An-Najah National University
Faculty of Graduate Studies

ASSESSING THE IMPACT OF ADOPTING GREEN INNOVATION PRACTICES ON SUSTAINABLE PERFORMANCE IN THE PALESTINIAN CONSTRUCTION INDUSTRY: GREEN ORGANIZATIONAL CULTURE AS A MODERATOR

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Dedication

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

To my dearest father, my idol,
who taught me tenacity, whose sacrifices paved my way toward success.

To my beloved mother, my inspiration,
whose prayers, boundless support, and unwavering faith in me always push me forward.

To my lovely sisters, my safe place,
who have always encouraged me throughout this journey.

To everyone who supported me, even with one word.

I dedicate this thesis.

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I would thank my friends and all participants in the survey from the Palestinian construction industry.

Lastly, I would like to express my deep gratitude to everyone who guided me directly or indirectly during work on this thesis.

Declaration

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

ASSESSING THE IMPACT OF ADOPTING GREEN INNOVATION PRACTICES ON SUSTAINABLE PERFORMANCE IN THE PALESTINIAN CONSTRUCTION INDUSTRY: GREEN ORGANIZATIONAL CULTURE AS A MODERATOR

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.

Student's Name: **Maryana Naser Wajih Faour**

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Date: **17/06/2025**

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Abstract

The construction industry is considered one of the largest contributors to environmental degradation; therefore, most scholars are recently seeking to integrate green practices within this industry to achieve a sustainable future. Accordingly, this study aims to investigate the impact of adopting green innovation (GI) practices on sustainable performance in its three pillars (i.e., environmental, social, and economic) in the Palestinian construction industry, in addition to exploring the moderating effect of green organizational culture (GOC) on this relationship. For this purpose, a quantitative research approach using a self-administered questionnaire was adopted. The target population consists of key practitioners in the Palestinian construction industry, i.e., contracting, consulting, and engineering firms, in which specific classifications were identified for these firms to be included in the sampling frame. Thus, 143 valid responses were obtained, one response from each firm, and the SmartPLS software was used to analyze the study model and test the proposed hypotheses. The findings show that the level of adopting GI practices and sustainable performance in Palestinian construction firms is high, whereas GOC is being implemented at a moderate level. Besides, the findings indicate a positive and significant relationship between the adoption of GI practices and sustainable performance. Further, GOC positively impacts both adopting GI practices and sustainable performance and also positively moderates the relationship between them. Undoubtedly, highlighting green concepts in a challenging context like Palestine, which suffers from political instability, ongoing conflict, and limited resources, has significant implications. In detail, the study contributes to GI theory by emphasizing the importance and effectiveness of adopting GI practices in conflict-affected and resource-constrained contexts, as well as to the GOC theory by confirming its ability to facilitate the adoption of GI practices and achieve sustainable performance. The study

encourages policymakers and stakeholders to transform conventional construction activities into greener ones and contributes to bridging the gap regarding the misconception of GI and its impact on sustainable performance in the construction industry. Based on the available literature, this is the first study to explore the moderating role of GOC between the adoption of GI practices and sustainable performance in the Palestinian construction industry.

Keywords: Green innovation, sustainable performance, green organizational culture, construction industry.

Chapter One

Introduction and Literature Review

1.1 Chapter Overview

This chapter represents the basic foundation for the research, as it offers a broad summary of the research subject, including a general background, research problem statement, significance, objectives, hypotheses, and the study's overall structure. In addition, this chapter focuses on conducting a comprehensive literature review to determine what previous studies have found in the context of the topic under study. Accordingly, the chapter reviews theoretical studies relevant to the study topic and the concepts addressed, including green innovation practices, green organizational culture, and sustainable performance. Moreover, the nature of the relationships between these variables within the construction industry was clarified, leading to the development of research hypotheses in line with the literature review. The chapter seeks to provide the Palestinian construction industry and other stakeholders with a deeper grasp of the expected relationship between adopting green innovation practices and sustainable performance, with green organizational culture acting as a moderator.

1.2 General Background

The construction industry contributes significantly to economic growth, employment generation, and enhancing quality of life through providing shelter and infrastructure development, as well as meeting the needs for commercial activities, educational services, and manufacturing operations (Bohari et al., 2016). Indeed, Mavi et al. (2021) asserted that around 13% of the total global gross domestic product (GDP) is derived from the worldwide construction industry, whereas based on the Palestinian Central Bureau of Statistics [PCBS] (2024), the Palestinian construction industry contributes nearly 3.1% to the country's GDP.

