparency in the renewable energy policy. NABLUS and HEBRON governorates scored the highest (5.53 and 5.47), respectively. None of the pairs were found to be significantly different with respect to the ability to increase industrial activities by the local community.

Given the criteria that assess the importance of local knowledge about renewable energy systems, many pairs are significantly different regarding building long-term knowledge about renewable energy projects, as SALFEET, JENIN, and JERUSALEM scored the highest (5.91, 5.90, and 5.90) respectively, while each of NABLUS and HEBRON have the highest scores for the existence of In-house R&D activities on renewable energy (5.72 and 5.68) respectively. As for Using previous project experience in renewable energy projects, HEBRON scored the highest (5.00), while JERICHO scored the lowest score (2.50). For the existence of relevant universities and research institutes, NABLUS and JENIN scored the highest (5.31 and 4.77) respectively, while JERICHO scored the lowest (1.37). Regarding the existence of regional knowledge for the development of the agriculture and forestry sector, TUBAS and TULKAREM scored the highest (5.60 and 4.08), respectively.

There is a significant difference between ten pairs of governorates that were compared with each other regarding local government units obtaining public support in order to investing in renewable energy, with BETHLEHEM and QALQILYA governorates obtaining the highest scores (4.00 and 3.82) respectively. None of the pairs were found to be significantly different with respect to other infrastructure variables which include proximity to technology suppliers, employment, wages, R&D infrastructure, and financing for investment in renewable energy.

Table 5.11: Result of post hoc analysis by region (Turkey HSD test)

Item	Pair-wise comparison	P-value	Mean values
Q1.1	TULKAREM - RAMALLAH	0.000	(3.60) - (1.94)
	TULKAREM - JERICHO	0.021	(3.60) - (1.75)
	QALQILYA - NABLUS	0.041	(4.18) - (2.69)
	QALQILYA - RAMALLAH	0.000	(4.18) - (1.94)
	QALQILYA - JERICHO	0.003	(4.18) - (1.75)
	QALQILYA - JERUSALEM	0.029	(4.18) - (2.47)
	QALQILYA - HEBRON	0.032	(4.18) - (2.53)
	SALFEET - NABLUS	0.002	(4.54) - (2.69)
	SALFEET - RAMALLAH	0.000	(4.54) - (1.94)
	SALFEET - JERICHO	0.000	(4.54) - (1.75)
	SALFEET - JERUSALEM	0.002	(4.54) - (2.47)
	SALFEET - JENIN	0.004	(4.54) - (2.73)
	SALFEET - BETHLEHEM	0.007	(4.54) - (2.25)

	SALFEET - HEBRON	0.002	(4.54) - (2.57)
Q1.2	QALQILYA - RAMALLAH	0.049	(3.18) - (1.80)
	SALFEET - RAMALLAH	0.000	(3.72) - (1.80)
	SALFEET - JERICHO	0.019	(3.72) - (1.62)
Q1.3	TULKAREM - NABLUS	0.000	(4.32) - (2.47)
	TULKAREM - JENIN	0.000	(4.32) - (2.33)
	TULKAREM - HEBRON	0.004	(4.32) - (2.63)
	SALFEET - NABLUS	0.039	(4.09) - (2.47)
	SALFEET - JENIN	0.018	(4.09) - (2.33)
Q1.4	TULKAREM - NABLUS	0.000	(4.32) - (2.37)
	TULKAREM - RAMALLAH	0.000	(4.32) - (2.60)
	TULKAREM - QALQILYA	0.000	(4.32) - (1.91)
	TULKAREM - JENIN	0.000	(4.32) - (2.20)
	TULKAREM - SALFEET	0.001	(4.32) - (2.27)
	TULKAREM - HEBRON	0.002	(4.32) - (2.68)
Q2.1.1	TULKAREM - HEBRON	0.007	(4.84) - (6.26)
Q2.1.2	TULKAREM - NABLUS	0.023	(5.32) - (6.34)
	TULKAREM - QALQILYA	0.002	(5.32) - (7.00)
	TULKAREM - SALFEET	0.004	(5.32) - (6.91)
	TULKAREM - HEBRON	0.001	(5.32) - (6.79)
	JERUSALEM - NABLUS	0.019	(5.18) - (6.34)
	JERUSALEM - QALQILYA	0.001	(5.18) - (7.00)
	JERUSALEM - SALFEET	0.003	(5.18) - (6.91)
	JERUSALEM- HEBRON	0.001	(5.18) - (6.79)
Q2.1.3	JERICHO - HEBRON	0.018	(3.750 - (5.63)
Q2.1.4	HEBRON - TULKAREM	0.028	(3.25) -(5.00)
	HEBRON - JERICHO	0.006	(5.32) - (3.25)
Q2.1.5	JERICHO - NABLUS	0.001	(2.75) - (5.31)
	JERICHO - QALQILYA	0.005	(2.75) - (5.45)
	JERICHO - HEBRON	0.002	(2.75) - (5.37)

