An-Najah National University

Faculty of Graduate Studies

ASSESSMENT OF THE IMPACT OF PALESTINIAN GOVERNMENTAL PRACTICES ON SUSTAINABLE INDUSTRIAL SOLID WASTE MANAGEMENT IN THE WEST BANK

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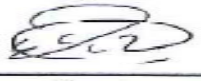
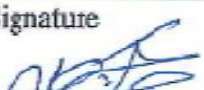
Dr. Shadi Sawalha Co-Supervisor	 Signature
Dr. Hasan Manassra External Examiner	 Signature
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Dedication

I dedicate this thesis to my beloved mother the most affectionate

person in the world, who is encouraging and helping me to fight hard to make my dreams come true. Mom thank you for being a constant source of support

during life and through the process of pursuing a master's degree.

I am truly thankful for having you in my life.

To my lovely father, the source of power and support who raised me

until I became what I am today.

To my brother and sisters for their everlasting support and help.

I dedicate my thesis with big love.

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Finally, I gratefully acknowledge all who, directly or indirectly helped me complete my thesis successfully.

Declaration

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

ASSESSMENT OF THE IMPACT OF PALESTINIAN GOVERNMENTAL PRACTICES ON SUSTAINABLE INDUSTRIAL SOLID WASTE MANAGEMENT IN THE WEST BANK

I declare that 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.

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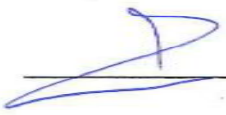
Signature 

Date 20/8/2023

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ASSESSMENT OF THE IMPACT OF PALESTINIAN GOVERNMENTAL PRACTICES ON SUSTAINABLE INDUSTRIAL SOLID WASTE MANAGEMENT IN THE WEST BANK

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Abstract

Sustainable solid waste management (SSWM) is a vital and important research problem, which has gained significant attention in recent years. This research aims to assess the impact of Palestinian governmental practices on SSWM and to determine the implementation level of these practices in the industrial sector in Palestine. Additionally, it aims to identify the barriers facing the Palestinian government to implement their practices effectively and efficiently.

A research model was developed and study variables were linked to achieve objectives and answer the research questions. The independent variable in the model was governmental practices, which include awareness and guidance, incentives and fees, laws and regulations, waste collection, and reduction. The dependent variable is SSWM which was studied through its environmental, economic, and social aspects. The study utilized a quantitative approach, where data was collected using questionnaires. A total of 80 questionnaires were collected from the industrial sector in Palestine, and the research model was evaluated using the SMART-PLS software.

The results have indicated that the level of implementation of governmental practices in the industrial sector is moderate due to the presence of several obstacles, namely; limited financial resources, weak institutional capacity, limited public awareness political and socio-economic context. Furthermore, the hypothesis tests revealed a significant and positive impact of governmental practices on SSWM and a positive and significant relationship between governmental practices and the environmental, economic, and social impact of solid waste in Palestine.

Keywords: Govermantal practices (GP), Sustainable Solid Waste managments (SSWM), Solid Waste, Partial Least Squares Structural Equation Modeling (PLS-SEM).

Chapter One

Introduction and Theoretical Background

1.1 Overview

This chapter includes an introduction, in addition to the general background of the research. The sections include the following order; general background, problem statement, research questions, the significance of the research, hypotheses, as well as the conceptual model.

Furthermore, this chapter includes a literature review related to government practices for solid waste management (SWM) as well as SSWM and the relationship between them.

1.2 Theoretica Background

The remarkable economic, industrial development and increase in the population led to an increase in solid waste generation, which caused a high burden on governments to find correct and healthy ways of waste disposal (Abdella Ahmed et al., 2022).

Also, urbanization has exacerbated the problem of waste, hygiene, and health. (Pradhan, 2008). Developing countries are treating this issue as an urgent problem because they have serious negative effects on human health (Al-Khatiba, 2010). The administrators of SWM are now worried about how to dispose of it. If regulations are implemented, while taking into consideration the unique characteristics of each society, they may gradually progress towards higher environmental standards and reduced costs(Al-Khatib, 2009).

The major problems in non-industrialized countries include the public's overall lack of environmental knowledge and awareness and the ongoing expansion of landfill locations. While, in industrialized countries, the amount of waste and the shortage of disposal places have often been the sources of worry (Alhumoud, 2005).

SWM cannot be solved just through technological solutions, it also requires a comprehensive process that takes into account the economic, environmental, and social contexts. Furthermore, these variables have interrelationships complicated and are dependent on one another in waste management systems (Al-Khatib, 2007). All of these

problems must be resolved to have a sustainable SWM solution. Most of the time, the problem is not environmental laws themselves; some developing countries have very strict laws than industrialized countries but they suffer from the absence of enforcement and/or the presence of workable substitutes (Pradhan, 2008).

Inadequacy of infrastructure, limited financial resources, wrong legislation, unclear duties, conflicts of roles, and the absence of an effective institutional role to deal with SWM all lead to a bad cycle of lack of funding. This lead to poor service, which causes a decrease in the number of peoples who are ready to pay for these services, increase the depletion of the available resources, and so on. Moreover, a population expansion does not fit with an increase in the revenue of local governments for waste managemen (Mbuligwe, 2002).

It is significant to note that the absence of strategies, policies, and clear standards for treating the impacts of solid waste and environmental pollution has resulted in missed chances to use it as a resource that may be utilized. SWM in developing countries faces different kinds of issues, and many of solutions for those issues are hampered by limited legal, financial, institutional, and technical support. As a result, the dependence on money donors makes SWM services unsustainable if they stop their finance (Jamaica, 2007).

SWM is a very serious environmental challenge that communities and countries face worldwide. It consists of waste collection, transportation, treatment, and disposal, in order to minimize environmental pollution, reduce resource depletion, and improves sustainable development (Rodionov, 2011).

It aims to solve waste management's economic, social, and environmental aspects to obtain long-term sustainability. It is clear that the reduction, reuse, and recycling of waste, by adopting sustainable practices, societies can reduce the environmental effects of waste, protect public health, and conserve resources (Hettiarachchi, 2018).

SSWM include many key principles which include: waste-to-energy (WtE) and resource recovery, waste hierarchy, source separation and recycling, public awareness, and participation, and extended producer responsibility (EPR) (Cointreau, 2006).

SSWM produce many benefits, including resource conservation, promoting public health, job creation, energy recovery, and reduced environmental pollution. It connected to the overall goal of achieving sustainable development by reducing the negative effects of waste generation and disposal on communities and ecosystems (A. J. Smith, Heistermann, M., Voigt, C., Frischknecht, R., & Stucki, M. (2018), 2018).The implementation of SSWM practices requires collaboration between government entities, the private sector, non-governmental organizations, and local communities. It also requires technological advancements, development of infrastructure, capacity building, and continuous innovation and research (Rodionov, 2011).

As societies strive for sustainable development, adopting and promoting SSWM practices is crucial for creating cleaner, healthier, and more sustainable environments for current and future generations (Wilson DC, 2016).The manufacturing sector holds significant significance in Palestine, with transformative industries, notably the food industry, accounting for a substantial portion of total industry activities, as reported by the Palestinian Central Bureau of Statistics (PCBS, 2022). Given this context, there is a critical need to prioritize the integration of govermantal practices within these sectors to effectively mitigate the environmental, economic and social consequences associated with waste generation. Recognizing the limited research available and the existing recommendations, the main objective of this study is to investigate how governmental practices can contribute to the promotion of SSWM in Palestine.

1.3 Solid Waste

Waste is defined as unwanted and unusable materials. It has different forms such as; liquid, solid, or vapor. Thus, solid waste is a form of waste that has been defined by many researchers (Bazargan et al., 2022). It is useless or hasn't an economic worth to anyone. Solid waste is a term used to explain the non-liquid materials that are generated from different industrial, commercial, and other human activities (Abdella Ahmed et al., 2022), another definition of it is that “ it is the waste produced from homes, shops, hospitals, and offices’’ (Ramachandra, 2007). Globally, approximately 2.01 billion tons of solid waste are produced annually. By 2050, it is expected to increase to reach 3.4 billion tons annually, which is the double amozunt of waste produced in 2016 (Sukma et al., 2022).

Solid waste (SW) is defined in the Palestinian Environmental Law (1999) as any non-hazardous waste, or waste, generated by different activities, including household organic waste, street sweepings, hospital institutional waste, and domestic waste (Ramachandra, 2007), commercial, agricultural, construction, industrial waste, and sludge produced by waste treatment plants. At both the global and local levels, unsuitable SW disposal affects all the important elements of the living environment (air, land, and water) (Litman, 2011).

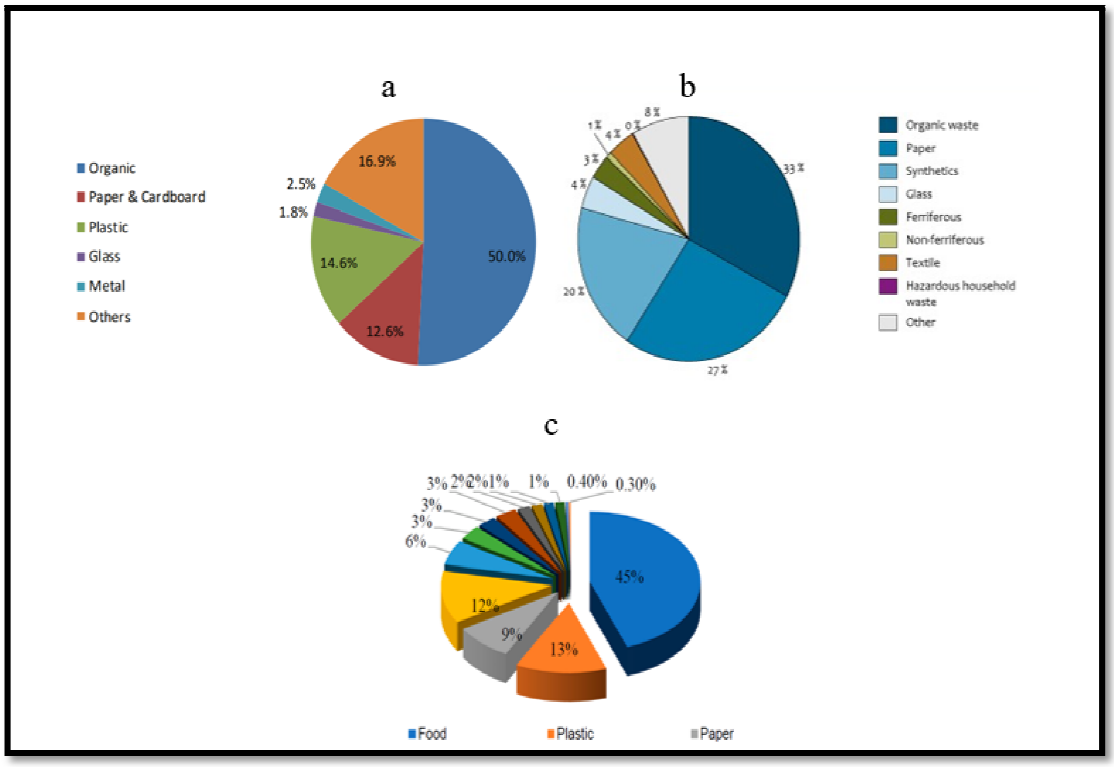
Although waste generation is important and is predicted to keep increasing, approximately, 50% of urban waste from emerging nations is still not being collected (Kaza et al., 2018). SW may be non-recyclable and recyclable items that were generated through different social activities, but it does not have any worth to the user. The composition of SW differs from one country to another depending on its economic status, industrial activities, lifestyle, and SWM systems, in addition to social level and domestic activities (Zhu et al., 2020).

Table (A.1) in Appendix (A) shows the waste description ordering to its type (Broomfield, 2015). For example, as Figure 1 (a) and according to (MOLG, 2019), organic waste represents 50%, while plastic represents 14.6% of SW in the West Bank (MOLG, 2019). If these percentages are compared to another country such as the Netherlands, organic waste constitutes 33%, while paper constitutes 20% of SW as shown in Figure 1 (b), while Figure 1 (c) shows Malaysian waste fraction which contains 45% food, 13% plastic and 9% papers (Tenaga, 2019).One indicator of urban planning challenges, particularly in developing nations, is the percentage of waste that is uncollected. This is a result of ineffective institutional, legislative, and participatory initiatives. As a result, waste management solutions that are suitable, legal, and practicable are required for solid waste governance (Hettiarachchi, 2018).

The sources, types, and rates of waste formation must be understood in order to develop and operate a successful SWM system. Table (A.2) in Appendix (A) shows the types of SW which are; residential, industrial, commercial, institutional, construction and demolition, municipal services, process, and agricultural waste (Li, 2016).

Figure 1

Waste fraction comparison



(a): West Bank (MOLG, 2019) (b): Netherlands (National Institute for Public Health, 2019)

(c): Malaysian waste fraction (Tenaga, 2019)

1.4 Solid Waste Management (SWM)

SWM adopts appropriate technologies and procedures that include generation, collection, storage, treatment, transportation, and disposal of various wastes with minimal risk and cost to human health and the environment, as it works to increase the quality of life and reduce the risks of improper waste disposal (Lehmann, 2011).

Significant progress has been made in policies and strategies for solid waste during the second half of the twentieth century, aiming at preserving environmental resources and reducing all environmental and health risks (Hester, 2002). SWM includes many stages that include the processes of generation, collection, handling, storage, transportation, treatment, and recovery of resources in addition to the final disposal. Treatment and separation from the source is one of the most critical stages, and the waste collection process can be considered one of the most expensive stages (Sakawi, 2011). Nitary landfills are one of the widespread methods of waste disposal because of their ability to take large quantities in addition to their relative environmental sustainability. However,

they are not considered a final solution for waste, as many strategies and methods have been developed in recent decades, which include biological, chemical, and thermal methods (Hester, 2002).

As mentioned above, the components of solid waste differ from one country to another depending on the economic situation, industrial activities and the adopted lifestyle, which leads to different waste practices from one country to another. Waste management can be defined as the process by which waste is collected, transported, treated and disposed of. All operations must be carried out within legal limits to ensure the preservation of health and the environment (Longhi et al., 2012). SWM aims to address all environmental and social issues associated with waste generation and disposal. The objectives of SWM vary according to local priorities and contexts, but they generally include the following:

- *Minimize Waste Generation:* The main target is to minimize the quantity of generated waste from its source. This can be accomplished by waste reduction initiatives, such as improving sustainable consumption, encouraging the environmental design of products, and implementing waste prevention measures (Smith, 2018).
- *Resource Conservation and Recovery:* SWM aims to improve resource recovery and conservation. This can consist collection, separation, and recycling of wastes such as paper, plastics, metals, and glass to transfer them from disposal and reuse them in the production cycle as valuable and new resources (EPA, 2010).
- *Proper Waste Handling and Disposal:* The suitable and safe handling, treatment, and disposal of solid waste are very important objectives. It includes proper waste collection, transportation, and disposal procedures to protect public health, reduce environmental pollution, and prevent the spread of diseases (Tchobanoglous, 2013).
- *Environmental Protection:* SWM aims to conserve the environment from harmful waste effects. This includes preventing water, air, and soil pollution, reducing greenhouse gas emissions, and protecting natural resources by minimizing the extraction of raw materials through recovery and recycling (Hoornweg, 2013).
- *Health and Safety:* SWM focuses on the way of saving public health and safety. Appropriate waste management practices assist prevent the spread of diseases,

reduce odors, and minimize potential risks to the environment and human health (Ramitha, 2021).

- *Promotion of Circular Economy:* The main objective of SWM is to transfer from a "take-make-dispose" model to a circular economy path. This consists of the designing of waste management systems that emphasize the importance of recycling, recovery, and reuse of waste, this led to reducing the dependence on resources and reducing waste generation (Mandpe, 2022).
- *Stakeholder Engagement and Education:* SWM also aims to improve stakeholders' participation and education, including government agencies, communities, businesses, and individuals. Educational programs, and awareness campaigns, improve waste disposal practices' responsibility and emphasize vital participation in waste management activity (Tchobanoglous, 2013).
- *Cost-Effectiveness:* It includes improving waste management practices to reduce financial charges on communities, governments, and individuals (Pires, 2019).

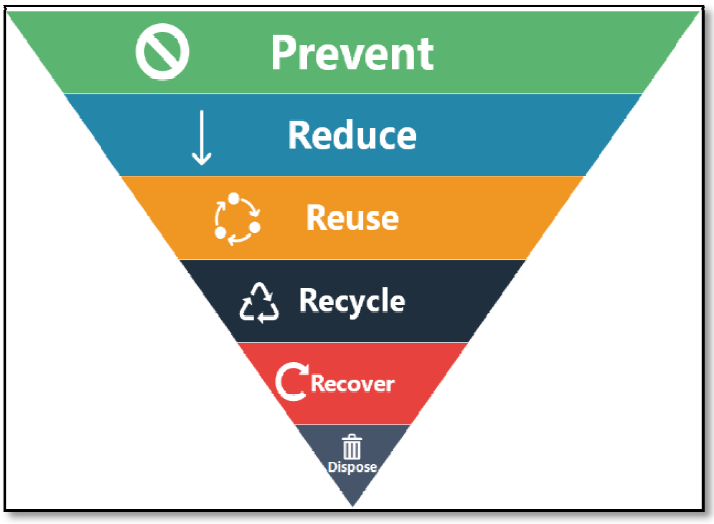
So, SWM is related to the Waste Hierarchy which is shown in Figure (2), where the first priority is to prevent waste production from its sources and the second one is waste reduction. For generated waste, it could be recyclable, reusable, or recovered (Demirbas, 2011).