Although the construction industry has beneficial contributions, it substantially affects the environment. In more detail, Khan et al. (2024) confirmed that the construction industry is considered one of the key generators of environmental pollution (including air, water, noise, and waste pollution) and emissions of hazardous gases, in addition to consuming substantial amounts of natural resources and energy. In this regard, Yusof et al. (2015) and Duong et al. (2021) reported that the construction sector consumes 40% of

global energy and utilizes more than 50% of extracted raw materials. Accordingly, these detrimental ecological effects of construction activities have raised awareness regarding the ability of the sustainability concept to address environmental challenges.

Consequently, Aghimien et al. (2018) defined sustainability as the balanced use of natural resources to preserve the ability of next generations to fulfill their demands. Regarding the construction industry, the concept of sustainability has emerged as one of the key performance-related issues in this industry and is referred to as sustainable construction (Pero et al., 2017). Therefore, Bohari et al. (2016) pointed out that sustainable construction relates to the attainment of sustainable development within the built environment and is responsible for reducing the ecological footprint of the building throughout its lifespan while ensuring a comfortable and safe life for its inhabitants. In sum, construction firms nowadays seek to take sustainability into account in order to enhance their performance and move from traditional performance to sustainable performance. In this regard, Aghimien et al. (2018) mentioned that sustainable performance includes three pillars: social performance, environmental performance, and economic performance.

Generally, improving sustainable performance requires construction firms to investigate and explore green initiatives that can be embedded within their activities and processes. Accordingly, Shamsuzzoha et al. (2022) mentioned that green innovation (GI) is among the most significant green initiatives to achieve sustainable performance, and they defined GI as an environmental strategic tool that involves applying eco-friendly practices within the firm's operations to reduce pollution and use resources efficiently. Undoubtedly, the adoption of GI practices has remarkable results on the firm's sustainability. In the context of supporting this notion, Xie et al. (2019) found in a study conducted on 209 Chinese manufacturing firms that green process innovation positively impacts the firm's sustainable performance. Similarly, Alsharif and Tong (2019) revealed that green product innovation in the construction sector focuses mainly on waste minimization, energy saving, and pollution control, which leads to improved environmental performance.

Accordingly, insights from existing literature suggest that there is a clear correlation between GI and sustainable performance. In the construction industry context, Duong et al. (2021) affirmed that while the adoption of GI has the potential to improve product differentiation and draw in new clients, construction firms are still reluctant to adopt GI

practices because of funding constraints. Therefore, the study investigated the effect of adopting GI practices on sustainable performance within the Palestinian construction industry.

On the other hand, previous studies proposed another emerging green strategy that has gained much attention recently, called green organizational culture (GOC), which is described by Roscoe et al. (2019) as the principles and values that guide various practices in the firm toward environmental preservation. In this regard, several studies have been carried out to explore the correlation between GOC and GI. For instance, Imran et al. (2021) stated that the successful application of GI practices is ensured by the existence of GOC, as it affects both the firm and its employees. In addition, Imran and Jingzu (2022) supported the relationship between GOC and GI and mentioned that firms should disseminate their green beliefs and ideas in advance among all their members if they want to adopt GI within their operations. Drawing on the previous discussion, it is clear that GOC facilitates the adoption of GI practices.

Furthermore, other researchers have taken interest in the effect of GOC on sustainable performance. In this regard, Küçükoğlu and Pınar (2018) pointed out that GOC creates an environment that promotes valuable sustainable outcomes within the firm; hence, GOC has a positive impact on sustainable performance. Additionally, Xiaoyi et al. (2023) found that GOC is positively correlated with business sustainability and showed that GI mediates the relationship between GOC and business sustainability in the Chinese manufacturing industry. Thus, GOC is one of the key drivers in enhancing a firm's sustainable performance. Regarding the role of GOC between GI and sustainable performance, Li et al. (2023) mentioned that employees' green behavior enhances the implementation of green product innovation practices, which subsequently leads to achieving sustainable performance for firms. Another study by Sangkala et al. (2023) revealed that green culture strengthens and improves the relationship between GI behavior and green environmental effects.

In light of the above discussion, it is clear that the green culture is responsible for building GI practices within the firm; thus, GI is driven by GOC. On the other hand, GOC is a key factor in attaining the firm's sustainable performance. Since GOC associates with both GI and sustainable performance, it is logical to argue that GOC moderates the relationship

between GI and sustainable performance. In short, GOC enhances the firm's sustainable performance through the synergy of adopting GI practices.

Drawing on relevant literature, many studies have been conducted about GI, GOC, and sustainability in several sectors, but there is a lack of studies on these variables in the construction sector. In addition, no study has examined the moderator role of GOC in the relationship between GI and sustainable performance in the construction industry. Therefore, this study contributes to bridging the aforementioned gaps by investigating the relationship between GI adoption and sustainable performance, as well as the moderating effect of GOC on this relationship within the Palestinian construction industry.