Q.2.2.1	RAMALLAH - NABLUS	0.025	(4.22) - (5.25)
	RAMALLAH - QALQILYA	0.027	(4.22) - (5.73)
	RAMALLAH - HEBRON	0.049	(4.22) - (5.37)
	JERICHO - NABLUS	0.000	(2.57) - (5.25)
	JERICHO - QALQILYA	0.000	(2.57) - (5.73)
	JERICHO - HEBRON	0.001	(2.57) - (5.37)
Q2.2.2	QALQILYA - TULKAREM	0.004	(6.91) - (5.12)
	QALQILYA - TUBAS	0.009	(6.91) - (4.40)
	QALQILYA - JERUSALEM	0.004	(6.91) - (5.00)
	QALQILYA - JENIN	0.020	(6.91) - (5.37)
Q2.2.3	RAMALLAH - NABLUS	0.001	(4.18) - (5.53)
	RAMALLAH - JENIN	0.014	(4.18) - (5.33)
	RAMALLAH - HEBRON	0.022	(4.18) - (5.47)
Q2.2.5	TULKAREM - NABLUS	0.028	(4.48) - (5.91)
Q2.3.1	RAMALLAH - TULKAREM	0.002	(4.14) - (5.40)
	RAMALLAH - NABLUS	0.000	(4.14) - (5.53)
	RAMALLAH - QALQILYA	0.024	(4.14) - (5.54)
	RAMALLAH - JENIN	0.000	(4.14) - (5.90)
	RAMALLAH - HEBRON	0.000	(4.14) - (5.89)
	JERICHO - TULKAREM	0.000	(3.00) - (5.40)
	JERICHO - TUBAS	0.003	(3.00) - (5.80)
	JERICHO - NABLUS	0.000	(3.00) - (5.53)
	JERICHO - QALQILYA	0.000	(3.00) - (5.54)
	JERICHO - JENIN	0.000	(3.00) - (5.90)
	JERICHO - SALFEET	0.000	(3.00) - (5.91)
	JERICHO - HEBRON	0.000	(3.00) - (5.89)
	JERUSALEM - JENIN	0.006	(4.47) - (5.90)
	JERUSALEM - HEBRON	0.021	(4.47) - (5.89)
	JERUSALEM - BETHLEHEM	0.029	(5.90) - (4.25)