Managing solid waste is very critical for environmental, economic sustainability, and public health (Kumar, 2018). So effective SWM includes some activities, which are:

- *Waste Generation*: Solid waste is generated from different sources, it may include households, businesses, schools, hospitals, and industries. The amount and composition of solid waste differ depending on many factors that are already mentioned (Ahsan, 2014).
- *Waste Collection:* Appropriate waste collection is important to prevent environmental pollution. It includes systematic waste collection from households and commercial, and public areas. Waste collection tools can include curbside vans, communal bins, or special collection points (Ham, 2013).
- *Waste Transportation*: After waste collection, solid waste is transported to disposal sites or treatment facilities. Effective transportation systems include waste transportation at the exact time and safe transfer of waste to reduce environmental and health risks (Nikolaos, 2008).

Figure 2

Waste Hierarchy



Note: (Zhang, 2022)

- *Waste Treatment:* Waste treatment includes different procedures to reduce the environmental effects of solid waste. The common treatment methods include incineration, composting, landfilling, and recycling. Recycling can provide a valuable material, composting is able to convert organic waste into nutrient-rich soil, while WtE technology converts waste to energy in the form of electricity (Kumar, 2011).
- *Waste Disposal:* If the waste is not recyclable or treated, then it will be disposed of in landfills. Suitable landfills design, construction, and operation are very critical to reduce soil and water pollution and decrease greenhouse gas emissions (Narayana, 2009).
- *Waste Reduction and Resource Recovery:* Waste reduction aims to reduce the quantity of generated waste and improve sustainable consumption styles. Resource recovery involves extracting worthy resources from waste by using recycling or reusing processes, which led to reducing the demand for new raw materials (Agamuthu, 2019).

Governmental policies and regulations play a pivotal role in supporting SSWM practices. By applying comprehensive waste management strategies, governments can reduce the environmental effects of solid waste, protect resources, minimize pollution, and cinserve public health.

1.4.1 SWM in the World

Since the population has increased significantly and the amount of garbage created has increased, finding solutions to regulate the quantities of waste produced has become a priority when designing governmental plans and programs (Wilson DC, 2016). SWM has become a challenge for countries as a result of the increase in the quantities of waste generated, which led to an increase in the economic burden on countries to dispose of it. This necessitated the creation of national legislation, policies, and strategies to limit the aggravation of this problem (Tregidga & Milne, 2006). In recent years, environmental protection has received increased attention from a global approach to improve and maintain sustainable development, so new dimensions were given to legislations and regulations linked to waste management (Bello et al., 2022). Although there are many regulations and laws that govern SWM, they are not implemented. Waste creation and ineffective waste management systems are acknowledged as one of the causes of these pollutants since they provide one of the biggest environmental concerns to urban civilizations (Rossi et al., 2021). The majority of waste management laws are adopted with the specific aim of preserving both the environment and the public's health by preventing, restricting, or securing the negative effects of hazardous and non-hazardous waste as well as inert waste and managing these wastes generally (Qureshi et al., 2021).

To address the imperative of enhancing human health and environmental protection, promoting reuse and recycling, implementing effective waste prevention programs, and establishing extended producer responsibility (EPR), it is essential to select suitable technologies. Consequently, there is a need for updated definitions of waste, byproducts, and end-of-waste to accommodate these objectives. In addition, the challenges of climate change and energy consumption are closely intertwined with SWM systems, necessitating efforts to reduce greenhouse gas (GHG) emissions and improve energy recovery. These are critical concerns that must be addressed in the long-term management of waste (Bello et al., 2022).

The majority of countries around the world face an environmental problem caused by solid waste, whereby financially sustainable, socially acceptable, and technically feasible solutions must be sought in addition to being environmentally friendly (Zhu et al., 2020).

China has created sustainable solutions for SWM based on the option of converting solid waste into energy and increasing the frequency of waste transportation to reduce the spread of odors and health hazards. Follow the solution of converting waste into energy to the necessity of separating the waste from each other depending on its source, as it was noted that the separation of food waste increases the amount of energy produced. The Chinese government has worked to find another sustainable solution to get rid of organic waste and food waste by establishing decentralized composting stations distributed in remote rural areas (Zhu et al., 2020). The Chinese city of Macau suffered from an increase in the quantities of waste produced as a result of the increase in the population, as the government relied on following the method of landfilling as a way of disposal, but this solution is no longer effective due to the scarcity of land and its high cost, which prompted the government to conduct studies and research to find healthy and sustainable ways to dispose of this waste. Studies have shown that there are large quantities of waste that can be recycled and reused, in addition to the possibility of using the incineration system as a more effective alternative method for waste disposal, as this method can be used to produce energy (Jin et al., 2006).

The quantity of organic waste produced by Dar es Salaam is approximately 62-70% of its solid waste, which can decompose to produce organic nutrients and biogas. To exploit this waste sustainably, the government has established a biogas plant from solid waste and then generates electricity from it. This project brought many benefits to the government, including producing high-quality organic fertilizers, protecting the environment from pollution, reducing solid waste quantities, and generating electricity (Mbuligwe & Kassenga, 2004).

Addis Ababa has been keen to improve the efficiency and sustainability of waste at construction sites by using multiple management methods, including implementing strong management practices at construction sites, reusing and recycling residual materials at sites, increasing the implementation of green building specifications, and imposing penalties for bad waste management practices (Tafesse et al., 2022).

The SWM system in Germany is renowned for its comprehensive and environmentally sustainable approach. It follows the principles of the waste hierarchy, which prioritizes waste prevention, recycling, and resource recovery over disposal. Here are some key aspects of the SWM system in Germany: Waste Prevention, Recycling, and Resource

Recovery, EPR, WtE, Landfill Restriction, Public Participation and Education, and Circular Economy Approach. The German SWM system is supported by robust legislation, including the Closed Substance Cycle and Waste Management Act and various federal and state regulations. Technological advances and continuous innovation, as well as cooperation between industry and government, lead to the success of SWM systems (Nelles et al., 2016).

In Singapore, the National Environment Agency has adopted an innovative and comprehensive approach to SWM that focuses on "3P", which can be interpreted as the private and public sectors and individuals working together to achieve sustainability in solid waste, as it focuses on waste recycling, waste reduction, and energy recovery. To reduce the amount of waste sent to landfills (Agency, 2021). Some key practices and initiative are mentioned below:

- *Waste-to-Energy (WtE) Facilities:* Singapore has invested in advanced WtE facilities that treat non-recyclable waste and convert it into electricity. These facilities help reduce the volume of waste going to landfills and generate renewable energy.
- *Mandatory Waste Segregation:* The government has implemented a mandatory waste segregation policy for commercial and industrial sectors. This encourages businesses to segregate their waste into recyclable and non-recyclable categories, making it easier for recycling and resource recovery (Zhang, 2017).
- *Extended Producer Responsibility (EPR):* Singapore has implemented EPR schemes to hold producers accountable for managing the waste generated from their products. This encourages manufacturers to design products with recycling and disposal in mind (Zhang, 2017).
- *Public Education and Awareness:* The government conducts public education campaigns to raise awareness about waste reduction, recycling, and proper waste disposal practices. These campaigns aim to promote behavior change and encourage individuals to adopt sustainable waste management habits (Zhang, 2017)
- *Integrated Waste Management Facilities:* Singapore has established integrated waste management facilities, such as recycling plants and materials recovery facilities, to process and recover valuable resources from waste. These facilities help maximize resource recovery and minimize the amount of waste sent to landfills (Zhang, 2017).

1.4.2 SWM in Palestine

The SWM system in Palestine is an issue that continues to undergo development and improvement. Due to political and geographical constraints, there are unique challenges to overcome. However, there are concerted efforts to promote sustainable waste management practices throughout the country (Qasem, 2018).

Waste collection services in Palestine are primarily managed by municipalities and local councils. However, there are disparities in the coverage and effectiveness of these services, particularly between urban and rural areas. Some cities have well-established waste collection systems, while others rely on informal waste pickers or private contractors to manage waste collection (MOLG, 2019).

The most popular method used to waste disposal in Palestine is landfilling. However, limited available and correctly designed and controlled landfills result in inappropriate waste disposal infrastructure. This status introduced health and environmental risks, especially in areas where landfills are not fully managed (Khaleefa, 2018).

In Palestine, recycling activities are still in the early stages. Efforts are underway to improve recycling activities for fixed types of materials such as plastic and paper. The establishment of recycling centers and the increasing public awareness related to the importance of recycling are the main priorities in sustainable waste management practices (Khaleefa, 2018).

Early, composting organic waste is gaining attention as a way to transfer waste to a nutrient-rich compost for agricultural usage. Many composting projects have been implemented in both rural and urban areas, which offering a helpful solution for organic waste management (Khaleefa, 2018).

In Palestine, public awareness activities and educational programs play a very important role in improving sustainable waste management practices. These initiatives' purpose is to teach the public about waste segregation, recycling, and the environmental impacts of unsuitable waste disposal. By promoting responsibility sense and changing their behavior, these programs support building a new culture for sustainable waste management (Abu-Salah, 2016). Insufficient financial resources, an unstable political situation, a shortage of infrastructure, and limited access to land due to the Israeli

occupation are ongoing barriers that need to be solved. These factors inhibit the development and implementation of comprehensive and sustainable waste management practices (Assi, 2019).

International assistance is also important in solving these challenges and improving sustainable waste management in Palestine. Different international organizations and donor agencies supply technical assistance, capacity building, and financial resources to support infrastructure development, waste management facilities, and recycling activities. Efforts are being made to improve sustainable waste management practices over the country, that include fees and incentives implementation to encourage right waste managemen(Al-Smadi, 2020).

To support these services and fund sustainable waste management practices, waste collection fees or tariffs are implemented in some municipalities. These tariffs are typically charged to households or businesses based on the quantity of generated waste or the level of service required. The generated revenue from these fees can be used to promote waste collection infrastructure, invest in recycling facilities, and support public awareness activities (MOLG, 2017). Besides fees, incentives also play a significant role in encouraging suitable waste management behavior. In some areas, municipalities have implemented incentive programs that reward houses or businesses for adopting waste reduction, recycling, and responsible waste disposal. The incentives have different forms of financial rewards, such as discounts on waste collection tax or fees benefits for businesses that implement sustainable waste management practices (Hischier, 2017).

1.5 Sustainability

Sustainability is considered the most important active and global topic that is discussed and applied in different disciplines such as social, economics, management, environment, and others (Rockström, 2017). Carrying capacity is considered one of the most common concepts of sustainability, which can explain the ability of the ecosystem to support the maximum number of populations in sustainable ways, later, this concept was expanded to reach the entire planet (Sachs, 2019). Another concept called the triple bottom line which is also considered a sustainability concept, emphasizes the wants to balance between social economic, and environmental factors (Henderson, 2019). Later, it become called circular economy which was improved and developed to reduce the

amount of generated waste and encouraged reuse, recycling of the resources (Frischmann, 2019).

To improve sustainable practices, governments play a vital role in founding the regulations and guidelines, executing them, and providing economic incentives to promote adopting sustainable initiatives. They also have the responsibility for developing the policy, awareness and education, and international cooperation. They also increase public awareness about sustainability and collaborate with international institutions to solve global challenges, it also encourages innovations to available a sustainable future (Shen, 2020). Companies have a very important role in sustainability. Researches show that companies have the responsibility to work in a social and environmental style, as their work is expanded to developing their economy, and they can also improve sustainable development by adopting sustainable services, practices, and products (Nilsson, 2016).

As mentioned above, there are three pillars of sustainability, which are:

1. Economic sustainability: It is realted with economic impacts of sustainability, which include the best use of resources, long-term profit in addition to economic expansion that does not affect negatively with environment and society (Byrne, 2016)
2. Social sustainability: This pillar is interested in human safety, education, and health. It also includes health care, fair work, and their rights (Waddock, 2019).
3. Environmental Sustainability: This one focuses on the environment and its mechanism and resources such as air, water, and biodiversity, and how to restore it (Fuss, 2018).

Sustainable management aims to control how to use industrial and natural resources in the best way with achieving a future multiplicity of them and finding long-term solutions without causing any effects on the safety and health of the society and environment and maleficence the economy (Ahmed et al., 2022). Where the sustainability concept cares about how to integrate the environmental, economic, and social aspects in addition to their impact, and how to make decisions without affecting natural resources and in the best ways that help future generations (Tregidga & Milne, 2006).

The systems that support all economies and societies are very important for global sustainability (Statistics, 2011). The sustainability of waste needs collaboration at all economic, social, and environmental levels, so it can't achieve isolated actions. In order to achieve it, sustainable and intellectual management must be created, it may include staff who are able to carry out this mission with high effectiveness and efficiency.

1.5.1 Sustainable Solid Waste Management (SSWM)

The SSWM required in the twenty-first century includes the impacts at all stages, starting from the planning stage to design to the operation and to decommissioning stage. So, the range of existing and new waste-treating technologies and administrative approaches have been expanded to include achieving long-term sustainability aims and preserving the current quality of the environment. This ordered growth makes governments and waste management businesses able to share waste management needs with the highest level of environmental sustainability, recycle materials from waste, increase the renewable energy supply, and look for more acceptable social alternatives (UN, 2016).

SSWM includes three main aspects referred to the following questions:

1. What? It consists of the scope, which describes the important management and planning of the waste system elements and many planning and management challenges, such as public participation, financial management, and strategic planning.
2. Who? Who does care about the stakeholders or actors?
3. How? How strategic aims and problems should be solved and explained Resource Management and strategic Waste smoothly (Wilson DC, 2016).

It is necessary to find ways and systems that prevent future resource depletion by generating sustainable systems and a unified waste management system, as the continuous depletion of resources caused by a high population has led to an increase in the risk of decreasing future resources. (Rodionov, 2011). Hierarchical SSWM deals with solid waste in an environmentally-efficient, economical, and socially acceptable way. The waste generation and disposal process is considered an important sign of sustainable behavior. So strategies and technologies for waste treatment must be able to achieve sustainability goals and concern about maintaining the quality of the

environment and must be taken into account the current economic, political, and social situation (Pires, (2011); Rodionov, 2011).

The Sustainable Development Goals (SDGs) whshowmn in Figure (3), are a set of global goals that everyone must work toward in order to protect the environment, end extreme poverty, and reduce inequality by 2030. One of the 17 SDGs established by the United Nations is SDG 11, which aims to foster inclusive, secure, resilient, and sustainable cities and human settlements.

Figure 3

Sustainable Development Goals

Note: (UN, 2016)

This goal has a strong connection to the management of solid waste. Member nations have agreed to minimize the adverse environmental impact per person caused by cities before 2030, with a particular emphasis on improving air quality, municipal waste management, and other related measures, including international commitments. Another relevant SDG is SDG 12, which focuses on promoting sustainable consumption and production patterns. In this context, member states have committed to significantly reducing waste generation by 2030 through strategies such as waste prevention, reduction, recycling, and reuse, as outlined in objective 12 (Albu, 2021).

To achieve the goal of solid waste sustainable development, there is a necessary need for the chosen and published appropriate technologies, techniques, and managing the alternatives to decrease the amount of SW through materials recovery and producing energy from it. This, in turn, reduces the need of energy and raw materials as inputs for technical and industrials processes (Musleh, 2010).

The application of a SSWM system can lead several positive outputs, including:

- *Environmental Protection:* The sustainability of SWM conserves the environment by minimizing the pollution and reducing the harmful emission materials into the air, water, and soil. It improves suitable waste disposal and reduces the effects of waste on natural resources and ecosystems (Hoornweg, 2012).
- *Resource Conservation:* SSWM systems preserve the conservation of different materials through recycling, resource recovery, and waste reductions. Which leads to reducing energy consumption in production processes, reducing resource depletion, and reducing raw material extraction (World Bank, 2012).
- *Waste Reduction:* Reducing the waste generation from its source is one of the most important goals of sustainability, as strategies are implemented to reduce it, such as promoting environmentally friendly products, and the reduced total volume of waste, which leads to reducing the social, economic and environmental impacts that result from waste treatment and disposal (Hoornweg, 2012).
- *Recycling and Circular Economy*: Effective SWM systems are concerned to promote a circular economy and recycling, as it facilitates the collection, sorting, and processing of recyclable materials, which leads to a reduction in dependence on raw materials due to the availability of valuable resources. Which reduces harmful emissions and contributes to the conservation of resources (Agency, 2018).
- *Energy Recovery:* Incineration and anaerobic digestion are the technologies used to convert waste into energy, at which energy is recovered from non-recyclable waste, which leads to a reduction of dependence on fuel and produces renewable energy, as it contributes to energy saving and reduces the volume of waste that is entered into landfills (Psomopoulos, 2009)
- *Economic Opportunities:* SSWM systems contribute to improving the economy by developing recycling and converting it into industries with new job opportunitie (Agency, 2018).

- *Health and Public Safety:* The correct SSWM systems reduce the risks and negative impacts on safety and public health resulting from the wrong disposal of waste which leads to the reduction of hazardous toxic materials and pollution (Cointreau, 2006).
- *Social Benefits:* SSWM contributes to improved quality of life for communities. It promotes cleanliness, reduces litter, and enhances the aesthetics of neighborhoods. Public education and awareness campaigns associated with sustainable waste management can also foster a sense of environmental responsibility and community engagement (Cointreau, 2006).