1.2.1 Problem Statement and Research Questions

Despite the importance of all sectors, Aigbavboa et al. (2017) asserted that the attainment of sustainability is mostly driven by the construction industry due to its significant effect on the surrounding environment. Indeed, the construction industry is responsible for many ecological issues, such as resource depletion, global warming, the production of massive amounts of waste, and air and water pollution (Mavi et al., 2021). In Palestine, the amount of waste resulting from the construction process, specifically buildings, is estimated at 17 to 81 kg per square meter of building floor (Hammad et al., 2021). Hence, these adverse ecological effects of such an industry can be rectified through the adoption of green strategic methods such as GI, resulting in enhanced sustainable performance.

In Palestine, the situation of the construction industry is even more complicated due to the Israeli government's control over a large percentage of natural resources, including water and energy (Sadeh, 2025). This reality may reduce interest in the green approach and increase the operating cost of buildings. Thus, the stakeholders and policymakers within the construction industry should make concerted efforts toward fostering green behaviors and adopting GI practices, leading to reducing unnecessary costs and enhancing the economic performance.

In this regard, Tajuddin et al. (2015) confirmed the presence of knowledge gaps related to the innovation topic in the construction sector. Besides that, the Palestinian construction sector suffers from a lack of studies related to the mechanism of adopting GI practices as well as its impact on sustainable performance. Therefore, there is an urgent need to investigate the relationship between the adoption of GI practices and sustainable

performance in such a dominant sector, in addition to studying the impact of other variables in strengthening this relationship. Generally, GOC has the potential to create new solutions and approaches for handling performance issues. In supporting this notion, several studies have stated that GOC is a pre-requisite for the adoption of GI and achieving sustainable performance (Imran et al., 2021; Judi et al., 2022). Notably, no study in the Palestinian construction industry addressed the GOC as a moderator variable in the correlation between the adoption of GI practices and sustainable performance.

Accordingly, the research was designed to address the following questions:

- RQ1: What is the level of adopting GI practices and GOC in the Palestinian construction industry?
- RQ2: What is the impact of GI adoption on sustainable performance in the Palestinian construction industry?
- RQ3: What is the impact of GOC on GI adoption in the Palestinian construction industry?
- RQ4: What is the impact of GOC on sustainable performance in the Palestinian construction industry?
- RQ5: Does GOC moderate the relationship between GI adoption and sustainable performance in the Palestinian construction industry?

1.2.2 The Significance of Research

The variables addressed in this research give the study a distinctive position in the heart of the existing literature, as they are among the popular topics that have received the attention of most researchers recently. This study has significant contributions in both theoretical and practical aspects. Regarding the theoretical aspect, this study developed a conceptual framework that encompasses three variables: adoption of GI practices, sustainable performance, and GOC. In more detail, the study examines the impact of GI adoption on overall sustainable performance, including all its dimensions: social, environmental, and economic, since, based on insights from relevant literature, it is anticipated that the adoption of GI is the driving force for improving sustainable performance. In addition, the study is distinguished from other studies by adding GOC as a moderator between GI adoption and sustainable performance, since, to our knowledge, this relationship has not been studied previously in this manner in the Palestinian construction industry. Moreover, the results of the study revealed the level of adopting

GI practices and GOC in the Palestinian construction industry. Based on prior discussion, this study theoretically contributes to bridging the gap related to the topics of GI and GOC in the construction sector. From a practical aspect, the study findings serve as an incentive for construction firms to integrate GI practices within their operations, as relevant literature has confirmed that construction firms have a misunderstanding regarding GI adoption, leading to high resistance to green change. Furthermore, it provides a roadmap for construction firms and facilitates the decision-making process about converting traditional construction practices into green ones through the adoption of innovative green technologies. Consequently, adopting GI practices opens the door to better green investments.

1.2.3 The Objectives of Research

This research primarily aims to fill the significant knowledge gap in the relevant literature regarding the moderating role of GOC in the relationship between the adoption of GI practices and sustainable performance in the Palestinian construction industry. Accordingly, the research objectives can be summarized as follows:

- To examine the level of adopting GI practices and GOC in the Palestinian construction industry.
- To assess the relationship between GI adoption and sustainable performance in the Palestinian construction industry.
- To determine the relationship between GOC and GI adoption in the Palestinian construction industry.
- To determine the relationship between GOC and sustainable performance in the Palestinian construction industry.
- To investigate if the GOC moderates the relationship between GI adoption and sustainable performance in the Palestinian construction industry.

1.2.4 The Research Hypotheses

The following hypotheses are derived from the proposed study model and were explained in depth in the subsequent sections:

H1: The adoption of GI practices has a positive impact on sustainable performance in the Palestinian construction industry.

H2: The GOC has a positive impact on the adoption of GI practices in the Palestinian construction industry.

H3: The GOC has a positive impact on sustainable performance in the Palestinian construction industry.