Q2.3.2	JERICHO - TULKAREM	0.006	(2.50) - (4.84)
	JERICHO - NABLUS	0.021	(2.50) - (4.56)
	JERICHO - JENIN	0.009	(2.50) - (4.73)
	JERICHO - HEBRON	0.004	(2.50) - (5.00)
Q2.3.3	RAMALLAH - TULKAREM	0.001	(3.42) - (5.04)
	RAMALLAH - NABLUS	0.000	(3.42) - (5.72)
	RAMALLAH - JERICHO	0.021	(3.42) - (1.37)
	RAMALLAH - JENIN	0.000	(3.42) - (5.07)
	RAMALLAH - HEBRON	0.000	(3.42) - (5.68)
	JERICHO - TULKAREM	0.000	(1.37) - (5.04)
	JERICHO - TUBAS	0.048	(1.37) - (4.20)
	JERICHO - NABLUS	0.000	(1.37) - (5.72)
	JERICHO - RAMALLAH	0.021	(1.37) - (3.42)
	JERICHO - QALQILYA	0.000	(1.37) - (5.00)
	JERICHO - JERUSALEM	0.001	(1.37) - (4.23)
	JERICHO - JENIN	0.000	(1.37) - (5.07)
	JERICHO - SALFEET	0.000	(1.37) - 5.00)
	JERICHO - HEBRON	0.000	(1.37) - (5.68)
	JERUSALEM - NABLUS	0.049	(4.23) - (5.72)
	BETHLEHEM - TULKAREM	0.042	(3.00) - (5.04)
	BETHLEHEM - JENIN	0.030	(3.00) - (5.07)
	BETHLEHEM - HEBRON	0.002	(3.00) - (5.68)
Q2.3.4	NABLUS - RAMALLAH	0.000	(5.31) - (3.44)
	NABLUS - QALQILYA	0.000	(5.31) - (2.36)
	NABLUS - JERICHO	0.000	(5.31) - (1.37)
	NABLUS - SALFEET	0.000	(5.31) - (2.54)
	NABLUS - BETHLEHEM	0.014	(5.31) - (3.00)
	JERICHO - TULKAREM	0.001	(1.37) - (4.20)
	JERICHO - TUBAS	0.042	(1.37) - (4.40)
	JERICHO - RAMALLAH	0.034	(1.37) - (3.44)

	JERICHO - JERUSALEM	0.011	(1.37) - (3.94)
	JERICHO - JENIN	0.000	(1.37) - (4.77)
	JENIN - RAMALLAH	0.018	(4.77) - (3.44)
	JENIN - QALQILYA	0.002	(4.77) - (2.36)
	JENIN - SALFEET	0.005	(4.77) - (2.54)
	HEBRON - QALQILYA	0.014	(4.58) - (2.36)
	HEBRON - SALFEET	0.038	(4.58) - (2.54)
	HEBRON - JERICHO	0.000	(4.58) - (1.37)
Q2.3.5	TULKAREM - BETHLEHEM	0.011	(4.08) - (1.87)
	TUBAS - JERICHO	0.047	(5.60) - (2.87)
	TUBAS - BETHLEHEM	0.001	(5.60) - (1.87)
	RAMALLAH -TULKAREM	0.000	(2.24) - (4.08)
	RAMALLAH - TUBAS	0.000	(2.24) - (5.60)
	RAMALLAH - NABLUS	0.021	(2.24) - (3.41)
	RAMALLAH - JERUSALEM	0.029	(2.24) - (3.65)
	RAMALLAH - JENIN	0.002	(2.24) - (3.63)
	RAMALLAH - HEBRON	0.047	(2.24) - (3.53)
Q3.1	NABLUS -TULKAREM	0.024	(2.00) - (3.20)
	NABLUS - QALQILYA	0.004	(2.00) - (3.82)
	NABLUS - JERUSALEM	0.001	(2.00) - (3.65)
	NABLUS - BETHLEHEM	0.005	(2.00) - (4.00)
	JENIN - QALQILYA	0.024	(2.23) - (3.82)
	JENIN - JERUSALEM	0.016	(2.23) - (3.65)
	JENIN - BETHLEHEM	0.028	(2.23) - (4.00)
	HEBRON - QALQILYA	0.011	(2.00) - (3.82)
	HEBRON - JERUSALEM	0.008	(2.00) - (3.65)
	HEBRON - BETHLEHEM	0.013	(2.00) - (4.00)

Chapter Six

Conclusion and Discussion

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Conclusion and Discussion

This research builds on the policy mix approach, which is defined as a combination of government policy tools that affect the quality and quantity of public and private R&D investments aimed at developing innovation systems. There are two levels of the policy mix, the first is the policy strategy level that includes long-term goals, and the other is the policy tool level that focuses on the tools, techniques, and activities necessary to achieve these goals. This research also adds an intermediate level called "Innovation Policy Criteria”. It studies the impact of the three basic standards of innovation policy on renewable energy systems development, through a survey study.