To achieve sustainability of SWM, governments plays very vital roles. First, governments play a crucial role in developing regulations and policies. They create guidelines, regulations, and standards that improved SSWM practices, such as waste recycling, reduction, and suitable disposal methods. By setting clear goals governments create a framework for waste management that is unified with sustainability objectives (Pizzol, 2012).

Second, governments contribute to ensuring the provision of appropriate infrastructure for SWM, as they invest to develop waste treatment facilities, WtE plants, as well as the development of recycling centers handling (Velis, 2017). Moreover, governments support SSWM practices through economic tools. They for example implement taxes or fees on non-recyclable or non-biodegradable materials to improve waste reduction and recycling. Governments also provide financial facilities, grants, and support to companies and communities that adopt sustainable waste management practices (Agency, 2018). Public awareness and education are also very important in waste management sustainability. Governments execute public awareness, educational programs, and awareness initiatives to the citizens about the importance and effects of waste reduction, recycling, and suitable disposal. By expecting a culture of environmental awareness, governments authorized individuals to make informed options and participate in sustainable waste management practices (Dikgang, 2019).

1.6 The Status of Solid Waste in Palestine

1.6.1 Waste Generation

Information about the quantities of solid waste produced in the Palestinian territories varies with the diversity of its sources. Some of them relied on field surveys to calculate the quantities of produced waste, and some of them relied on real weights that were determined with scales found in waste dumps distributed in the West Bank and Gaza Strip.

Based on the statistics of the Palestinian Central Bureau of Statistics (2019), which divided the solid waste production sectors into the domestic sector, economic establishments and health care centers, the average solid waste production is estimated at about 2622 tons /day, or approximately 0.91 kilogram per capita at West Bank while it is 0.70 kg/ per capita in Gaza Strip which equal to 1330 ton /day. Table (A.3) in Appendix (A) shows the quantities of waste produced according to the area (MOLG, 2019).

Table (A.4) in Appendix (A) shows the average solid waste production in the West Bank according to residential area. It is clear from the data that there is a discrepancy in the quantities of waste produced between the rural, city, and refugee camps, due to several reasons, including the concentration of major markets and institutions in the main cities, the influx of citizens from the villages and camps to the cities daily, in addition to the economic situation and the different lifestyle between cities and villages and refugee camps (MOLG, 2019).

1.6.2 Waste Fraction

There are many studies and research concerned with determining the types of solid waste in addition to its components. Figure (4) shows the fraction of solid waste (MOLG, 2019). Knowing the fraction of solid waste and its sources helped to recognize the feasibility of separating or reducing produced solid waste such as separating metals, paper, cardboard, and plastics for recycling or separating and recycling organic waste. Table (A.5) in Appendix (A) also shows the types of solid waste depending on their sources (MOLG, 2017).

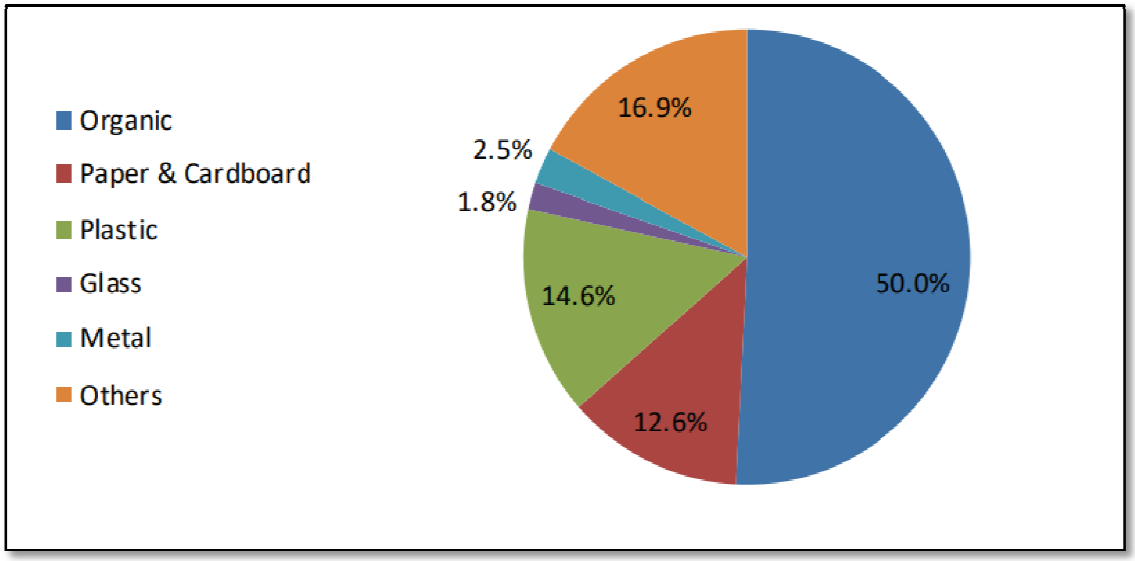
1.6.3 Regulations and Legal Framework

The problem of solid waste posed a significant challenge to the Palestinian government because of its significance and the effects it has on the environment, society, and the economy (Al-Khatib, 2009). Many legislations dealt with many issues to manage the waste sector, as they included technical and financial issues, roles, responsibilities, penalties, and others. These legislations include:

- Legislations that are directly related to solid waste management, such as Environment Law No. (7) of 1999 and its amendments, Local Authorities Law No. (1) of 1997 and its amendments, Public Health Law of 2004.
- Suggested system projects directly related to waste management, such as Solid Waste Management and Handling Project 2005, Medical Waste Management Project (2012), and Hazardous Waste Management System.
- Other laws that are indirectly related, the most important of which is the Amended Basic Law (2003), Jordanian Cities and Villages Regulation Law No. 79 (1996), the Joint Service Councils Statute of (2016), and its amendments, Standards, and Metrology Law No. 6 of (2000), and Law No. 6 of (1999) regarding Tenders and Works Government, Law No. 9 on Public Supplies of (1998) MOLG (2017), Law 1 of (1998) on Encouragement of Investment, and the amended Agriculture Law of (2003) (GIZ, 2014)

Figure 4

Waste fraction in West Bank



Note: (MOLG, 2019)

- In addition to approving a guide for fees, costing, and collection of solid waste in the MOLG (2016) in order to improve sustainability of the solid waste and the solid waste management system No. (3) (2019).

1.6.4 The Roles of Governmental Agencies

At the national level, government agencies play an important role in solid waste management, where the Ministry of Local Governorate (MOLG) and the Environmental Quality Authority (EQA), in addition to the Ministry of Health (MOH), play a major role in this field, while the Palestinian Standards Institution (PSI), the Palestinian Central Bureau of Statistics (PCBS), the Municipal Fund, the Union of Municipalities, in addition to the Ministry of Economy all play a Secondary role in solid waste management, each according to their specialization (MOLG, 2017).

In general, local institutions are responsible for developing and providing appropriate legislative and institutional frameworks for managing the solid waste sector. In addition to planning, supervising, following up, and controlling infrastructure activities, ensuring that local bodies and joint services councils have the powers and capabilities to achieve effective management of this sector.

To reduce the overlap in responsibilities and tasks, the Palestinian Council of Ministers 2008 issued a decision to form the National Committee for Solid Waste Management, which includes the previous governmental agencies. The main vision of the committee was “Integrated and sustainable management of solid waste that contributes to achieving economic and social benefits to the Palestinian people (MOLG, 2014)

The roles of joint services councils (JSCs)

In the West Bank, with the higher council, there are 15 JSCs supervising SWM. From these, 14 JSCs handle solid waste collection. And just 11 focus on waste collection and transfer, while three JSCs (Jenin JSC, Jericho JSC, and South Gaza JSC) control landfill sites along with waste collection duties. The Hebron and Bethlehem Higher Council (H&B HC) manages Al Menya Sanitary LF, a medical waste treatment facility, and two transfer stations, but it is not included in waste collection. These 12 JSCs supply 83% of the total Local Government Units (LGUs) in the West Bank and serve 74% of the population. The other areas depend on the LGUs for waste management services.

Only Hebron & Bethlehem Higher Council and the JSC of Southern Gaza handle the responsibility of medical waste treatment in limited quantities. The Higher Council treats approximately 700 kg of medical waste per day, while the Southern Gaza Council process 1000 kg through A Pilot Project (MOLG, 2019).

1.6.5 Solid Waste Management Systems

The SWM system which is explained in detail in the MOLG (2019) started with a collection process that is executed in most Palestinian governorates through joint services councils, local authorities, or UNRWA. Waste is collected by using one of the following methods:

- *Primary collection*: Where waste is collected by the competent authorities directly from its sources, i.e., in front of homes and facilities.
- *Secondary collection*: Waste is collected from containers distributed in service locations.

In both methods, the waste is transported to the disposal sites (waste dumps) or to the transfer stations that act as a link between the sources of waste production and the disposal points. Solid waste is collected using collection vehicles that differ from each other in capacity and working principle, mechanical vehicles or animals, or agricultural tractors.

The diversity of vehicles types that used in the collection operations led to the difficulty of finding a technical staff who have the ability to maintain these vehicles due to the absence of general and unified specifications for these vehicles. An example of this is the restriction of driving a specific vehicle to a specific driver due to the incompetence of others in dealing with it, and other problems.The types of containers used as waste collecter points also vary, as they differ from each other in volume and capacity, as small containers ($1m^3$) are distributed in residential areas, while large containers ($8m^3$) are spread in central markets and industrial area (MOLG, 2019)

After collecting waste from containers by using vehicles, it is transported to landfills for final disposal (waste dumps), while some areas suffered from the high distance between the collection and disposal areas, which enforce them to store these wastes in transfer stations, the storage process led to use vehicles with high efficiency. In addition to

providing a relatively suitable environment for sorting waste and benefiting from some recyclable materials, compared to waste dumps, which pose a threat to people interested in separating waste.

After completing the collection and transportation of the waste, it is removed into the sanitary landfills scattered in different areas of the West Bank shown in Table (A.6) in Appendix (A). In the West Bank, there are three sanitary landfills (LFs): Jericho Sanitary LF, which serves the Jericho area, and Zahret Al Fenjan Sanitary LF, which serves the northern half of the West Bank. Rammun Sanitary LF, which will be built to serve the center of the West Bank, is another projected sanitary landfill. Unfortunately, other political barriers have prevented the construction of this LF. While many other parts of the middle area send their waste to random dumpsites, some of the middle areas send their waste to Zahret Al Fenjan or Al Menya LF. Despite the existence of sanitary landfills, their presence did not prevent the existence of hundreds of Random Dumpsites distributed in various areas of the West Bank (Tayeh, 2019), Table (A.7) in Appendix (A) illustrates in detail the locations and amount of waste of the Random Dumpsites..

1.6.6 Tariff System

According to the published Palestinian government decision number (3) for the year 2019, Each JSC has its own tariff system for SWM and waste collection. Several JSCs base their tariff system on the population, the quantity of waste they collect, or the number of homes they serve. For instance, in the Jericho JSC, the Jericho municipality pays the JSC a set sum regardless of how much garbage is collected or how many people are served. The types of applicable tariff system has an impact on waste reduction tactics; for instance, if the tariff system is based on the weight of the collected wastes, they encouraged to reduced the amount of generated waste, but the JSC will not be interested in such waste reduction.

The applied tariffs in all JSCs, except Ramallah JSC and Tubas JSC, are above the actual cost. Accordingly, the cost recovery in six JSCs is more than 100% (maintenance and operational cost only). However, some JSCs suffer from a financial shortage because the percentage of collection fees from some of their participation is less than 100%.

1.7 Problem Statement

Previous studies have shown the increasing global attention on SSWMpractices and the importance of the role played by industrial companies and governments in applying and supervising these practices, whether in developing or developed countries, where sustainability includes economic, social and environmental aspects.

Although governments are striving to find practices that enhance sustainability, the levels of application of these practices differ from one individual to another and from one company to another and are affected by multiple factors such as levels of awareness, economic incentives, and others (Shen, 2020). Despite the existence of these practices, measuring their effectiveness is a major concern for governments, as it requires measuring the impact of regulations, policies and strategies on reducing waste, preserving the environment and recovering resources (Abu-Salah, 2016).

In Palestine, as a developing country, the continuous population expansion and large economic activity have led to an increase in the amount of produced waste. This prompted the Palestinian government to introduce the National Strategy for Solid Waste Management, which aims to suggest solutions for waste management to improve sustainability. Despite the presence of many systems, policies, and laws controlling solid waste management in Palestine, they are not totally and correctly implemented. Furthermore, these solutions are temporary and do not care abot sustainability in this field (MOLG, 2017).

1.8 Research Significance

Solid waste is a global problem that requires urgent attention by policymakers and governments, due to its danger to health and the environment. This research aims to evaluate the impact of governmental practices and their effectiveness for solid waste management, as it highlights the urgent need to develop various policies and strategies. In addition to identifying and evaluating government practices, it is necessary to identify all obstacles that prevent the correct implementation of these practices and to identify mechanisms for developing policies and strategies to achieve sustainability goals.

The research can also be used to guide government decision-makers and promote the implementation of sustainable waste management practices, which lead to a healthier and cleaner environment. Moreover, it could be a reference that contains knowledge on sustainable waste management practices, which can be used by researchers and academics to further research this important problem. It introduces a comprehensive assessment of governmental practices towards SWM, so it can help to improve sustainable waste management practices in Palestine, which can significantly benefit the environment and society.

So, the research highlights the necessity of having a completed and integrated sustainable system for solid waste management. It addresses the major obstacles and challenges facing the Palestinian government to implement the best, effective and safe waste management system.

1.9 Research Questions

Based on the research problem, this research aims to answer the following questions:

1. What is the implementation level of the governmental practices that encourage Palestinian investorst to invest in solid waste solutions?
2. What are the impacts of SSWM on its three pillas (the environment, society, and economy) in the West Bank?
3. What are the main barriers that prevent the proper implementation of waste management practices?

1.10 Research Hypotheses

To answer the research questions, based on the research problem and literature review, main hypothese has been developed to be tested during the research, which is:

- H1: The governmental practices positively affect SSWM.

While the sub hypothesis were:

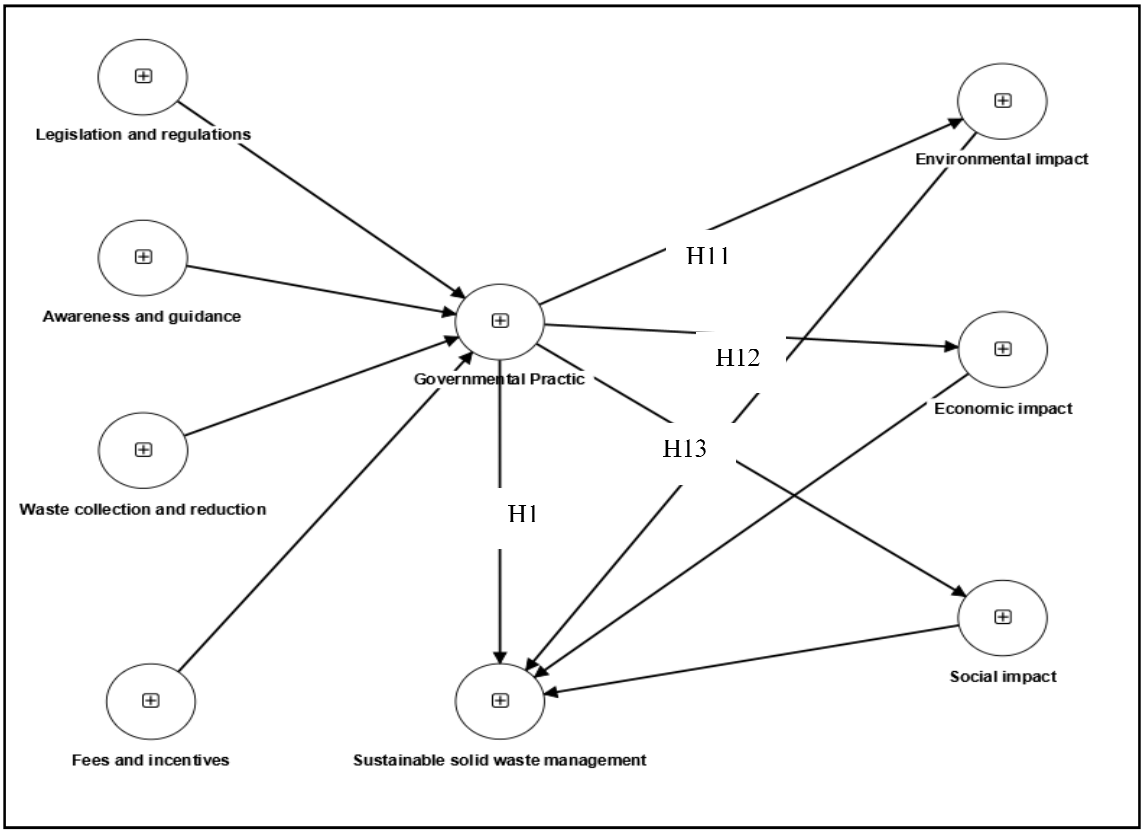
- H11: The governmental practices positively affect environmental sustainability.
- H12: The governmental practices positively affect economic sustainability.
- H13: The governmental practices positively affect the social sustainability.