H4: The GOC moderates the relationship between the adoption of GI practices and sustainable performance in the Palestinian construction industry.

1.2.5 The Structure of the Thesis

This thesis consists of four chapters: Chapter One offers a general background about the research, including the research problem statement, research questions, significance, objectives, and hypotheses. Moreover, this chapter presents a comprehensive literature review of the variables addressed and the expected relationships between them; in addition, it concludes by displaying the adopted conceptual model, including the proposed hypotheses. Chapter Two describes the methodology followed, including the research approach, sampling plan, measurement development, questionnaire design, and data analysis techniques. Chapter Three displays the descriptive statistics of the questionnaire responses and the analysis results of the gathered data in addition to testing the proposed hypotheses. Finally, Chapter Four discusses the results along with their implications, in addition to providing conclusions, recommendations, study limitations, and anticipated future research directions.

1.3 Green Innovation Concept

Generally, innovation is considered an essential component for firms to successfully compete in an unstable environment and gain a competitive advantage (Shamsuzzoha et al., 2022). According to Duong et al. (2021), innovation is related to change and can be described as developing a new or enhanced process or product that is significantly different from the prior one. In this regard, it is imperative to differentiate between two primary types of innovation based on the degree of novelty: incremental and radical innovation. The first means improving an existing process or product through minor changes, whereas the latter refers to generating an entirely new concept (Xue et al., 2014). Additionally, Alkahtani and Nordin (2020) mentioned that one of the basic concepts associated with the innovation process is innovativeness, which is considered an organizational competence responsible for enhancing a firm's innovation performance. Thereby, innovation is the outcome of organizational innovativeness.

According to Judi et al. (2022), globalization and social media's development have raised public awareness of firms' environmental responsibilities. As a result, firms are now seeking to alter their behavior toward a greener approach. In this regard, the "green approach" has captured the attention of the majority of scholars, and most topics have been linked to this approach to tackling environmental issues (Marcelline et al., 2022). Indeed, one of the most famous green topics is GI, as most firms seek to adopt it in response to increasing pressures regarding environmental protection from stakeholders, customers, regulations, and environmentalists (H. Wang et al., 2021).

In the literature, GI is described using different terms, including environmental innovation and eco-innovation (Tang et al., 2018). According to Sezen and Çankaya (2013), GI is "the production, assimilation, or exploitation of a product, production process, services, management or business method that is novel to the organization (developing or adopting it) and which results, throughout its life-cycle lead, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy) as compared to relevant alternatives" (p. 156).

Moreover, Marcelline et al. (2022) asserted that GI refers to carrying out conventional activities using new methods that minimize detrimental effects on the environment and humans. Another study by Halicioglu (2020) defined eco-innovation as a type of innovation that aims to attain remarkable progress toward sustainable development by utilizing natural resources in an effective manner. In the same context, Marcelline et al. (2022) mentioned that GI may be proactive or responsive, where proactive GI is a tool for achieving organizational goals, including long-term profitability and cost-efficiency, through developing green technology to engage in eco-friendly activities. In contrast, responsive GI is a new feature added to a product or process to address a specific environmental issue.

According to Tang et al. (2018), GI is mainly divided into two categories: green product innovation and green process innovation, whereas other researchers divided GI into four categories: green process innovation, green product innovation, green marketing innovation, and green organizational innovation (García-Granero et al., 2020). In this regard, Hashim (2018) summarized the overall components of GI into seven key categories: product, resources, operation, technology, equipment, waste, and pollution.

The majority of innovation studies highlighted the significant impacts of adopting GI. For instance, H. Wang et al. (2021) confirmed that GI is a strategic tool to help businesses achieve sustainable performance as it relies on recycling, effective use of resources, and pollution prevention. Additionally, Burki and Dahlstrom (2017) mentioned that GI enables firms to raise their market share, enhance their competitive position, and eliminate imitation opportunities. Consequently, GI emerged to safeguard future communities and generations from the harmful effects of our daily practices.

Based on GI literature, it was observed that most studies have given a higher priority and attention to material-based industries, while very few studies have focused on the construction industry (Hazarika & Zhang, 2019). Therefore, this lack of studies may result in the failure of construction firms to embrace GI practices due to their misunderstanding of the GI concept (Isa et al., 2019). Thus, this study focuses on explaining the adoption of GI practices in the construction industry alone, in addition to interpreting the term GI in depth within the construction context.

1.4 Adoption of Green Innovation in the Construction Industry

The construction industry is facing huge pressure from all stakeholders to become green; thereby, GI is considered an optimal paradigm to move from resource-intensive traditional construction practices to green practices (Hashim, 2018). In fact, GI in the construction industry has distinctive features since, unlike other industries, it can be developed at the firm level, which refers to building eco-friendly organizational policies and procedures, in addition to the project level, which refers to using innovative green products and methods during the construction process (Xue et al., 2014). Undoubtedly, if the innovation is not adopted within the firm, it cannot be leveraged at the project level, i.e., GI starts first at the firm level.