6.1 Findings

The contributions of this quantitative study indicate important implications for policymakers locally and regionally. The results show that municipalities should have an important role in supporting facilitators in the process of developing renewable energy sources, but not the main actors in the process. The results of the study indicate a clear weakness in the development of renewable energy systems in Palestine, which resulted in a lack of reliance on renewable energy sources and their activities. This weakness also explains the lack of local companies and promoters in this field. The results also indicate that the weak development of renewable energy systems in the Palestinian territories is linked to the weakness of the infrastructure. The region suffers from weak public support in many areas, poor availability of technical manpower, and a lack of investment in innovation activities for renewable energy.

Policymakers have an important role in creating a suitable environment for investment in the field of renewable energy by creating legal economic conditions, activating policy tools, and creating interaction between the public and private sectors in order to support entrepreneurship in the field of renewable energy. In this study, cooperation activities were the most important and influential criterion in the development of renewable energy systems (H2 hypothesis). In addition, the location factor, which is part of the policy tools, showed an important and positive role in development (H1 hypothesis). That is, with the interest of municipalities and councils in the economic aspects, they follow their interest in attracting investors to contribute to the development of renewable resources in their region. Knowledge criteria about renewable energy systems showed a low impact on development, as municipalities and councils gave low importance to this criterion. We are not saying that local knowledge is not important in the process of developing renewable energy systems, but it may not be of direct importance at this stage as the other two criteria for innovation policy. This may also be related to the weak infrastructure characteristics in Palestine, which makes the focus on knowledge and expertise come later in the advanced stages of the transition towards renewable energy. Experience and local knowledge are factors affecting the development of renewable energy sources in advanced economies whose local conditions are very good compared to emerging markets such as Palestine. The investments allocated to research and development in this field in our region are low due to economic and political obstacles. The results of the control variables (Own Projects and Own Promotion) show the negative impact of these variables on the development of renewable energy systems. In this study, the results show that Palestinian municipalities and councils lack policies that focus on developing and promoting their own projects, and therefore they do not play any negative role that reduces public gains in favor of private gains.

6.2 Conclusions

By reviewing the literature, it has been observed that developed and developing countries are constantly striving to develop RESs using various tools and software. The efforts of some of these countries to develop renewable energy systems and increase their share of total energy production are based on the existence of energy policies with international standards, while others seek to constantly develop their energy policies to reach internationally approved standards, and this is what Palestine lacks. Palestine suffers from a weakness in the energy policy system, which is the reason for the weak development of renewable energy systems that appears in the research results.

Our findings conclude that it is important for policy makers to pay close attention to the promotion of collaborative activities between the public and private sectors in the development of renewable energy systems, especially the activities of defining common goals, defining legislation, and formulating implementation plans. This recommendation came as a result of local government units attaching great importance to reducing energy consumption from the IEC, interesting in providing opportunities for direct investment in renewable energy projects, and emphasizing on the great role of support provided by foreign donor institutions. The results of the cooperation activities prove the second hypothesis, which indicates that cooperation is the most important and influential criterion in the development of renewable energy systems. This prompts the call for the development of a supportive local network in which public and private agencies cooperate, which increases the development of renewable energy systems in local government units.

Furthermore, it is also important to focus on location factors that summarize economic and structural conditions. In terms of reducing dependence on traditional energy sources, searching for local investors, creating legal economic conditions that support the field of renewable energy, and promoting research and development activities in various renewable energy fields. With regard to local knowledge, it has not been observed any direct impact on the development of renewable energy systems in Palestine, at least in the current stage of the transition towards the renewable energy sources in Palestine.