1.11 The Proposed Conceptual Model

To answer and respond to the research questions, a conceptual modelthat shown in figure (5) was drawn by considering the previous studies and problem statement. It involves governmental practices as an independent variable and SSWM as a dependent variable. Each of the above constructs includes several indicators that have been developed based on the previous literature.

Figure 5

The Proposed Conceptual Model



Chapter Two

Methodology

2.1 Overview

This chapter explains the methodology used in the research, then shows the study flow chart, study population, how to choose the study sample, and design the questionnaire as a collecting data method and sampling techniques, and finally, it reviews the data analysis techniques to study hypotheses.

2.2 Research Methodology

Research methodology was defined as how the theoretical and systematic analysis of the approaches applied in the study is carried out (Bryman, 2016). Where it includes all the steps of the study, techniques, and instructions that will complete the research, including defined of the research problem, setting the study hypotheses and questions, in addition to selecting the sample, and the methods of data collection and analysis it, to find the final result and recommendations (Newhart, 2017). The importance of the research methodology is to conduct research studies in systematic, scientific methods with high reliability, which make the researcher generalize the final results in various populations or contexts (Hair, 2020). It also includes choosing the proper research method and data collection tools depending on the research types, the nature of the collected data, and analysis methods, in addition to the type of research such as quantitative or qualitative, and research design such as correlation, experimental, or observational research (Newhart, 2017).In addition to the technical aspects of research, ethical considerations are a very important component of research methodology, where researchers must take ethical principles into their account to ensure that the research is done in responsibly and ethical ways, in addition to protecting the rights of researchers (Bryman, 2016).

Through the review of previous literature and researches, it was clear that there is no study related to this topic in Palestine, so to achieve the main objective, the researcher identified government practices and then identified the main barriers which prevent the proper implementation of waste management solutions in addition to measuring the effects of these government practices on different aspects such as social, economic and environmental.

Figure (6) show the research flowchart that adapted during this research, which consists of three main phases as follows:

- The formulation phase involves identifying the research problem, which is the need to investigate the impact of government practices on solid waste and its role in achieving sustainability. This is followed by conducting a thorough and critical review of the existing literature on the topic to identify the current state of knowledge and any gaps or limitations in the research. Based on the literature review, hypotheses, and research questions are developed, and a quantitative and qualitative research approach is adopted.
- The execution phase includes designing a questionnaire and evaluating it with the help of academic experts. The study population consists of manufacturing firms, such as those in the food, metal, and engineering industries, as paper, stone and marble, and wood industries, and then the study sample has been selected. The questionnaire is distributed electronically via email followed by phone calls.
- Analytical Phase, the data collected through the questionnaire are analyzed using smart-PLS software to test the hypotheses. The results of the analysis are then discussed, and recommendations are provided based on the findings.

2.3 Data Collection approaches

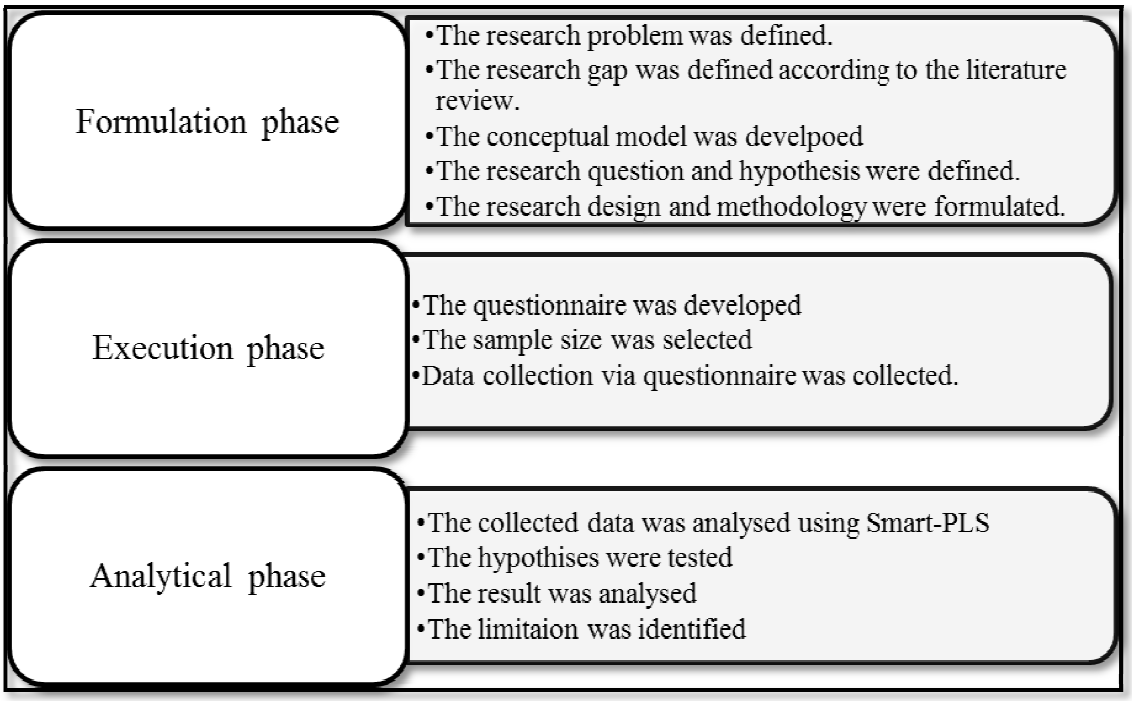
A qualitative and quantitative approches were used to achieve the main goals, which include; data collection about the current situation of solid waste in West Bank, studying current implementing regulations and laws, in addition to their impacts on waste sustainability. In the quantitative approach, the questionnaire was used as a tool for data collection as it was distributed to the different factories, in addition to the semi-structured interviews as a qualitative approach, where interviews were held with the relevant persons in the (MOLG) and the (EQA).

2.3.1 Questionnaire

A questionnaire is a tool that is used to collect data from targeted populations in a structured and standardized manner. It consists of a set of questions designed to gather data about particular topics, opinions, behaviors, or characteristics (Krosnick, 2018).

Figure 6

The research flowchart



2.3.1.1 Questionnaire Designe

After setting the study objectives and reviewing the literature, the elements for measuring the dependent and independent variables were constructed, and the questionnaire was created. As presented in Table (A.8) in Appendix (A), a 28 items were generated. The questionnaire consisted of three parts; the first part included demographic information for the targeted factories. The second part aimed to measure the effect of government practices on factory waste, while the third part aimed to study the impact of the practices presented in the second part on sustainable management from three aspects: economic, social, and environmental. The questionnaire used in this study was in English and Arabic language as shown in Appendix (B) and (C), respectively. Taking into account that the questionnaire was distributed in Arabic language to the different factories

The most important tools in research are validity and reliability, which are used to assess the quality of the final result obtained from the analysis process. For reliability, the results from the analytic process must be consistent, which means that they must remain the same when the research is repeated under the same conditions. Regarding validity, it explains the accuracy of the results (Hancock, 2010). To measure

government practices, which were represented as an independent variable, based on previous literature, 4 indicators were selected which are (Legislation and regulations, waste collection and reduction, fees and incentives, in addition to awareness and guidance).

Also, to measure the impact of the government practices on SSWM, which was represented as a dependent variable, 3 indicators were selected, each of them having a number of items, as follows: economic impact has 7 items, while each of environmental and social impact has 4 items. A five-point Likert scale was used to evaluate all the previous items, which included the following options, from which the respondent must choose one of them: (1: Not at all), (2: To a slight degree), (3: To a moderate degree), (4: To a great degree), (5: To a very great degree).

2.3.1.2 Questionnaire Population and Sample Size

In research, the sample population is a subset of the larger population that is selected to represent it. It may consist of individuals, objects, or events and is chosen based on specific criteria to provide insights into the characteristics, behaviors, or attitudes of the larger population. The main objective of selecting a sample population is to gather reliable and accurate information about the larger population in a time- and cost-efficient manner. By using a sample population, researchers can minimize the resources required to conduct their research while still obtaining meaningful and relevant results (Fraenkel, 2012).

This research is conducted to evaluate the effect of Palestinian practices on SSWM. The national institution that represents all legal industrial sectors in Palestine is the Palestinian Federation of Industries (PFI), which consists of sixteen federations that are categorized according to their specialization which are; the Palestinian food industries union, the Metal and engineering industries union, Palestinian paper industries union, and Palestinian plastic industries union, etc. Table (1) summarizes the number of manufacturing companies that are registered in each union and the number of target population according to the study.

The sampling frame is defined as the list of aimed groups at which the study samples are taken (Thompson, 2014). The study sample must be representative, enabling the researcher to generalize the results. The firms chosen to form the research sample must

meet a number of conditions, including holding valid licenses and registrations with the Palestinian Ministry of Economy and the Palestinian Federation of Industries. Due to the fact that they produced waste that falls under the categorization approved by the Ministry of Local Government, their economic activity is manufacturing rather than commerce.

Table 1

The number of targeted manufacturing companies

Industrial sectors	Members Number	Percentage of each sector	Min. number of the target population
Food	178	45.7%	37
Metal and engineering	136	34.96%	28
Paper	35	8.99%	7
Plastic	40	10.28%	8
Total	389	100%	80

While the sample size is defined as the number of individuals or observations that are included in a sample to satisfy the research aims. In simpler terms, it's the number of selected units from a large population for analysis. When conducting a study, the sample size is an important consideration since it affects the precision and accuracy of the results. Generally, more reliable and accurate results will obtain from a larger sample size, whereas a smaller sample size may result in greater variability and lower statistical power. Several factors should be taken into account to determine the suitable sample size, including the research questions, acceptable precision level, available resources, and population variability (Sarstedta, 2017).

80 firms from 390 members were capable and could be contacted based on predetermined criteria. A probability sampling procedure was used to ensure a representative sample that allows the generalization of the final results, which is widely used in quantitative research studies.

During the data collection period, which spanned approximately two months, a sample size of 80 responses was obtained. Hair (2011) provided recommendations for sample size in PLS-SEM to achieve a statistical power of 80%. These recommendations are presented in Table (A.9) in Appendix (A). Given that this study involves a maximum of

seven arrows pointing at a construct, the sample size obtained is sufficient to achieve a 5% significance level with a minimum R^2 of 0.25, which is deemed acceptable.

2.3.2 Semi-structured interview

A semi-structured interview is a qualitative research method that combines the flexibility of open-ended conversations with a structured framework of questions. In this approach, a list of key topics and questions was prepared to guide the interview, allowing for immediate exploration and follow-up inquiries based on the responses (Patton, 2015).

This approach was used to answer the third question of the research, which is " What are the main barriers that prevent the proper implementation of waste management practices?", therefore, this question was asked directly to the relevant persons from the MOLG and EQA.

2.4 Data Analysis Techniques

Smart PLS (Partial Least Squares) is a statistical software instrument used for Structural Equation Modeling (SEM) analysis. It is based on the Partial Least Squares approach, which is a technique used to estimate the relationships between dependent and independent variables.

The conceptual model of the study was drawn using Smart PLS (V.4), in addition to clarifying the relationship between the main variables and their indicators. In order to test the hypotheses that had been set, the data obtained from the respondents were analyzed.

After drawing the conceptual model and entering the data into the software, the following calculations were done:

- PLS - Algorithm: The reliability and validity of the indicators and the entire model were examined through tests and the thresholds for each test.
- Bootstrapping: Through it, the importance of the relationships contained in the hypotheses was verified in order to judge their validity or reject.

Chapter Three

Results and Analaysis

3.1 Overview

In this chapter, the findings of the data gathered from manufacturing companies are presented. The analysis of the questionnaire responses, as well as the assessment of model validity and reliability, and the testing of hypotheses, conducted using Smart PLS software are also presented.

3.2 The Analysis of Survey Response

3.2.1 Response Rates

After filtering the data collected through the questionnaire, 80 responses were obtained from out of 80 factories that were contacted to fill out the questionnaire, with a response rate of 100%. Table (A.10) in Appendix (A) shows the respondent's profile summary, with a percentage of 72.5% for engineers, 27.5% for administrators, 40.0% for the Northern governorates, 25.0% for the central governorates, and 35.0% for the Southern governorates of the West Bank. The results also showed that the percentage of the age of the factories participating in filling out the questionnaire, which ranged between 0-5 years, is 41.25%, 6-10 is 31.25%, 11-15 is 15.0% and more than 15 years is 12.5%, respectively.

The percentages of respondents also differed based on the organizational sector, which was as follows: 8.75% for paper industries, 10% for plastic industries, 46.25% for food industries, and 35.0% for metal and engineering industries. This led to different types of waste produced in these factories, as follows: 16.25% for paper and cardboard, 25% for organic waste, 22.5% for plastic, and 36.25% for metal. furthermore, it was found that 62.5% of this waste is collected by Joint Service Councils and 37.5% by municipalities. Also, 49.59% of the respondents manufacturing companies have ISO 9001 certification, 4.96% have ISO 14000, 16.53% have a GMP, and 28.93% have HASAP certification.

3.2.2 Descriptive Analysis

A descriptive analysis was conducted to find out the status of government practices of solid waste, The standard deviation and the mean for each variable are presented in Table (2). This study used a five-point Likert scale (1- very slight degree to 5- very great degree). To interpret the results, the length of the period was calculated using equation 1:

$$interval\ length\ = \frac{(highest\ weight - lowest\ weight)}{three\ levels} \rightarrow \quad (1)$$

So;

$$= \frac{(5-1)}{3} = 1.33$$

according to the equation, the interval length was 1.33, meaning the score between 1 - 2.33 was low, 2.34 - 3.66 was moderate, and 3.67 - 5 was assumed high.

Table 2

The mean, standard deviation and implementation level of the governmental practices

Item	Mean	STD.	Implementation level
Awareness and guidance	2.360	0.878	Moderate
Waste collection and reduction	2.375	0.980	Moderate
Fees and Incentives	2.187	0.931	Low
Legislation and regulations	3.237	0.935	Low
Economic Impact	2.180	0.947	Low
Environmental Impact	2.643	0.844	Moderate
Social Impact	2.664	0.863	Moderate
Total Sustainable Solid waste management	2.495	0.884	Moderate
Total for governmental practices implementation	2.539	0.931	Moderate

3.3 Questionnaires Analysis

The Partial Least Squares (PLS) Approach was used by using Smart-PLS (v. 4.0.9.3) software to analyze the quantitative data obtained as responses to the questionnaire. When the conceptual model is designed, it must be taken into account that there are two types of variables, which are internal (dependent variables), and external variables

(independent variables) in the conceptual model. Also, the analysis using the program includes two main components, the first component describes the relationships between the latent variables which is called the structure model or the inner model. The second component called the measurement model or outer model, which is used to evaluate the relationship between the latent variable and the indicators associated with it (Hair, 2011).

There are also two types of measurement models, which are: the reflective measurement model, in which the indicators are the basic structure of the model, and in which the arrows are from the variable to the indicators, where any indicator can be removed without affecting the meaning of the variable dependent on it. As for the model in which the indicators cause the variable, and in which the arrows exit from the indicators to the variable, it is called the formative variable, as the deletion of any indicator from the indicators leads to a change in the nature of the variable and affects it (Hair, 2011).

Our research model comprises 28 reflective items representing 9 latent variables. It incorporates both first-order and second-order constructs. The primary aim of this model is to explore the impact of governmental practices as an independent variable and sustainable solid waste management as a dependent variable.

3.4 Assessment of Outer Model (Measurement Models)

When assessing formative measurement models, it is important to evaluate the construct validity and reliability of the constructs. Convergent validity is determined by examining indicator reliability, composite reliability, and average variance extracted (AVE). Discriminant validity is assessed using cross-loadings, the Fornell-Larcker criterion, and the Heterotrait-Monotrait ratio (HTMT). These measures help ensure the quality and distinctiveness of the constructs in the model.