According to Hazarika and Zhang (2019), GI in the construction industry refers to finding new or improved methods to attain greater functionality using fewer resources, new technology designs, and systematic adjustments in the construction processes and management. Another study by Miozzo and Dewick (2004) described GI in the construction industry as changes related to decreasing the energy needs of buildings, or, in other words, minimizing the ecological effect of structures and buildings. Additionally, Bohari et al. (2016) mentioned some green strategies used to minimize adverse effects on the environment during the construction process, such as improving process efficiency,

saving natural resources, and reducing the quantity of waste and emissions generated. Thus, if the construction firm uses nontoxic and recyclable materials as well as renewable energy resources, it is likely that there won't be any ecological effects from the construction process.

Obviously, the construction industry is among the main contributors to ecological impacts; hence, the adoption of GI in this industry is considered a pivotal matter. In this regard, Shamsuzzoha et al. (2022) defined the adoption of GI as the full use of new or enhanced green practices and technologies as the best available course of action to contribute to sustainability. Moreover, Hazarika and Zhang (2019) asserted that the adoption of GI depends mainly on the characteristics of both the firm and the environment where it operates, in addition to the characteristics of the innovation itself.

It's worth mentioning that the adoption of GI in the construction industry has significant impacts at different levels. At the industry level, GI can contribute to industry modernization and development (Isa et al., 2019). While at the firm level, Xue et al. (2014) asserted that GI can improve firm image, support decision-making, and increase market share and customer satisfaction. For the project level, Isa and Abidin (2021) indicated that GI can shorten project duration and save costs by simplifying construction activities and increasing productivity. Thereby, adopting GI in the construction firms is inevitable for fostering reputation, competitive advantage, quality of life, and environmental performance.

Nevertheless, Alsharif and Tong (2019) revealed that the construction industry faces some challenges related to adopting GI, such as a lack of green construction materials and equipment, insufficient funds, ineffective project management, insufficient expertise, and absence of eco-friendly regulations. Despite these challenges, some construction firms have achieved remarkable success in adopting GI. Indeed, Halicioglu (2020) addressed a case study of three construction firms and summarized the factors affecting their success in adopting GI as follows: collaboration with R&D universities, support for new ideas and knowledge sharing, involvement of stakeholders in the GI process, and focus on reducing ecological impacts through adherence to ecological regulations.

Furthermore, Isa et al. (2019) mentioned that most construction firms look at adopting GI as a burden. Besides that, Alsharif and Tong (2019) pointed out that the construction

industry is one of the most change-resistant sectors that fails to adopt GI compared to other industries. On the contrary, Tajuddin et al. (2015) asserted that the opinions of previous researchers are inconclusive and necessitate further investigation, since, according to Isa and Abidin (2021), low adoption levels of GI in the construction industry could pose a threat to the industry's sustainability in the long run. Based on the previous debate, this study was carried out to examine how adopting GI affects the sustainable performance of construction firms, which may convince firms to invest in GI and thus reap its potential benefits.

1.4.1 Green Innovation Practices

Generally, GI practices refer to a set of innovative actions and initiatives implemented by the firm to reduce its ecological footprint (Shamsuzzoha et al., 2022). In the construction industry context, GI practices require those engaged in construction activities to raise their commitment in order to minimize the ecological impacts of their operations (Hashim, 2018). Accordingly, Isa et al. (2019) asserted that integrating GI practices within construction firms ensures the successful execution of the construction project. Hence, construction firms should strive to integrate GI practices into their business strategy and equip themselves with the required knowledge to increase their innovation capability.

However, the study by Isa and Abidin (2021) suggested that GI practices vary among different industries due to differences in job activities and business outcomes. In this regard, researchers suggested different classifications for GI practices in the construction industry. For instance, Hashim (2018) classified GI practices into technical innovation, process innovation, and administrative innovation. On the other hand, Xue et al. (2014) and Hazarika and Zhang (2019) divided these practices into two main components, i.e., management innovation and technological innovation. Furthermore, Tajuddin et al. (2015) proposed that innovation in the construction context consists of three parts: innovation in equipment, materials, and techniques; management innovation; and information technology innovation, where the first part was referred to as technical innovation, taking the form of either process or product innovation.

In the context of this study, GI practices were divided into three primary categories: product innovation, process innovation, and organizational innovation (Isa & Abidin, 2021; Halicioglu, 2020). The study by Tajuddin et al. (2015) acknowledged that GI

practices enable construction firms to grow sustainably, survive over the long run, and strengthen their market position. Accordingly, it is critical for construction firms to understand the nature of these practices, as this enhances the firm's ability to successfully adopt GI practices and thus gain superior opportunities for growth and sustainability.