The results also indicate that the increased innovative activities in Palestinian local government units are related to the role of municipalities and councils. Innovation activities in areas where municipalities and councils are responsible for electricity distribution are greater than in areas where electricity distribution companies are affiliated. This is explained by the fact that the municipalities and councils responsible for the distribution of electricity have a greater incentive to develop renewable energy projects in their regions, as this reduces their import of electric energy from the IEC. However, the results show that the political role of municipalities and councils in the development process of renewable energy systems is a facilitator rather than an actor.

Finally, the motivation for getting municipalities and citizens to invest in renewable energy projects is profit. Since the electrical energy market in Palestine is closely related to electricity distribution companies that import electricity from Israel and sell it to citizens, renewable energy projects constitute a strong competitor for these companies. The continuation of the energy system in Palestine in this way, which is devoid of stimulating the population and companies, makes the development of renewable energy systems and increase their share of the total energy production just a dream. The Palestinian Authority and policy makers should work to amend the current system to compel electricity distribution companies to sell electricity at a price that the market and citizens pay to produce electricity from renewable energy sources.

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جامعة النجاح الوطنية

كلية الدراسات العليا

تقييم تأثير معايير سياسة الابتكار على التنمية المحلية للطاقة المتجددة في وحدات الحكم المحلي الفلسطيني

إعداد

فتحية عبد الفتاح ضمايره

إشراف

الأستاذ المشارك د. تامر الخطيب

قدمت هذه الأطروحة استكمالا لمتطلبات الحصول على درجة الماجستير في الادارة الهندسية بكلية الدراسات العليا في جامعة النجاح الوطنية في نابلس، فلسطين.

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الملخص

تعد أنظمة الطاقة المتجددة مكونًا قويًا لاستراتيجيات الابتكار المحلية المستدامة. يستخدم هذا البحث نهج مزيج السياسات لدراسة معايير سياسة الابتكار، والتي تشمل عوامل موقع البلديات، وأنشطة تعاون أصحاب المصلحة، والمعرفة المحلية حول مصادر ومشاريع الطاقة المتجددة، بهدف معرفة تأثير هذه العوامل على صانعي القرار وتطوير مشاريع الطاقة المتجددة ومصادرها المحلية. يهدف هذا البحث إلى فهم تأثير مزيج السياسات المختلفة على قطاع الطاقة وأنظمة الابتكار التكنولوجي، من خلال معايير سياسة الابتكار التي تم تحديدها، والتي تشكل مزيج السياسات، والتي قد تؤثر على عملية تطوير مصادر الطاقة المتجددة في البلديات والمجالس المحلية الفلسطينية. في هذه الدراسة تم تحليل عينة من 216 بلدية ومجالس محلية فلسطينية. تشير النتائج إلى ضرورة قيام صانعي السياسات بتعزيز التعاون بين القطاعين العام والخاص، والتركيز على عوامل الموقع مثل خفض استيراد الطاقة، والحوافز، والانبعاثات التي تؤثر بشكل مباشر على مصادر الطاقة المتجددة. أظهرت النتائج ان المعرفة المحلية ليس لها تأثير مباشر على عملية تطوير أنظمة الطاقة المتجددة، حيث يمكن أن تشكل دعمًا غير مباشر في مرحلة لاحقة لتنفيذ معايير السياسة الأخرى التي تمت مناقشتها في هذه الدراسة. تظهر النتائج كذلك أن زيادة إمكانات تطوير مصادر الطاقة المتجددة تتم من خلال تبني صانعي السياسات دور الميسّر وإنشاء شبكة ابتكار محلية تتعاون فيها جهات فاعلة مختلفة بحيث يمكن لأصحاب المصلحة من القطاعين العام والخاص تقديم الدعم من أجل تطوير أنظمة الطاقة المتجددة المحلية.