3.4.1 Convergent Validity

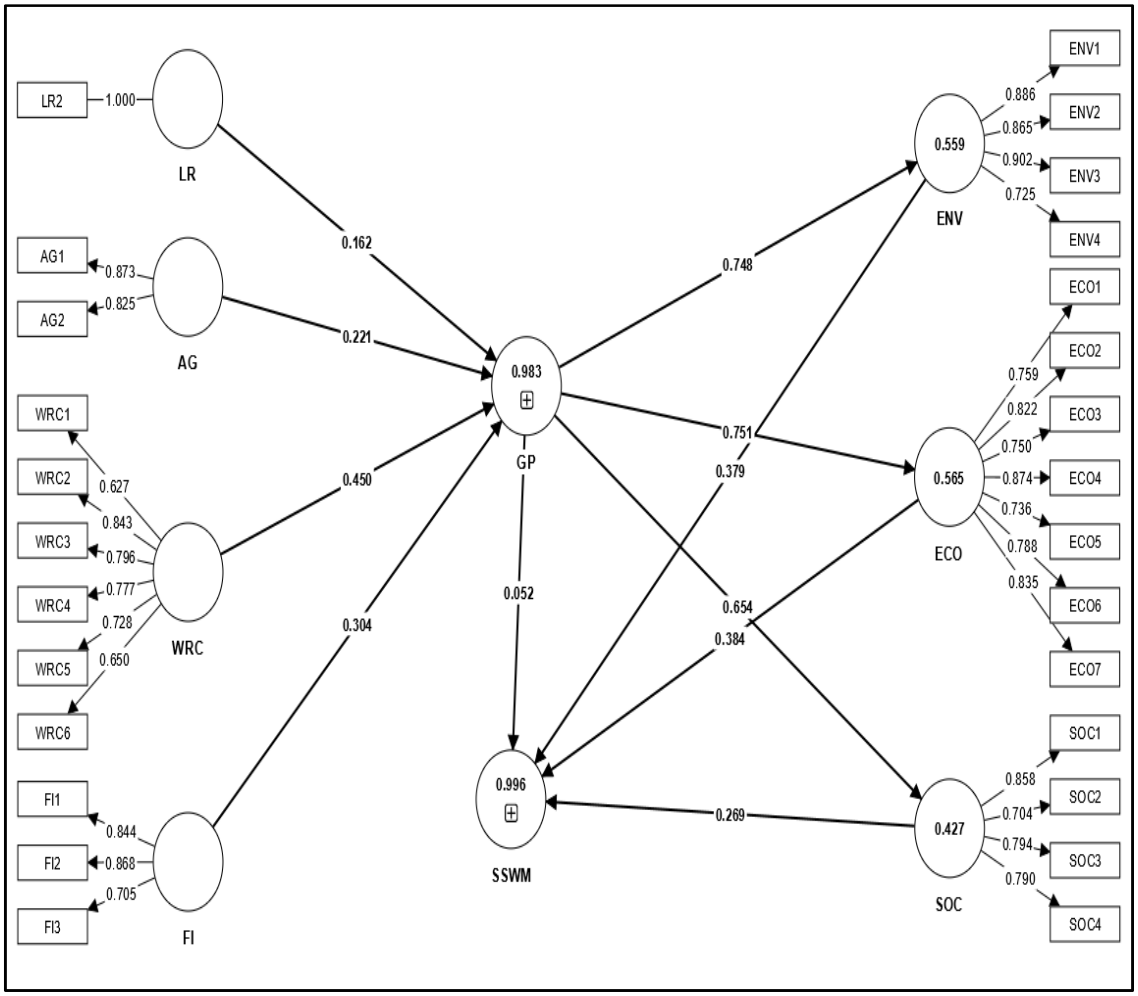
Convergent validity: refers to the extent to which a measurement aligns positively with other measurements that assess the same concept. When evaluating convergent validity within formative measurement models, three tests can be conducted to assess it:

- Factor loadings: are indicators of the extent to which different items or measures share commonalities within a construct. A widely accepted guideline for assessing

convergent validity is that the factor loadings must be 0.708 or higher. However, in exploratory studies, a threshold of 0.60 is often considered acceptable (Hair, 2011). LR1 was deleted due to its low factor loading. In Figure (7), it is evident that all of the items meet or exceed the recommended values for factor loadings, indicating that they exhibit a strong level of association with the construct.

Figure 7

The factor loading of the Outer model (Measurement Model)



- The average variance extracted (AVE): is a measure calculated by summing the squared loadings of the indicators on a construct and dividing it by the number of indicators. It represents the amount of variance explained by the construct concerning its indicators. According to (Hair, 2011), an AVE value higher than 0.50 indicates that the construct explains more than half of the variance in its indicators, suggesting good convergent validity.

In this study, the AVE values range from 0.549 to 0.718, indicating strong convergent validity. These values surpass the recommended threshold of 0.50, indicating that the constructs under investigation explain a significant portion of the variance in their respective indicators. Table (A.12) in Appendix (A) shows the constructs measurement properties.

- Composite reliability: To ensure internal consistency, composite reliability (CR) is assessed for each indicator within a measurement model. Composite reliability values range from 0 to 1, with higher values indicating greater reliability. According to (Hair, 2011), a CR value exceeding 0.70 is generally considered acceptable. In Table (A.12) in Appendix (A), all the CR values surpass the threshold of 0.7, confirming the reliability of the measured constructs.

In assessing internal consistency, both composite reliability (CR) and Cronbach's alpha were calculated for all constructs in the study model. Cronbach's alpha is a traditional criterion used to evaluate the internal consistency of a measure. A recommended threshold for Cronbach's alpha is 0.7 or higher. Table (3) presents Cronbach's alpha values for all constructs in the study. It indicates that all constructs' Cronbach's alpha values meet or exceed the recommended threshold of 0.7 which is considered as high, except the value of AG which is considered as moderate. This suggests that the items within each construct are internally consistent, meaning they are measuring the same underlying concept reliably. Therefore, based on values reported in Table (3), the constructs in the study demonstrate satisfactory internal consistency.

Table 3

Composite Reliabilities, AVE and Cronbach's Alpha values of research constructs

#	Items Number	Composite reliability	Cronbach's alpha	Average variance extracted (AVE)
AG	2	0.838	0.614	0.720
ECO	7	0.924	0.903	0.634
ENV	4	0.910	0.868	0.719
FI	3	0.849	0.733	0.654
SOC	4	0.867	0.795	0.621
WRC	6	0.877	0.834	0.591

3.4.2 Discriminant Validity

The test that is used to calculate the range to which a construct is distinct from other constructs in the same model is called Discriminant validity. It emphasizes that the construct shows a unique and different concept that is not caught by other constructs (Hair, 2011). It can be examined by evaluating correlations within the indicators of a construct or cross-loadings.

Discrimination validity can be assessed if the results of the cross-loading are compared with the loadings of the other constructs in the same model. Whereas, Table (A.13) in Appendix (A) shows the cross-loading for all indicators. Where it is clear from the table that the cross-loading archived the discriminant validity, which must be higher than the cross-loading on the other construct, that means the indicators are highly correlated with their own construct more than their association with the other constructs in the study model. So, according to the results, the discriminant validity of the all construct are approved using the cross-loadings.

Another widely used approach used to assess discriminant validity is the Fornell-Larcker. It compares the correlations between latent variables with the square root of the average variance extracted (AVE) for each construct. According to the criterion, the square root of the AVE for constructs should be greater than the largest correlation with other constructs. Table (4) shows the results of the results using the Fornell-Larcker method, where the AVE square root of the constructs is compared for each construct in correlation with other constructs.

For each construct the square root of AVE is larger than the greatest correlation it has with other constructs, Where it can be concluded that the constructs is distinct from others and includes different and unique aspects, as well as supporting the results obtained from the cross -loading test.

Based on the information contained in Table (4), it can be concluded that this criterion is achieved in the study model. Which provides further evidence for the distinctiveness and uniqueness of all constructs in the research model. The Heterotrait-Monotrait ratio (HTMT) test is another method used to assess discriminant validity. which was created, and introduced by (Henseler, 2015), It compares the correlations between heterotrait (different constructs) with the correlations within the monotrait (same construct). If the

ratio of HTMT less than 1, then it is acceptable and indicates a good discriminant validity.

Table 4

Discriminant Validity based on Fornell-Larcker

#	AG	ECO	ENV	FI	LR	SOC	WCR
AG	0.849	-	-	-	-	-	-
ECO	0.614	0.796	-	-	-	-	-
ENV	0.542	0.775	0.847	-	-	-	-
FI	0.641	0.640	0.621	0.809	-	-	-
LR	0.608	0.489	0.476	0.627	1.000	-	-
SOC	0.489	0.805	0.796	0.585	0.453	0.788	-
WCR	0.688	0.724	0.717	0.727	0.584	0.582	0.741

Table (5) shows the HTMT values. From the table, it is clear that all test values are less than 1, which means that the correlations between the different constructs are less than the correlations within the same combination, and this supports what was reached using Fornell-Larcker.

Table 5

Discriminant Validity based on Heterotrait-Monotrait Ratio (HTMT)

	AG	ECO	ENV	FI	LR	SOC	WCR
AG	-	-	-	-	-	-	-
ECO	0.819	-	-	-	-	-	-
ENV	0.715	0.867	-	-	-	-	-
FI	0.939	0.781	0.777	-	-	-	-
LR	0.778	0.513	0.499	0.724	-	-	-
SOC	0.697	0.945	0.957	0.759	0.513	-	-
WCR	0.926	0.816	0.790	0.907	0.639	0.685	-

3.4.3 Discriminant Validity Assessment

To assess the discriminant validity of the formative model, which represents the GP practices construct, it is necessary to evaluate the importance of the construct indicator. Bootstrapping used to determine the weight and loading. Table (6) provides the t-values for each first-order construct, indicating whether they are statistically significant.

Additionally, (Hair, 2011) stated that the collinearity of indicators, measured by the Variance Inflation Factor (VIF), should be below 5, as established in this study (refer to Table 6).

Table 6

Weight, T- Values, and Variance Inflation Factor (VIF) values for first order contract

Second order	First order contract	Outer weight	T-value	VIF
Governmental practices	AG	0.588	2.830	2.236
	FI	0.437	4.771	2.524
	LR	1.000	2.480	1.894
	WCR	0.237	4.666	2.614

3.5 Assessment of the Inner Model (Structural Model)

Once the measurement reliability and validity have been confirmed, the subsequent step involves evaluating the structural model and examining the relationships between constructs. In PLS-SEM, several criteria are commonly used to assess the structural model, which includes:

- Coefficient of Determination (R^2): This criterion measures the amount of variance in the dependent variable that can be explained by the independent variables. It indicates the predictive power of the model.
- Effect Size (F^2): Effect size is used to assess the practical significance of the relationships between constructs. It quantifies the proportion of variance in the dependent variable that can be attributed to the independent variables, considering the size of the effect.
- The goodness of Fit Index (GoF): The GoF index provides an overall measure of how well the model fits the data. It considers both the measurement and structural aspects of the model, combining the goodness of fit for both parts.
- Significance of Path Coefficients and Hypotheses Testing: The significance of the path coefficients is examined to determine whether the relationships between constructs are statistically significant. Hypotheses testing is conducted to assess the support or rejection of the proposed hypotheses based on the significance of the path coefficients.

3.5.1 The Coefficient of Determination (R^2)

The coefficient that use to evaluate the expected accuracy of a structural model is called R^2. Where it refers to the percentage of the variance of the dependent variable that can be explained by the independent variables, its values should range from 0 to 1, taking into account that the higher the value, the more predictive accuracy increases.

According to (Hair, 2011), When interpreting R^2 results, it must be taken into account that the interpretation of the results depends on the complexity of the model, and there is a general rule and guidelines that can be used to interpret these results, which suggest that values of 0.25, 0.50, or 0.75 should be considered weak, moderate, or high, respectively.

In this research, the results in Table (7) show that the R^2 values for the variables in the model are approximately high, and it is above the threshold of 0.75. This means a strong level of expected accuracy for variables based on the collected data.

Table 7

The average R^2 values

Construct	R-Square	R-Square Adjusted	Result
SSWM	0.996	0.996	High
GP	0.983	0.982	High

3.5.2 The Effect Size (F^2)

The effect size is a measure that quantifies the impact of excluding a specific exogenous construct on the endogenous constructs in a structural model. It can be calculated using the following equation (Equation 2):

$$F^2 = \frac{(R^2included - R^2excluded)}{1 - R^2included} \rightarrow \qquad (2)$$

(Cohen, 1988) provided guidelines for interpreting effect sizes, suggesting that F^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effects of the exogenous latent variable, respectively.

The f^2 values of the independent variables were analyzed using the PLS algorithm. As seen in Table (8). The Values of f^2 started from 0.097 to 0.298. In more detail, this

analysis shows that WRC has the largest effect on GP ($f^2 = 4.504$), followed by FI ($f^2 = 2.129$, High), and AG ($f^2 = 1.261$, High), However, LR have the lowest effect with $f^2 = 0.802$, High.

Table 8

Results of the effect size

Path	F^2	Effect Size
AG→ GP	1.261	High
FI→GP	2.129	High
LR→GP	0.802	High
WRC→GP	4.504	High

3.5.3 The Goodness of Fit (GoF) for the Model

GoF is a measure that evaluates the overall ability of the study model to capture the relationships between variables. It is calculated as the geometric mean of both the average variances extracted (AVE) and the average of R^2 values of the endogenous variables. The formula for calculating GoF is as follows Equation (Wetzels, 2009);

$$GoF = \sqrt{(AVE * Average\ R^2)} \rightarrow \qquad (3)$$

Where:

- AVE represents the average variance extracted, which assesses the amount of variance captured by the measurement model for each latent variable.
- Average R^2 refers to the average coefficient of determination (R^2) calculated for the endogenous variables, indicating the proportion of variance explained by the independent variables.

In this study: $GOF = \sqrt{0.638*0.983}$

$=0.792$

By taking the geometric mean of AVE and the average R^2, GoF provides an overall measure of the model's ability to fit the data and capture the relationships between constructs. A higher GoF value indicates a better fit and a higher level of reliability for

the study model, according to (Wetzels, 2009), the interpretation of the goodness of fit (GoF) value can be categorized as follows:

- If the GoF value is less than 0.1, it indicates that there is no fit between the model and the data. In other words, the model does not adequately capture the relationships between the variables.
- If the GoF value falls between 0.1 and 0.25, it suggests a small fit. This means that the model partially captures the relationships between the variables, but there is room for improvement.
- If GoF values between 0.25 and 0.36 indicate a medium fit. In this case, the model reasonably captures the relationships between the variables, but there may still be some room for refinement.
- GoF values larger than 0.36 suggest a large fit. This indicates that the model fits the data well and effectively captures the relationships between the variables.

A calculated value of GoF equal to 0.792 indicates a sufficiently high level of global PLS model validity. This value surpasses the threshold values mentioned earlier by (Wetzels, 2009), indicating that the model fits the data well and effectively captures the relationships between the variables. A GoF value of 0.792 suggests a large fit, indicating a strong overall validity of the model in representing the observed data.

3.5.4 The Significance of the Path Coefficients - Hypothesis Test

The structural model was estimated to examine the relationships among the variables in the study, after running the PLS-SEM algorithm. The path coefficient test is commonly used to assess these relationships. Path coefficients represent the strength and direction of the relationships between variables and can take values between -1 and +1.

A positive path coefficient (between 0 and +1) indicates a positive relationship, meaning that an increase in the independent variable is associated with an increase in the dependent variable. A path coefficient of +1 indicates a perfect positive relationship. On the other hand, a negative path coefficient (between 0 and -1) indicates a negative relationship, where an increase in the independent variable is associated with a decrease in the dependent variable. A path coefficient of -1 represents a perfect negative relationship.

Path coefficients close to 0 indicate a weak or negligible relationship between the variables. Values close to +1 in path coefficients indicate a strong positive relationship between variables, while values close to -1 indicate a strong negative relationship. These values provide information about the strength and direction of the relationships in the structural model. The program contains procedures called bootstrapping through which the significance of the path coefficients is tested, as it relies on non-parametric bootstrapping, which assumes that the data isn't normally distributed, as it is based on generating a large number of subsamples to obtain strong estimates of the path coefficients. As recommended by (Hair, 2011), to ensure the reliability of results, 5000 subsamples were used in bootstrapping procedures.

Table (9) shows the results of bootstrapping analysis, as it includes the values of path coefficients (β), the values of standard deviation, and the T-values, in addition to P values for direct relationships. These values can be used as indicators of the importance, direction, and strength of the relationships between the study constructs.

Table 9

Hypotheses Test Results

Path	HYP.	Original Sample (β)	Standard Deviation	T-value	P-value	Result
GP→ SSWM	H1	0.052	0.022	2.334	0.020	Supported
GP→ ENV	H11	0.748	0.060	12.383	0.000	Supported
GP→ ECO	H12	0.751	0.073	10.342	0.000	Supported
GP→ SOC	H13	0.654	0.104	6.314	0.000	Supported

Based on the information in Table 10, it is clear that there are significant positive relationships between all constructs, where;

- Governmental practices and sustainable solid waste management: The positive path coefficient and the low p-value indicate a significant positive relationship between these two constructs. This means that the implementation of governmental practices is positively affected with achieving sustainable solid waste management. Hence, H1 is supported.
- Governmental practices and environmental impact: The positive path coefficient with low p-value indicate a significant positive relationship between governmental practices and environmental impact. Hence, H11 is supported.

- Governmental practices and economic impact: the positive path coefficient and low p-value indicate a significant relationship between governmental practices and economic impact. Hence, H12 is supported.
- Governmental practices and social impact: Similarly, the positive path coefficient with low p-value indicate a significant relationship between governmental practices and social impact. Hence, H13 is supported.

Chapter Four

Discussions, Conclusions and Recommendations

4.1 Overview

This chapter reviews the achieved results obtained from collected data, in addition to the current situation of solid waste in industrial firms in Palestine. It also shows the results of the hypotheses and theoretical implications of the research.In addition to the above, it presents a summary, conclusion, and recommendations of the research. It also discusses the limitations that the researcher encountered while conducting the research.

4.2 Discussion of Results

The study has some objectives which were: assessing the effect of governmental practices on SSWM. In addition, to explore the implementation level of the governmental practices. The proposed conceptual model includes four governmental practices (Awareness and guidance, Waste collection and reduction, Fees and incentives, and Legislation and regulations). Furthermore, the environmental, economic, and social impact was used to study sustainable aspects.

4.2.1 Discussion of GP Status in Palestine

Based on the assessment of data collected, the results show that Palestinian industrial firms display a moderate level of implementation in terms of their overall governmental practices, scoring 2.539 on a scale of 5. The highest average score of 2.288 among the economic effect indicators explains that government practices have created investment possibilities. The remaining indications vary from a low of 2.087 to a high of 2.250, all falling within the moderate range.