Drawing on past literature, it is worth mentioning that the majority of construction firms are still incapable of incorporating the appropriate GI practices into their business plans and operations because of misunderstanding the form of these practices (Isa et al., 2019; Duong et al., 2021). To address the aforementioned research gap, each practice was explained in detail within the construction context to facilitate the transition from traditional construction practices into eco-friendly practices, which in turn achieve better environmental performance.

1.4.2 Green Product Innovation

In order to achieve a successful GI in the product, it is essential to understand the dimensions of the product term within the construction context. Accordingly, Bamgbade et al. (2017) emphasized that the product term refers to construction products, materials, and components, which are utilized during the construction process and obtained from suppliers. Therefore, Miozzo and Dewick (2004) indicated that product suppliers or producers could serve as a source of key innovations within the construction industry.

In this study, green product innovation relates to adopting new or improved products, materials, and technological components with the aim of minimizing ecological impacts during their life cycle (Miozzo & Dewick, 2004). Thus, from the construction industry perspective, the environmental impact of eco-innovative construction products results mainly from their use throughout the entire building life cycle and their disposal rather than during their manufacturing process.

According to Isa and Abidin (2021), green product innovation in the construction industry is divided into three major components. Firstly, product management refers to providing guidelines and plans for product and material storage in order to minimize unforeseen waste, as well as preserving positive relationships with regional suppliers that minimize transportation-related pollution (Miozzo & Dewick, 2004). Secondly, product adoption relates to the ability of construction firms to adopt innovative green materials and products early, which in turn reduces energy consumption throughout the transportation

and installation of products on site (Bamgbade et al., 2017). The last component is green procurement, which involves purchasing and using recycled and renewable construction products and materials, as well as selecting suppliers who adopt 3R strategies in developing products (Marcelline et al., 2022).

As found by Bamigboye et al. (2019), the cost of construction materials could account for 40% of the total project cost; therefore, the adoption of innovative green construction products and materials is indispensable for saving costs. Moreover, Halicioglu (2020) mentioned that innovative products should be durable, reliable, high-quality, energy-efficient, eco-friendly, cost-saving, and have low carbon emissions during the building life cycle. Several studies proposed different types of eco-innovative construction materials, such as precast concrete, green concrete, recycled steel, solar panels, green roofs, energy-efficient windows, and low-emissivity glass (Bamigboye et al., 2019). Accordingly, construction firms that acquire and utilize new green products and materials can stand out in the market, gain a competitive edge, enhance life quality for end users, and contribute greatly to sustainability.

1.4.3 Green Process Innovation

In general, green process innovation refers to the application of new or improved production processes to minimize environmental consequences (Tang et al., 2018). Whereas in the construction industry, green process innovation is defined as improving the current construction processes or creating new technologies that, either completely or partially, change how buildings are built while having the fewest negative effects on the environment (Miozzo & Dewick, 2004).

In this regard, Isa and Abidin (2021) divided green process innovation to be consistent with the nature of the construction industry into two components. The first component is green technology, which includes keeping up with the latest technological advancements to be embedded into construction processes, like Building Information Modeling (BIM), 3D printing, and low-emission equipment, resulting in the protection of natural resources including land, water, and energy (Alkahtani & Nordin, 2020). The second component is green operations, which relates to the establishment of site plans for waste management, pollution prevention, and noise control, as well as constantly improving these plans at the firm and project levels to preserve the natural environment throughout the duration of the services provided (Bamgbade et al., 2017).

In light of the extreme progress of artificial intelligence (AI) technologies, it is impressive to employ them in construction processes. For instance, AI-driven robots can be used for performing repetitive tasks such as welding, whereas AI-driven cameras can be used for monitoring construction sites to detect safety infractions and promptly notify managers. Additionally, AI-enabled drones can perform site surveys and track the progress of construction work remotely instead of manual inspections (Regona et al., 2022). In sum, adopting modern construction methods can improve the efficiency of construction processes, reduce costs and time, and achieve environmental sustainability.

1.4.4 Green Organizational Innovation

The study by García-Granero et al. (2020) defined green organizational innovation as upgrading and reorganizing a firm's policies, procedures, structures, and systems to address environmental needs. It is worth noting that implementing innovation at the organizational level is as important as other types of innovation. In supporting this notion, many scholars have acknowledged that green organizational innovation facilitates the development and implementation of green product and process innovations (García-Granero et al., 2020). Indeed, integrating green organizational innovation ensures that the firm's decisions are consistent with green orientation, whether in selecting products, processes, suppliers, or other resources.