As shown by the previous research (Al-Khatib, 2019), which used the governorate of Nablus as a case study, public awareness and incentives or funding are either insufficient or ineffective and must be sufficient. Additionally, there is a lack of attention on SWM practices as well as the limited implementation of regulations governing the collection, disposal, and tax collection linked to SW (Al-Khatib, 2019).

And this indicates that the Palestinian government may move from a level of moderate implementation to a level of high implementation if it makes an investment in doing so.

Although there is generally a moderate level of law enforcement and legislation implementation, there are a variety of strategies that can be developed to increase the enforcement of these laws and regulations, such as reviewing and improving current policies and laws and working to have them implemented by imposing penalties on violators (Permana, 2015).

The implementation level of fees and incentives in the solid waste management system can vary between municipalities in Palestine. Some governorates may have more comprehensive fee systems and incentive programs, while others are still in the early stages of implementation. The effectiveness of these mechanisms also depends on proper monitoring, public participation, and enforcement (Shahateet et, 2015).

Expanding and enhancing the use of fees and incentives in Palestine's solid waste management system requires continuous work. Collaboration between government entities, local governments, waste management service providers, and community stakeholders is necessary for this. Palestine can increase waste reduction, recycling rates, and overall environmental sustainability by coordinating financial incentives with sustainable waste management practices (Al-Smadi, 2020).

Nevertheless, when testing the situation in Palestine, which is classified as a developing country, especially in the industrial sector, it is clear that the solid waste sector needs more serious attention to reach a sufficient level of maturity. Since many firms are not classified as large-scale companies, the government should maximize their effort in order to increase awareness, minimize waste generation, and capitalize on future environmental activities.

4.2.2 Discussion of SSWM Status in Palestine

The findings from the data analysis revealed a significant and positive correlation between governmental practices and sustainable solid waste management across its three dimensions: environmental, economic, and social. Furthermore, there is a similarly positive correlation between governmental practices and the direct impact of solid waste management on the social, economic, and environmental aspects.

Additionally, the results indicated that the overall level of implementation for SSWM was measured at 2.495, reflecting a moderate level. Further analysis revealed that within

the specific dimensions of sustainable effects, namely environmental, social, and economic aspects, the implementation levels were 2.643, 2.664, and 2.180 respectively, which also fell within the moderate range.

A study was done to assess the impact of Palestinian governmental practices on the environment, and it revealed a positive correlation between governmental practices and environmental impact. This relation was examined through a set of indicators, such as:

- Reduction in environmental pollution.
- Protection of natural resources.
- Decrease in gas emissions.
- Improved the quality of water and air.

The response rate for this indicators was between 2.550 for (ENV 3) and 2.800 for (ENV 4).

Based on these results, the decision-makers within companies and the Palestinian government must prioritize the perfection of governance practices that support the environmental impact of solid waste. These results align with numerous previous studies, emphasizing the need for increased attention and focus on this aspect.The highest mean score of 2.288 among the economic impact indicators explains that government practices have generated investment opportunities. The remaining indications vary from a low of 2.087 to a high of 2.250, all falling within the moderate range. Therefore, the government must take higher attention to improving the economic aspect of sustainability.

Based on the results related to social impact, the average response rate for the indicators ranged from 2.612 to 2.737. This indicates that the Palestinian government needs to make significant progress in terms of its social effects. The responses of managers from various industrial firms were analyzed, highlighting the importance of promoting public health, increasing public awareness about waste and disposal methods, enhancing life quality, improving citizen health, and improving economic development. The examination of these aspects underscores the need for organizations to focus on these areas and make substantial progress.

4.2.3 Hypothesis Testing Discussion

The study considered one main hypothises (H1) and three sub-hypothises (H11, H12, and H13) through which the relationship between sustainable waste management and government practices was examined. The results showed a strong and positive relationship between government practices and sustainable waste management, which proves the first hypothesis (H1). As for the other hypotheses, their results showed the existence of strong and positive relationships between government practices and environmental, economic and social impact which proves the other hypotheses (H11, H12, and H13).

4.3 Barriers that Prevent the Proper Implementation of SWM Solutions

In order to asnswer the final research question, interview with the related governmental entities such as MOLG and EAQ was done to identify the different barriers faced by the Palestinian government in sustainable solid waste management. The following is a summary of the main barriers that emerged from the research:

- *Low Financial Resources:* inadequate funding and budget allocations prevent the implementation of SSWM practices. This includes restrictions on investments in technology, waste treatment facilities, and infrastructure..
- *Institutional Capacity:* Designing and putting into practice sustainable procedures might be difficult in government organizations in charge of waste management due to weak institutional capacity and insufficient technical skills. This covers problems in developing, enforcing, and monitoring policies.
- *Public Participation and Awareness:* public involvement and awareness in waste management practices result in obstacles related to waste recycling, reduction, and waste segregation. Education and engagement courses and programs will be vital to improve sustainable waste management practices among the public.
- *Regulatory Framework:* The effective use of sustainable techniques is ravel by insufficient thorough and current waste management rules as well as by flexible enforcement implementation. It is important to support regulatory frameworks and make sure they are upheld.
- *Technology and Infrastructure:* Limited systems used for waste collection, inadequate access to suitable waste treatment technologies, and insufficient recycling

facilities increase the challenges and obstacles faced in SSWM. Investments in technology and infrastructure are important to improve waste management practices.

- *Political and Social Context:* The socioeconomic issues and political situation in Palestine make it more difficult to implement SSWM techniques. The success of waste management projects can be impacted by variables including resource limits, territory restrictions, and political instability.

The Palestinian government needs to solve these challenges and obstacles in addition to implementing suitable strategies to overcome them in order to improve sustainable solid waste management practices in the region.

4.4 Technical options for solid waste management

The technologies used in waste disposal and treatment differ from one country to another, depending on its economic capabilities and the types of waste produced. The Palestinian government can benefit from the experiences of successful countries in the field of waste management and use one of these methods or a combination of them, such as:

- *Waste recycling*: This technology can helps reduce the volume of waste and use resources effectively. Programs can be implemented to collect, sort and recycle reusable materials such as paper, plastic and glass (Abu-Salah, 2016).
- *Organic waste treatment:* Organic waste requires the use of fermentation and composting techniques to convert it into organic fertilizer that can be used in agriculture (Bello et al., 2022).
- *Converting waste into energy*: This technology is characterized by reducing the volume of waste, as it is possible to build plants to convert non-recyclable waste into energy, such as power plants from waste, to produce electricity or heat (Qureshi et al., 2021).
- *Pyrolysis:* Where industrial solid waste can be converted into energy through pyrolysis techniques, and this can contribute to the generation of electricity and heat (Zhu et al., 2020)

When using any of the previous technologies, analysis and monitoring are required to monitor air and water quality and ensure compliance with sustainable environmental standards.

Although there are many methods and technologies for solid waste management, it is not possible to decide which one is better than the other. A separate study should be conducted to compare these techniques, taking into account the current situation in Palestine and the political situation in particular, and recommending to decision-makers to implement the appropriate method, which ensures sustainability in waste management.

4.5 Conclusions

In conclusion, SSWM plays a vital role in improving public health, achieving long-term socio-economic development, and protecting the environment. The result of this research has focused on the role of governmental practices in improving sustainability and the current situation of SWM practices in Palestine and the implementation level for each practice

The result of assessing the governmental practices shows the need for increasing attention to implementing the governmental practices because it has a high effect on the sustainability of solid waste management. Some challenges problems and their proposed solutions are described below:

- *Lack of financial resources*; where the Palestinian government can search for alternatives to compensate for the shortfall in financial resources and reduce the dependence on the donors.
- *Weak implementation of regulations*: It can be improved by updating and reviewing the current regulations related to SWM, and make sure that it is clear, comprehensive, and aligned with the best international practices, in addition to Establish a strong monitoring system to follow compliance with waste management regulations, and Implement a transparent reporting mechanism that allows businesses and citizens to report irregularities to punish the offenders.
- *Limited public awareness*: It can improved by increase public awareness about the importance of proper waste management and the consequences of non-compliance with regulations and rules. Also, engage local communities and businesses in waste reduction and recycling activities to improve responsibility.

Furthermore, partnerships and collaboration between the government, international organizations, the private sector, and civil society, are very important in implementing

sustainable practices. In addition sharing best practices, knowledge, and experiences with other countries and learning from their successful experiences can also participate in the improvement of SWM systems in Palestine.

The adoption of an integrated and holistic system, the Palestinian government can effectively solves the social, economic, and environmental aspects of sustainability. This can cause a healthier and cleaner environment, improve resource efficiency, create new job opportunities, and enhance the life quality for Palestinian citizens.

Ultimately, SSWM needs the collaboration and commitment of all stakeholders, while the government (MOLG, MOH, PSI, MOE and EAQ) plays a vital role in putting the appropriate policies, ensuring effective implementation, and providing the needed resources. By prioritizing sustainability and adopting best practices, Palestine can pursue a more flexible and greener future.

4.6 Recommendations

Although the governmental SSWM practices are still in their first stages in developing countries like Palestine, there are many steps that can be adopted to improve governmental practices. The slow process results from different factors like; social, economic, and political constraints, however, there are many ways to improve. Many recommendations can be taken into account in order to improve the sustainability of solid waste, such as:

- Adopting an integrated waste management system that concentrates on 3R'S waste principles (reduction, recycling, and reuse). in addition to implementing comprehensive systems for waste management that include all stages of collection, sorting, and recycling.
- Improving public awareness of the community about the waste management importance, 3R's practices, in addition to the environmental, social, and political impacts of improper waste disposal. Also, conducting seminars, school, and workshops to promote waste reduction and recycling behaviors.
- Encouraging the participation of the community in waste management activities through recycling programs, neighborhood composting projects, and community clean-up drives. in addition to involving NGOs, community-based organizations, and local residents in decision-making processes.

- Updating and Reviewing the existing waste management policies and legislation to be unified with sustainable practices. Enter regulations that prioritize waste recycling and reduction in addition to the use of environmentally friendly packaging. Also, develop policies that support waste-to-energy conversion and improve circular economy principles.
- Implementing suitable fees and incentives to encourage waste recycling, reduction, and responsible waste management practices. Implement the pay-as-you-throw (PAYT) system where peoples pay based on the amount of generated waste. Also, offering financial incentives for industries and businesses to encourage them to adopt sustainable waste management practices.

In addition, it is important to provide some recommendations to emphasize the importance of waste segregation based on the waste classification of MOLG. Which may include:

- *Organic waste*: Constitutes 50% of the total waste produced in the West Bank. The composting method is an environmental approach that can used to get rid of organic waste, as it reduces carbon emissions and reduces pressure on major landfills, in addition to requiring relatively little energy. It also produces organic fertilizer that contributes to improving the quality of soil and agricultural crops without the need for organic fertilizers.
- *Paper and cardboard waste*: Which constitutes approximately 31.5% of waste. Reducing it from the source is considered one of the most important methods to get rid of and reduced its impact. However, if it is produced, it must be recycled in order to preserve resources and the environment.
- *Glass Waste*: Glass constitutes 1.8% from waste bank waste, it can be collected and sorted according to its color and melted for recycling, which reduces the need for raw materials and reduces resource consumption.

As for other waste, which constitutes approximately 17% of waste, other techniques can be used to dispose of it, such as burning, landfilling, etc.

The Palestinian government can improve SSWM practices by implementing these recommendations, promoting resource efficiency, reducing environmental impacts, and improving the overall quality of life for its citizens. These procedures will smooth the way for more sustainable a greener future in Palestine.

4.7 Research Limitations

This research has many limitations that should be mentioned. First, limited research has been done on this topic in developing countries like Palestine. This means that the existing kinds of literature are unique and can not describe and perceive the challenges and nature of the Palestinian context.

Second, the data collection phase takes the manufacturing sector in Palestine as the population study, which represents a small market. Consequently, the population study was limited and small because the number of firms that met the research criteria was small, which means caution should be taken when generalizing the results to the whole manufacturing sector in Palestine.

Third, the current political restrictions on movement cause difficulties to reach some firms, which leads to a small representativeness sample. This may affect the accuracy and comprehensiveness of the collected data.

Finally, the lack of an updated database that contains the correct contact information of manufacturing firms. This may lead to difficulties to reach certain firms and potentially introduced limitations in the data collection phase.

List of Abbreviations

Abbreviation	Meaning
AG	Awareness and guidance
ECO	Economic Effect
ENV	Environmental Effect
EPR	Extended Producer Responsibility
EQA	Economic Quality Authority
FI	Fees and Incentives
GHG	Greenhouse Gas
GP	Governmental Practices
JSC	Joint Services Councils
LF	Landfills
LGU	Local Government Units
LR	Legislation and regulation
MOLG	Ministry of Local Governments
PCBS	Palestinian Central Bureau of Statistics
PLS	The Partial Least Squares
SOC	Social Effect
SSWM	Sustainable Solid Waste Management
SWM	Solid Waste Management
WRC	Waste Reduction and Collection
3P	People, Privet sector, Public

References

Abu-Salah, B. R.-Y. (2016). Public Awareness and Attitude towards Solid Waste Management in the West Bank, Palestine. Waste Management & Research.

Agamuthu, P. (. (2019). Waste Management and Resource Efficiency: Proceedings of the International Conference on Waste Management and Resource Efficiency. Springer.

Ahsan, A. (2014). Assessment of Municipal Solid Waste Management System in a Developing Country. Chinese Journal of Engineering, 11.

al, Mohammed H. Al-Smadi et. (2020). Financial Sustainability of Municipal Solid Waste Management Systems in Palestinian Local Authorities. Waste Management & Research.

Al-Khatib, D. S. (2019). Public–private partnership in solid waste management. Environ Monit Assess.

Al-Khatib, I. A. (2009). A review of residential solid waste management in the occupied Palestinian Territory: a window for improvement? Waste Management & Research. The Journal for a Sustainable Circular Economy.

Al-Khatib, I. A. (2019). Barriers on the propagation of household solid waste recycling practices in developing countries: State of Palestine example. Journal of Material Cycles and Waste Management.

Al-Khatib. (2010). Solid waste characterization, quantification and management practices in developing countries. a case study: Nablus district - Palestine. Journal of environmental management, 1131–1138.

Al-Smadi, M. H. (2020). Financial Sustainability of Municipal Solid Waste Management Systems in Palestinian Local Authorities. Waste Management & Research.

Ariva Sugandi Permana. (2015). Sustainable solid waste management practices and perceived cleanliness in a low income city. Elsevier, 197-205.

Broomfield, M. (2015). Review of Environmental and Health Effects of Management of Municipal Solid Waste.

Bryman, A. (2016). Social Research Methods.

Byrne, J. T. (2016). A review of renewable energy supply and energy efficiency technologies. Renewable and Sustainable Energy Reviews, 697-714.

Cohen. (1988). Set Correlation and Contingency Tables.

Cointreau, S. (2006). Integrated Solid Waste Management: A Lifecycle Inventory.

Dalia M. Qasem, S. F. (2018). Solid Waste Management Challenges in the Palestinian Territories. Waste Management & Research.

Dikgang, J. &. (2019). Determining factors for waste management practices in South Africa: A case study of Johannesburg. Waste Management & Research.

Donald Bruce, T. G.-C. (2012). The Impact of State and Local Taxation on Economic Growth: A Time Series–Cross Section Approach. Public Finance Review, 739-763.

Enviromental protection agency. (2012). Resource conservation and recovery. WASHINGTON, DC 20460.

European Environment Agency. (2018). Circular economy in Europe: Developing the knowledge base.

European Environment Agency. (2018). Circular Economy in Europe: Developing the Knowledge Base.

Fraenkel, J. R. (2012). How to Design and Evaluate Research in Education.

Frischmann, B. M. (2019). Re-Engineering Humanity. Cambridge University Press.

Fuss, S. L. (2018). Negative emissions—Part 2: Costs, potentials and side effects. Environmental Research Letters.

Global Green Growth Institute. (2019). Solid Waste Management Policies and Practices: A Case Study of Singapore. Singapore.

Goh, S. K., Ng, W. J., & Lim, J. W. (2012). Sustainable solid waste management - a case study of Singapore. Cleaner Production, 29-30, 38-46.

Hair, J. E. (2011). A primer on partial least squares structural equation modeling (pls-sem). United Kingdom: SAGE Publications, Inc.

Hair, J. F. (2020). Essentials of business research methods. New york: Routledge.

Halabi, Y. (2019). Waste management practices in Palestine: Current state, challenges, and prospects. Waste Management & Research.

Ham, R. K. (2013). Solid Waste: Assessment, Monitoring and Remediation.

Hancock, G. R. (2010). The Reviewer's Guide to Quantitative Methods in the Social Sciences. 270 Madison Avenue, New York: Routledge.

Henderson, R. M. (2019). Building a sustainable future. Harvard Business Review,, pp. 104-113.

Henseler, J. R. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 115–135.

Hettiarachchi, H. (2018). Municipal Solid Waste Management in Latin America and the Caribbean: Issues and Potential Solutions from the Governance Perspective.

Hischier, I. M. (2017). Analysis of Economic Incentives for Improving Solid Waste Management in Low-Income Countries: A Case Study in Uganda. Waste Management.

Hoornweg, D. &.-T. (2012). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.

Hoornweg, D. B.-T. (2013). Environment: Waste Production Must Peak This Century. Nature, 502(7473),, 615-617.

Johnson, M. S. (2021). Government Practices and Economic Development: A Study on the Role of Policies and Initiatives. Journal of Economic Policy.

Johnson, M., Smith, K., & Thompson,. (2022). Government Practices and Public Awareness: A Study on Waste and Disposal Methods.

Julio López-Laborda, F. R. (2003). Environmental Taxes on Intermediate and Final Goods When Pollution Is Abatement Technology Specific. Journal of Environmental Economics and Management, 87-103.

Jun Li, X. W. (2020). Government Policies and Residential Energy Consumption: Evidence from OECD Countries. Energy Economics, 1-10.

Kumar, S. &. (2018). Solid Waste Management: Policies and Case Studies.

Kumar, S. (2011). Integrated Waste Management.

Li, W. C. (2016). Plastic waste in the marine environment: A review of sources, occurrence and effects. Science of the total environment, 333-349.

Loay Assi, M. A. (2019). Solid Waste Management Challenges in Gaza Strip. Sustainability.

M. H.-S. (2020). Financial Sustainability of Municipal Solid Waste Management Systems in Palestinian Local Authorities. Waste Management & Research.

Mandpe, A. (2022). Circular economy approach for sustainable solid waste management: A developing economy perspective. The Journal for a Sustainable Circular Economy.

Marko Sarstedta, P. B. (2017). The use of sampling methods in advertising research: a gap between theory and practice. INTERNATIONAL JOURNAL OF ADVERTISING.

Michael Devereux, R. G. (2002). Corporate Income Tax Reforms and International Tax Competition. The Economic Journal, 37-61.

Moayad Shahateet et, a. (2015). Incentive-Based Municipal Solid Waste Management in Palestine. 2nd Palestine International Conference on Waste Management and Green Technologies. Palestine.

MOLG. (2014). National Strategy for Solid Waste.

MOLG. (2017). National Strategy for Solid Waste.

Musthafa, M. K. (2016). Public Awareness and Participation in Solid Waste Management in Urban Areas: A Case Study of Kollam City, India. International Journal of Environmental Studies.

Nabil Khaleefa, G. K. (2018). Solid Waste Management in Palestine: Current Practices and Challenges. Journal of Civil Engineering and Architecture.

Narayana, T. (2009). Municipal solid waste management in India: From waste disposal to recovery of resources? Waste Management, 1163–1166.

National Environment Agency. (2021). Waste Management and Recycling.

National Institute for Public Health. (2019). Greenhouse gas emissions in the Netherlands 1990–2019.

Nations Environment Programme. (2015). Waste Management: The Key to Sustainable Development.

Newhart, P. &. (June 2017). Understanding research methods: An overview of the essentials, tenth edition.

Nikolaos, K. (2008). Routing Optimization Heuristics Algorithms for Urban Solid Waste. WSEAS TRANSACTIONS on COMPUTERS.

Nilsson, M. G. (2016). Policy: map the interactions between Sustainable Development Goals. Nature, 534(7607).

Pires, A. (2019). Waste hierarchy index for circular economy in waste management. Waste Management, 298-305.

Pizzol, M. &. (2012). Waste management in European countries: A review of systems analysis techniques. Journal of Environmental Management.

Psomopoulos a, C.S. (2009). Waste-to-energy: A review of the status and benefits in USA. Waste Management, pp. 1718-1724.

Ramitha, K. (2021). A Cross-Sectional Study on Occupational Health and Safety of Municipal Solid Waste Workers in Telangana, India. Indian J Occup Environ Med., 169-177.

Randy Becker, V. L. (2015). Determinants of the Level of Public Recycling Effort: An Economic Analysis. Resource and Energy Economics.

Rockström, J. G. (2017). A roadmap for rapid decarbonization. Science, 355(6331).

Roland Clift, J. D. (2012). Sustainable Materials Management: A Comprehensive Literature Review on Strategies for Achieving Sustainability in Materials Management. Journal of Industrial Ecology, 14-27.

Sachs, J. D.-T. (2019). Sustainable development report 2019: Transformations to achieve the sustainable development goals. Cambridge University Press.

Shen, L. C. (2020). Mapping global research trends in sustainable development from 1993 to 2017: A bibliometric analysis. Journal of Cleaner Production.

Smith, A. J. (2018). Sustainability assessment in the 21st century: A review and outlook. Sustainability.

Smith, J., Johnson, A., & Thompson, L. (2020). The Impact of Government Practices on Community Conditions: A Study on Quality of Life and Citizen Health.

Smith, J., Johnson, A., & Thompson, L. (2022). Government Practices and Public Health: A Study on the Impact of Policies and Regulations.

Statistics, N. C. (2011). New scarcity and economic growth more welfare through less production? New york • oxford: north-holland publishing company amsterdam.

Tayeh, R. (2019). olid Waste Management Strategies via Waste to Energy (WtE) Potential Assessment in Palestine.

Tchobanoglous, G. T. (2013). Integrated Solid Waste Management: Engineering Principles and Management Issues. McGraw-Hill Education.

Teo, M. L. (2019). Singapore's experience in solid waste management and resource recovery.

The World Bank. (2012). WHAT A WASTE: A Global Review of Solid Waste ManagemenT. Washington, DC 20433 USA: Daniel Hoornweg and Perinaz Bhada-Tata.

Thompson, K. V. (2014, Nov. 26). Estimating Population Size with Link-Tracing Sampling.

UNEP. (2015). Global Waste Management Outlook.

UNEP. (n.d.). Solid Waste Management in the Occupied Palestinian Territory.

United Nations. (2016). Sustainable Development Goals.

United Nations. (2020). Water and Climate Change.

Velis, C. A. (2017). Integrating informal waste recycling and modern waste management in the South: Challenges and opportunities. Waste Management.

Waddock, S. (2019). Corporate sustainability: A strategy, A philosophy, A religion, A disorder. Journal of Business Research, 365-372.

Wetzels, M. (2009). Using pls path modeling for assessing hierarchica construct models: guidelines and empirical illustration. Mis quarterly, 177-195.

Wilson DC, R. L. (2016). Comparative analysis of solid waste management in cities around the world. UK (Townshend M (ed.).

World Bank. (2012). What a Waste: A Global Review of Solid Waste Management.

Zhang, C. (2022). An overview of the waste hierarchy framework for analyzing the circularity in construction and demolition waste management in Europe. Science of the Total Environment.

Zhang, D. Q., & Keat, T. S.. (2017). The success of the National Recycling Programme in Singapore. Waste Management & Research

Appendices

Appendix A

Information and Data Analysis Tables

Table A.1

General classification of wastes

Classification	Waste Description
Type 1	A mixture of highly combustible waste, primarily paper, cardboard, wood, boxes and combustible floor sweepings, mixtures may contain up to 10% by volume of plastic bags, coated paper, laminated paper, treated corrugated cardboard, oily rags and plastic rubber Scraps. Commercial and industrial Sources
Type 2	A mixture of combustible waste such as paper, cardboard, wood scrap, foliage, floor sweepings and up to 20% cafeteria waste. Commercial and industrial sources
Type 3	Rubbish and garbage. Residential sources
Type 4	Animal and vegetation waste from restaurants, cafeterias, hotels, etc. Institutional, club and commercial sources
Type 5	Human and animal remains consisting of carcasses, organs and solid tissue wastes from farms, laboratories and animal pounds
Type 6	Medical waste including sharps pathological, surgical and associated infectious waste materials
Type 7	Department store waste
Type 8	School waste with lunch programs
Type 9	Supermarket waste
Type 10	Other wastes

Table A.2

Solid waste type according to its sources, and its main generators

#	Waste source	Main generator of waste
1	Residential	Residential communities
2	Industrial	Heavy and light industries - construction industries - power plants
3	Commercial	Commercial stores - hotels - markets - restaurants - commercial offices.
4	Institutions	Schools - hospitals - airports - governmental and non-governmental buildings
5	Construction and demolition waste	New construction sites - road maintenance - repair sites - building demolition
6	Municipal services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants
7	medical waste	Hospitals, health care centers, and medical clinics.
8	Process	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing.
9	Agriculture	Crops, orchards, vineyards, dairies, feedlots, farms

NOTE: Refer to (Abdella Ahmed et al., 2022)

Table A.3

The quantities of waste produced according to the area

Area	Quantities (ton/month)
Ramallah & Al Biereh	3300
Jericho	1110
Jenin	7050
Tubas	1080
Qalqilya	2550
Tukaram	1800
Hebron	8670
Northeast and Southeast Jerusalem	3000
Bethlehem	3825
Salfit	8670
Nablus	2520

Table A.4

Average solid waste production in the West Bank according to the residential area

Residential area	Solid waste production (kg/person)
City	1-0.8
Rural	0.5-0.7
refugee camps	0.6-.04

Table A.5

The types of solid waste in West Bank according to its source

Waste source	Domestic	Industrial	Commercial	Agricultural	Others
Percentage	45-50%	15-20%	20-25%	8-12%	0-4%

Table A.6

List of sanitary landfills in the West Bank

Sanitary landfills	Location	Targeted area	Served area	Received quantity (tons/day)
Zahret Al-Fenjan	Jenin Governorate	North of West Bank	Jenin Area Tubas Area Tulkarem Area Qalqelia Area Nablus Area Parts of Ramallah Area (Ramallah City, Al Bireh City, and Bitunia City)	1200
Jericho	Jericho Governorate	Jericho Governorate	Jericho Area	55
Al-Menya	Bethlehem Governorate	South of West Bank	Hebron Area Bethlehem Area NE&SE Jer. Area	1000
Biet Anan	Jerusalem Governorate	North and North west Jerusalem	North and North west Jerusalem & part of Ramallah LGUs	90

Table A.7

Random Dumpsites in waste bank

#	Location	No. of random dumpsite	Quantities (tons/day)
1	Salfit	9	66
2	Nablus	12	77
3	Ramallah & Al Biereh	50	200
Total		71	343

Table A.8

Operationalization Of Model constructs

Construct	Construct Items	Adopted from
Regulations and Laws (LR)	The factory management is aware of the regulations and laws regarding solid waste management and the penalties imposed on those who violate the rules and regulations	(Wilson, 2016)
	The implementation of government practices has helped ensure compliance with international laws and regulations.	(MOLG, 2017)
Fees and incentives (FI)	The government provides an enabling environment, incentive systems, loans, and facilitations to encourage factories to invest in the solid waste sector.	(MOLG, 2017)
	The necessary incentives are provided to the factory to encourage the implementation of clean production practices	
	The fees associated with waste services provided by government entities are aligned with the services rendered.	(MOLG, 2019)
Awareness And Guidance (AG)	Government institutions implement programs and campaigns to raise awareness among factories about the technical, health, and environmental aspects related to solid waste.	(Wilson DC, 2016)
	Government entities carry out activities and workshops to educate factories about the importance of waste reduction, recycling, and reuse (3R's).	(MOLG, 2017).
Waste collection and reduction (WRC)	The factory possesses sufficient awareness that helps in implementing initiatives aimed at reducing the quantity of waste generated.	(Halabi, 2019)
	Government practices encourage the factory to minimize waste production.	
	Government institutions encourage the factory to take necessary measures to reduce waste generation to the minimum level.	
	Government institutions promote the adoption of necessary measures for solid waste reuse.	(MOLG, 2017).
	The factory collaborates with relevant government institutions in the field of solid waste recycling.	
	The services provided, container quantities, and sizes are aligned with the quantity and type of waste produced.	

Economic Effect	Government practices have led to a reduction in energy consumption costs.	(Li, 2020)
	Government practices have resulted in lower costs of purchasing raw materials and resource conservation.	(Clift, 2012)
	Government practices have led to a decrease in waste treatment and disposal fees.	(Becker, 2015)
	Government practices have increased productivity and improved efficiency.	(Donald Bruce, 2012)
	Government practices have created employment opportunities.	(UN, 2016)
	Government practices have provided investment opportunities.	(Pires, 2011)
	Government practices have ensured compliance with laws and regulations, resulting in a decrease in factory violations and facilitating the acquisition of international certifications.	(Wilson DC, 2016)
Environmental Effect	Government practices have led to a reduction in environmental pollution.	(UN, 2016)
	Government practices have contributed to the protection of natural resources.	
	Government practices have resulted in a decrease in gas emissions.	(Rodionov, 2011)
	Government practices have improved the quality of water and air.	
Social Effect	Government practices have led to improvements in public health and safety.	(Johnson, 2021)
	Government practices have contributed to the development of economic activities	(Johnson, 2021)
	Government practices have resulted in increased public awareness about waste and disposal methods	(MOLG, 2017)
	Government practices have led to improvements in community conditions, resulting in an enhancement of quality of life and citizen health.	(MOLG, 2017).

Table A.9

Sample size recommendation in PLS-SEM for a statistical power of 80%

Maximum Number of Arrows Pointing at a Construct	*Significance Level*											
	%1				5%				10%			
	Minimum R^2				*Minimum* R^2				*Minimum* R^2			
	0.10	*0.25*	*0.50*	*0.75*	*0.10*	*0.25*	*0.50*	*0.75*	*0.10*	*0.25*	*0.50*	*0.75*
2	158	75	47	383	10	52	33	26	88	41	26	21
3	176	84	53	42	124	59	38	30	100	48	30	25
4	131	91	.58	46	137	65	42	33	111	53	34	27
5	205	98	62	50	1477	70	45	36	120	58	37	30
6	217	103	66	53	157	75	483	39	128	62	40	32
7	228	109	69	56	166	80	51	41	136	66	42	35
8	238	114	73	59	174	84	54	44	143	69	45	37
9	247	119	76	62	1831	88	57	46	150	73	47	39
10	256	123	79	64	189	91	59	48	156	76	49	41

Source: Cohen, J A power primer *Psychological Bulletin,* 112,15-51

NOTE: Refer to (Hair, 2011).

Table A.10

Respondents profile summary

NO.	Item	Option	Frequency	Percentage
1	Organization Sector	Paper industry	7	8.75%
		Metal and engineering industry	28	35%
		Plastic industry	8	10%
		Food industry	37	46.25%
		Total	80	100%
2	Type of waste produced	Paper and cardboard	13	16.25%
		Organic	20	25.00%
		Plastic	18	22.50%
		Glass	0	0.00%
		Metals	29	36.25%
		Total	80	100%
3	Factory Location	Southern governorates	28	35.00%
		Northern governorates	32	40.00%
		Central governorates	20	25.00%
		Total	80	100%
4	Factory age	Less than 5 years	33	41.25%
		6-10 years	25	31.25%
		11-15 years	12	15.00%
		More than 15 years	10	12.50%
		Total	80	100%
5	Having a formal environmental certification	ISO 9001	60	49.59%
		ISO 14000	6	4.96%
		GMP	20	16.53%
		HASAP	35	28.93%
		Total	121	100.00%
6	Job site	Engineer	58	72.50%
		Administrative	22	27.50%
		Technical	0	0.00%
		Total	80	100%
7	Waste collection responsibility	Municipalities	30	37.50
		Joint Service Councils	50	62.50
		UNRWA	0	0.00
		Total	80	100%

Table A.11

Descriptive Analysis Of All Aspects Of The Questionnaire

Indicator	Mean	Standard deviation
LR 1	3.862	0.997
LR 2	2.612	0.873
AG 1	2.462	0.908
AG 2	2.263	0.848
WRC 1	2.962	1.269
WRC 2	2.263	0.877
WRC 3	2.212	0.876
WRC 4	2.150	0.950
WRC 5	2.150	0.937
WRC 6	2.513	0.975
FI 1	2.013	0.955
FI 2	2.050	0.973
FI 3	2.500	0.866
ENV1	2.612	0.829
ENV2	2.612	0.829
ENV3	2.550	0.805
ENV4	2.800	0.914
ECO1	2.250	0.915
ECO2	2.125	0.900
ECO3	2.087	0.938
ECO4	2.237	0.912
ECO5	2.087	0.951
ECO6	2.288	0.990
ECO7	2.225	1.024
SOC1	2.737	0.877
SOC2	2.638	0.925
SOC3	2.671	0.853
SOC4	2.612	0.798

Table A.12

Constructs Measurement Properties.