Drawing on relevant literature, green organizational innovation can be divided into three main components: firm policy, supply chain collaboration, and human resources (Isa & Abidin, 2021). With respect to firm policy, it involves providing written environmental documents in the form of policies, procedures, and mission and vision statements, in addition to performing an environmental audit at both project and firm levels to ensure compliance with ecological regulations (Hashim, 2018). Regarding supply chain collaboration, construction firms should maintain good relationships and exchange knowledge with suppliers to stay up to date on the newest green processes and products, thus improving the firms' operational activities to be innovative and eco-friendly (Duong et al., 2021). In terms of human resources, firms should continue to offer green education and training to their employees to enrich their environmental knowledge and also motivate them with incentives based on their environmental initiatives (Bamgbade et al., 2017). In sum, green organizational innovation is crucial to the success of businesses;

therefore, construction firms should implement an environmental management system in order to demonstrate their commitment to environmental conservation.

1.5 Sustainable Performance

The term sustainability gained more popularity after the publication of the Brundtland Report by the World Commission on Environment and Development (WCED) in 1987. Based on this report, sustainability can be defined as the capacity to satisfy current needs without jeopardizing the ability of coming generations to satisfy their own (Brundtland, 1987). Hence, sustainability seeks to provide a healthy, reliable, and high-quality life for the present and coming generations. According to Piwowar-Sulej (2020), sustainability has evolved to include three pillars: social, economic, and environmental, called the "triple bottom line" (TBL). The WCED asserted that these three pillars should be adopted simultaneously, as losing one will probably result in losing another (Brundtland, 1987). Thus, these pillars should be viewed as integral parts of a whole to assure long-term sustainability.

One of the industries that causes the most damage to the environment is the construction industry (Pero et al., 2017). Indeed, the World Green Building Council recognized that the construction industry accounts for around 40% of total global carbon emissions, as well as 25% of global solid waste (World Green Building Council [WGBC], 2023). Therefore, the sustainability concept must be integrated within the construction industry in order to address and mitigate its ecologically harmful impacts.

Consequently, the phrase "sustainable construction" was first proposed in 1994 to characterize the construction industry's responsibility in achieving overall sustainability (Aigbavboa et al., 2017). In this regard, Pero et al. (2017) asserted that various definitions of the concept of sustainable construction have been put forward in the literature, where it was defined as one aspect of corporate social responsibility that construction firms should incorporate into their operations. In addition, Aghimien et al. (2018) described sustainable construction as a holistic process aimed at restoring and maintaining balance between built and natural environments, as well as establishing settlements that foster economic fairness and support human dignity.

Generally, Afzal and Lim (2022) indicated that the term sustainable performance is widely used to measure a firm's integration of sustainability principles within its

operations. Accordingly, the sustainability concept in construction firms can be achieved by paying attention to economic, environmental, and social performance at the firm and project levels (Mavi et al., 2021). For environmental performance, it pertains to how a firm's activities impact the natural environment (Sezen & Çankaya, 2013). According to Pero et al. (2017), the environmental performance of construction firms encompasses several aspects, such as avoiding overuse of finite resources, reducing waste, recycling, and conservation of energy and water. In addition, Yılmaz and Bakış (2015) added other environmental aspects, including reducing the usage of harmful materials and decreasing the frequency of environmental accidents. Therefore, firms' compliance with these aspects enhances their environmental performance and minimizes damage to the environment.

In terms of social performance, it generally relates to the workforce and the firm's standing as perceived by the local community (Piwowar-Sulej, 2020). Thus, social performance can be achieved by protecting the right to life for future generations, distributing opportunities fairly, reducing poverty, and providing social services (Judi et al., 2022). Also, a socially sustainable construction firm should interact with related stakeholders, invest in its human resources by educating and training employees, and increase labor opportunities (Mavi et al., 2021). Regarding economic performance, it reflects the firm's effect on the economic status of stakeholders (Sezen & Çankaya, 2013). As mentioned by Afzal and Lim (2022), economic performance requires construction firms to reduce costs, increase profits, enhance productivity, and boost market share while maintaining efficient utilization of resources. Hence, Sezen and Çankaya (2013) emphasized that focusing only on economic performance will not ensure prolonged survival; instead, the firm should include the three pillars of sustainability in its strategic plan.

1.6 Green Organizational Culture

Many researchers have emphasized that GOC is an emerging new research field, and as a result, its definition is still somewhat ambiguous (Imran & Jingzu, 2022). Therefore, Imran et al. (2021) confirmed that the definition of GOC can be inferred from the previous definitions of organizational culture (OC). As mentioned by Aggarwal and Agarwala (2023), OC is the values, assumptions, and attitudes that govern an organization's conduct in several contexts. Accordingly, GOC was described as an ecological philosophy

consisting of a set of principles, values, and beliefs that direct the behavior of the organization and its employees toward protecting the natural environment (García-Machado & Martínez-Ávila, 2019). Hence, it can be concluded that incorporating the green approach within the organization is the tool for enhancing OC.