Construct	Construct Items	Items Loading	CR	AVE
LR	LR 2	1	-	-
FI	FI 1	0.844	0.849	0.654
	FI 2	0.868		
	FI 3	0.705		
AG	AG 1	0.873	0.837	0.721
	AG 2	0.825		
WRC	WRC 1	0.627	0.878	0.549
	WRC 2	0.843		
	WRC 3	0.796		
	WRC 4	0.777		
	WRC 5	0.728		
	WRC 6	0.650		
ECO	ECO1	0.759	0.924	0.634
	ECO2	0.822		
	ECO3	0.750		
	ECO4	0.874		
	ECO5	0.736		
	ECO6	0.788		
	ECO7	0.835		
ENV	ENV1	0.886	0.910	0.718
	ENV2	0.865		
	ENV3	0.902		
	ENV4	0.725		
SOC	SOC1	0.858	0.867	0.622
	SOC2	0.704		
	SOC3	0.794		
	SOC4	0.790		

Table A.13

Cross loading discriminant validity

	AG	ECO	ENV	FI	LR	SOC	WRC
AG1	0.873	0.565	0.557	0.559	0.510	0.462	0.611
AG2	0.825	0.472	0.351	0.528	0.526	0.362	0.555
ECO1	0.458	0.759	0.581	0.481	0.387	0.602	0.582
ECO2	0.446	0.822	0.604	0.533	0.253	0.634	0.585
ECO3	0.455	0.750	0.655	0.488	0.377	0.561	0.481
ECO4	0.572	0.874	0.674	0.510	0.461	0.676	0.674
ECO5	0.501	0.736	0.521	0.500	0.372	0.592	0.623
ECO6	0.476	0.788	0.623	0.481	0.418	0.643	0.532
ECO7	0.503	0.835	0.657	0.570	0.447	0.763	0.549
ENV1	0.595	0.711	0.886	0.610	0.518	0.693	0.750
ENV2	0.453	0.723	0.865	0.529	0.414	0.684	0.672
ENV3	0.452	0.670	0.902	0.539	0.392	0.691	0.623
ENV4	0.294	0.494	0.725	0.401	0.248	0.640	0.306
FI 1	0.529	0.510	0.472	0.844	0.515	0.429	0.539
FI 2	0.629	0.599	0.524	0.868	0.596	0.546	0.708
FI 3	0.369	0.426	0.518	0.705	0.388	0.437	0.496
LR 2	0.608	0.489	0.476	0.627	1.000	0.453	0.584
SOC1	0.360	0.668	0.675	0.457	0.357	0.858	0.470
SOC2	0.399	0.532	0.483	0.350	0.399	0.704	0.377
SOC3	0.427	0.678	0.677	0.526	0.289	0.794	0.479
SOC4	0.360	0.649	0.657	0.498	0.394	0.790	0.501
WRC 1	0.240	0.380	0.350	0.400	0.427	0.279	0.627
WRC 2	0.639	0.642	0.676	0.632	0.508	0.607	0.843
WRC 3	0.588	0.618	0.660	0.646	0.451	0.542	0.796
WRC 4	0.465	0.480	0.526	0.482	0.281	0.417	0.777
WRC 5	0.612	0.608	0.520	0.542	0.499	0.406	0.728
WRC 6	0.407	0.416	0.353	0.478	0.424	0.228	0.650

Appendix B

Research Questionnaire in English

Graduate Studies College

Engineering Management Program

"Questionnaire about assessment the Impact of Government Practices towards Sustainable Solid Waste Management"

Dear respondent,

The researcher is conducting a study on "Assessment the Impact of Government Practices towards Sustainable Solid Waste Management." The study focuses on the issue of solid waste generated by factories and examines government practices regarding these wastes and the extent to which sustainable practices are implemented to mitigate their environmental, economic, and social impacts.

This survey consists of three sections:

- Section 1: Aims to collect general information about the factories.
- Section 2: Comprises four axes with several questions aimed at evaluating government practices regarding factory waste.
- Section 3: Comprises three axes aimed at studying the impact of these practices on sustainable solid waste management.

Answering this questionnaire will take several minutes. Please read all parts carefully and choose the appropriate answers accurately and impartially, with full appreciation for your participation.

Note: This questionnaire and the information provided will be used for scientific research purposes only.

Regards,

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Researcher, Master of Engineering Management

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Part one: General information

Please answer the following questions:

- Organization Sector

( ) paper industries ( ) metal and engineering industries

( ) plastic industries ( ) Food industries

- Type of waste produced

( ) Paper and cardboard ( ) Organic waste

( ) Plastic ( ) Glass

( ) Metal

- Factory location

( ) Northern governorates ( ) Southern governorates

( ) Central governorates

- Factory age

( ) Less than 5 years ( ) 6-10 years

( ) 11-15 years ( ) More than 15 years

- The factory has one or more of the following certificates

( ) GMP ( ) HASAP

( ) ISO 9001 ( ) ISO 14000

- Waste collection responsibility

( ) Municipality ( ) Joint Service Councils

( ) UNRWA

- Job site

( ) Administrative ( ) Engineer

( ) Technician

Part Two: Assessments of government practices for factory waste

Regulations and Laws						
No	Statements	Not at all	To a slight degree	To a moderate degree	To a great degree	To a very great degree
1.	The factory management is aware of the regulations and laws regarding solid waste management and the penalties imposed on those who violate the rules and regulations.					
2.	The implementation of government practices has helped ensure compliance with international laws and regulations.					
Awareness And Guidance						
No	Statements	Not at all	To a slight degree	To a moderate degree	To a great degree	To a very great degree
1.	Government institutions implement programs and campaigns to raise awareness among factories about the technical, health, and environmental aspects related to solid waste.					
2.	Government entities carry out activities and workshops to educate factories about the importance of waste reduction, recycling, and reuse (3R's).					

Waste collection and reduction						
No	Statements	Not at all	To a slight degree	To a moderate degree	To a great degree	To a very great degree
1.	The factory possesses sufficient awareness that helps in implementing initiatives aimed at reducing the quantity of waste generated.					
2.	Government practices encourage the factory to minimize waste production.					
3.	Government institutions encourage the factory to take necessary measures to reduce waste generation to the minimum level.					
4.	Government institutions promote the adoption of necessary measures for solid waste reuse.					
5.	The factory collaborates with relevant government institutions in the field of solid waste recycling.					
6.	The services provided, container quantities, and sizes are aligned with the quantity and type of waste produced.					
Fees and incentives						
No	Statements	Not at all	To a slight degree	To a moderate degree	To a great degree	To a very great degree
1.	The government provides an enabling environment, incentive systems, loans, and facilitations to encourage factories to invest in the solid waste sector.					
2.	The necessary incentives are provided to the factory to encourage the implementation of clean production practices					
3.	The fees associated with waste services provided by government entities are aligned with the services rendered.					

Part Three: Effect of Government Practices on Sustainable Solid Waste Management in Factories

Environmental Effect						
No.	Statements	Not at all	To a slight degree	To a moderate degree	To a great degree	To a very great degree
1.	Government practices have led to a reduction in environmental pollution.					
2.	Government practices have contributed to the protection of natural resources.					
3.	Government practices have resulted in a decrease in gas emissions.					
4.	Government practices have improved the quality of water and air.					
Economic Effect						
No.	Statements	Not at all	To a slight degree	To a moderate degree	To a great degree	To a very great degree
1.	Government practices have led to a reduction in energy consumption costs.					
2.	Government practices have resulted in lower costs of purchasing raw materials and resource conservation.					
3.	Government practices have led to a decrease in waste treatment and disposal fees.					
4.	Government practices have increased productivity and improved efficiency.					
5.	Government practices have created employment opportunities.					
6.	Government practices have provided investment opportunities.					
7.	Government practices have ensured compliance with laws and regulations, resulting in a decrease in factory violations and facilitating the acquisition of international certifications.					

Social Effect						
No.	Statements	Not at all	To a slight degree	To a moderate degree	To a great degree	To a very great degree
1.	Government practices have led to improvements in public health and safety.					
2.	Government practices have contributed to the development of economic activities					
3.	Government practices have resulted in increased public awareness about waste and disposal methods					
4.	Government practices have led to improvements in community conditions, resulting in an enhancement of quality of life and citizen health.					

Appendix C

Research Questionnaire in Arabic

جامعة النجاح الوطنية

كلية الدراسات العليا

برنامج الإدارة الهندسية

"استبانة حول تقييم أثر الممارسات الحكومية تجاه الإدارة المستدامة للنفايات الصلبة"

عزيزي القارئ،

تحية طيبة،

تقوم الباحثة بإجراء دراسة حول " **تقييم أثر الممارسات الحكومية تجاه الادارة المستدامة للنفايات الصلبة**"، حيث تركز الدراسة على قضية النفايات الصلبة الناتجة من المصانع ودراسة ممارسات الحكومة تجاه هذه النفايات ومدى تطبيق الممارسات المستدامة للحد من الاضرار البيئية و الاقتصادية والاجتماعية لهذه النفايات.

تتكون هذه الاستبانة من ثلاثة أقسام:

القسم الأول: يهدف إلى جمع معلومات عامة عن المصانع.

القسم الثاني: يتكون من ثلاثة محاور يندرج تحتها عدد من الاسئلة والتي تهدف الى تقييم الممارسات الحكومية لنفايات المصانع.

القسم الثالث: يتكون من ثلاثة محاور تهدف الى دراسة أثرهذه الممارسات تجـــاه الادارة المســـتدامة للنفايـــات الصلبة.

سوف تستغرق الإجابة على هذا الاستبيان عدة دقائق، يرجى قراءة جميع الأجزاء بعنايـــة، واختيـــار الإجابـــة المناسبة بدقة وحيادية مع التقدير الكامل لمشاركتك.

الباحثة: منى أيمن شبيطة

ماجستير إدارة هندسية

ايميل: muna.ayman1996@gmail.com

جوال: 00972595518519

ملاحظة: هذه الاستبانة والمعلومات الواردة بها ستستخدم لأغراض البحث علمي فقط.

القسم الأول: المعلومات العامة

يرجى التكرم بالإجابة عن الأسئلة التالية:

- **قطاع الصناعة**

( ) الصناعات الورقية ( ) الصناعات الانشائية

( ) الصناعات المعدنية والهندسية ( ) الصناعات البلاستيكية

( ) الصناعات الغذائية ( ) الصناعات الخشبية

( ) صناعة الحجر والرخام ( ) غير ذلك، اذكرها---------

- **نوع النفايات المنتجة في المصنع**

( ) الورق والكرتون ( ) النفايات العضوية

( ) بلاستيك ( ) الزجاج

( ) المعادن ( ) غير ذلك، اذكرها ----------

- **موقع المصنع**

( ) محافظات الشمال ( ) محافظات الجنوب

( ) محافظات الوسط

- **عمر المصنع**

( ) أقل من 5 سنوات ( ) 6-10 سنوات

( ) 11-15 سنة ( ) اكثر من 15 سنة

- **لدى المصنع واحدة او اكثر من الشهادات الاتية**

( ) GMP ( ) HASAP

( ) ISO 9001 ( ) ISO 14000

( ) غير ذلك، اذكرها---------

- **من المسؤول عن جمع نفايات من المصنع؟**

( ) البلدية ( ) مجالس الخدمات المشتركة

( ) الاونروا ( ) غير ذلك، حدد ---------

- **الموقع الوظيفي**

( ) اداري ( ) مهندس

( ) فني ( ) غير ذلك، حدد ---------

القسم الثاني: تقييم الممارسات الحكومية لنفايات المصانع

	الفقرة	بدرجة كبيرة جدا	بدرجة كبيرة	بدرجة متوسطة	بدرجة قليلة	بدرجة قليلة جدا
الاول	**الاطر القانونية والتشريعية**					
1	يوجد لدى إدارة المصنع وعي بالأحكام والقوانين الخاصة بإدارة النفايات الصلبة بالإضافة الى المخالفات التي تصدر بحق المخالفين للأنظمة والقوانين					
2	ساعد تطبيق الممارسات الحكومية على الإنسجام مع القوانين واللوائح الدولية					
الثاني	**الوعي والارشاد**					
3	تُنفذ برامج وحملات من قبل المؤسسات الحكومية لتوعية المصنع في الجوانب الفنية والصحية والبيئية المتعلقة بالنفايات الصلبة					
4	تُنفذ الجهات الحكومية نشاطات وورش عمل لتوعية المصنع بأهمية تقليل و إعادة تدوير النفايات واعادة استخدامها(3R'S)					
الثالث	**جمع النفايات والتقليل منها**					
5	يوجد وعي كافي لدى المصنع من شأنه المساعدة في تطبيق المبادرات التي تهدف الى تقليل كميات النفايات المنتجة					
6	تشجع الممارسات الحكومية المصنع على تقليل كميات النفايات المنتجة					
7	تشجع الجهات الحكومية المصنع على اتخاذ التدابير اللازمة لتقليل انتاج النفايات الى ادنى حد					

8	تشجع الجهات الحكومية المصنع على اتخاذ التدابير اللازمة لإعادة استخدام النفايات الصلبة					
9	يشترك المصنع مع المؤسسات الحكومية ذات العلاقة في مجال إعادة تدوير النفايات الصلبة الناتجة عنه					
10	تتلائم الخدمات المقدمة، أعداد الحاويات وأحجامها مع كميات النفايات المنتجة ونوعيتها					
الرابع	**الرسوم والحوافز**					
11	توفر الحكومة البيئة التمكينية ونظم الحوافز والقروض والتسهيلات لتشجيع المصنع على الاستثمار في قطاع النفايات الصلبة					
12	يتم توفير الحوافز الضرورية للمصنع لتشجيع تطبيق تجارب الانتاج النظيف					
13	تتلائم الرسوم مع خدمات النفايات المقدمة من قبل الجهات الحكومية					

القسم الثالث: اثر الممارسات الحكومية على الادارة المستدامة للنفايات الصلبة في المصانع

	الفقرة	**بدرجة كبيرة جدا**	**بدرجة كبيرة**	**بدرجة متوسطة**	**بدرجة قليلة**	**بدرجة قليلة جدا**
الاول	**التأثير البيئي**					
1	أدت الممارسات الحكومية الى تخفيض التلوث البيئي					
2	أدت الممارسات الحكومية الى حماية الموارد الطبيعية					
3	أدت الممارسات الحكومية الى الحد من الانبعاثات الغازية					
4	أدت الممارسات الحكومية الى تحسين جودة الماء والهواء					
الثاني	**التأثير الاقتصادي**					
5	أدت الممارسات الحكومية الى انخفاض تكلفة استهلاك الطاقة					
6	أدت الممارسات الحكومية الى انخفاض تكاليف شراء المواد الخام وتوفير الموارد					

7	أدت الممارسات الحكومية الى تخفيض رسوم معالجة النفايات والتخلص منها					
8	أدت الممارسات الحكومية الى زيادة الانتاجية وتحسين الكفاءة					
9	أدت الممارسات الحكومية الى توفير فرص العمل					
10	أدت الممارسات الحكومية الى توفير الفرص الاستثمارية					
11	أدت الممارسات الحكومية الى التوافق مع القوانين واللوائح الأمر الذي أدى الى تقليل المخالفات المترتبة على المصنع وتسهيل الحصول على الشهادات الدولية					
الثالث	**التأثير الاجتماعي**					
12	أدت الممارسات الحكومية الى تحسين الصحة والسلامة العامة					
13	أدت الممارسات الحكومية الى تنمية الأنشطة الاقتصادية					
14	أدت الممارسات الحكومية الى زيادة الوعي المجتمعي حول النفايات وطرق التخلص منها					
15	أدت الممارسات الحكومية الى تحسين الظروف المجتمعية التي تؤدي الى تحسين جودة الحياة وصحة المواطنين					

ملاحظات:.....

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شكرا لتعاونكم

جامعة النَّجاح الوطنيَّة
كليَّة الدّراسات العليا

تقييم أثر ممارسات الحكومة الفلسطينية تجاة الادارة المستدامة للنفايات الصلبة الصناعية في الضفة الغربية

إعداد
منى أيمن سعيد شبيطة

إشراف
د. محمد السيد
د. شادي صوالحة

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

2023

تقييم أثر ممارسات الحكومة الفلسطينية تجاة الادارة المستدامة للنفايات الصلبة الصناعية في الضفة الغربية

إعداد

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إشراف

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د. شادي صوالحة

الملخص

تُعَدُّ إدارة النفايات الصلبة المستدامة قضية بحثية ذات أهمية بالغة، ولقد تم تسليط الضوء عليها بشكل كبير خلال السنوات الأخيرة. تهدف هذه الدراسة إلى تقييم أثر الممارسات الحكومية الفلسطينية في إدارة النفايات الصلبة المستدامة، ودراسة وتقييم مستوى تنفيذ هذه الممارسات في القطاع الصناعي في فلسطين، اضافة الى عرض المعيقات التي تواجه الحكومة الفلسطينية وتمنعها من تطبيق ممارساتها بصورة صحيحة وفعالة.

لتحقيق هذه الأهداف تم تطوير نموذج بحثي يربط بين متغيرات الدراسة والتي استخدم فيها الممارسات الحكومية كمتغير مستقل يتكون من: الوعي والارشاد، الحوافز والرسوم، القوانين والتشريعات بالاضافة الى جمع النفايات والتقليل منها، والادارة المستدامة للنفايات الصلبة كمتغير تابع تم دراسته من خلال جوانبه الثلاث البيئية، الاقتصادية والاجتماعية. استُخدام النهج الكمي في الدراسة حيث تم جمع البيانات من خلال استخدام الاستبيان. حيث تم جمع 80 استبياناً من قطاع الصناعة في فلسطين، تم تقييم نموذج البحث باستخدام برنامج SMART-PLS.

أظهرت النتائج أن مستوى تطبيق الممارسات الحكومية في قطاع الصناعة متوسط، نتيجة لوجود العديد من العوائق مثل: نقص مصادر التمويل، ضعف القدرات المؤسساتية، محدودية الوعي العام بالاضافة الى الوضع السياسي، الاجتماعي والاقتصادي. إضافة إلى ذلك، كشفت اختبارات الفرضيات وجود تأثير إيجابي ومهم بين الممارسات الحكومية والادارة المستدامة للنفايات الصلبة، اضافة الى وجود علاقة ايجابية مهمه بين الممارسات الحكومية والاستدامة البيئية والاقتصادية والاجتماعية للنفايات الصلبة في فلسطين.

اضافة لما سبق تم استعراض معيقات الدراسة وبعض التوصيات للجهات الحكومية الفلسطينية يمكن الاخذ بها لتحسين واقع النفايات الصلبة والعمل على ايجاد حلول مستدامة من كافة النواحي البيئية، الاقتصادية والاجتماعية.

الكلمات المفتاحية: الممارسات الحكومية، الادارة المستدامة للنفايات الصلبة، النفايات الصلبة.