Based on past literature, various terms are used interchangeably to describe GOC, such as sustainability culture, eco-friendly culture, and pro-environmental culture (Imran & Jingzu, 2022). It is worth mentioning that GOC has the ability to guide the firm toward more sustainable performance, in addition to increasing profits as a result of its impact on sales and market behavior (Selfiani & Yunita, 2022). Additionally, Aggarwal and Agarwala (2023) pointed out that GOC provides the firm with a competitive edge as it is considered an intangible asset that cannot be imitated by rivals. Indeed, the GOC concept permits the firm to employ new advanced approaches instead of conventional ones, which leads to attracting more customers and increasing market share.

Previous studies suggested different models for GOC. For instance, Aggarwal and Agarwala (2021) proposed that GOC comprises three dimensions, namely, diffusion, depth, and degree. Whereas Fang et al. (2022) identified four dimensions for GOC: peer involvement, message credibility, employee empowerment, and leadership emphasis. On the other hand, Yang et al. (2017) mentioned another culture model called the "Denison Model", which states that OC can be measured using four cultural traits in terms of mission, adaptability, involvement, and consistency. In this regard, the study by García-Machado and Martínez-Ávila (2019) confirmed that the Denison model can be adapted for GOC as follows: green involvement culture, green consistency culture, green adaptability culture, and green mission culture. In this study, the Denison culture model was used to measure GOC since, to our knowledge, it has not been addressed previously in the context of the construction industry.

In more detail, the indicators of the Denison culture model can be summarized as follows:

- Green involvement culture: it refers to the participation of employees in achieving the firm's environmental responsibilities, in addition to making decisions based on environmental protection. Furthermore, this culture requires the firm to train its employees on environmental care in order to boost green living (García-Machado & Martínez-Ávila, 2019). In light of the construction industry, project managers and

supervisors must be well trained and equipped with the required knowledge to use advanced technologies, such as AI-driven drones.

- Green consistency culture: it focuses on stability and adherence to established principles within the firm regarding individuals' behavior toward environmental care. In other words, this culture refers to the agreement and consensus of all firm members to comply with established environmental policy (S. Wang et al., 2022). Thus, this culture requires construction firms to take established environmental policy into consideration at the firm and project levels when carrying out construction works and activities.
- Green adaptability culture: it includes the firm's ability to adapt to various changes and new information in order to protect the natural environment and enhance current environmental policies, as well as listening to customer opinions that may require organizational changes (Yang et al., 2017). Therefore, an adaptable construction firm constantly modifies its structure and technology by monitoring and incorporating the newest eco-friendly technologies into its operations.
- Green mission culture: it indicates that the firm's mission statement should embrace the green approach and environmental protection when conducting business. Thereby, firms should have a well-defined mission statement that prioritizes valuable environmental outcomes and considers environmental preservation a central corporate value (Aggarwal & Agarwala, 2023). Thus, construction firms should develop a green-based mission statement to achieve long-term success.

According to Imran et al. (2021), if the firm establishes a GOC based on a win-win strategy including all its members, then its environmental performance is predicted to improve remarkably. Despite the importance of GOC, Aggarwal and Agarwala (2021) asserted that the field of GOC research is still in its early stages, with only a few studies having been conducted. Similarly, Fang et al. (2022) confirmed the need for further research in this significant field. Accordingly, this study is considered one of the first studies to address the GOC concept within the context of the construction industry.

1.7 Adoption of GI practices and Sustainable Performance

The study by Shamsuzzoha et al. (2022) acknowledged that GI is a key determinant in the attainment of sustainable development. Accordingly, Halicioglu (2020) found in a study within the Malaysian construction industry that GI positively affects sustainable construction, where any type of innovation should improve sustainable performance in all its three dimensions, i.e., economic, social, and environmental. In the same context, the study by Alkahtani and Nordin (2020), including a sample of 364 construction companies, revealed that firms with GI capability can readily implement sustainability-oriented solutions, such as green buildings, and thus attain a better sustainable future. Based on insights from relevant literature, the role of GI practices in accomplishing sustainability goals in the construction industry is inevitable and cannot be ignored.

Furthermore, Li et al. (2023) found that the GI strategy is positively contributing to fostering sustainable performance and gaining a competitive advantage. In this regard, H. Wang et al. (2021) demonstrated in the Pakistan manufacturing sector that the practices of GI have a positive impact on firms' ecological performance. Besides that, the study by Marcelline et al. (2022) pointed out that adopting GI of technology enables firms to promote their sustainable economic and environmental performance. Moreover, Tang et al. (2018) found that green product and process innovation minimizes a firm's negative ecological footprint and enhances its social and economic sustainability. In sum, the adoption of GI should be perceived as an established proactive policy, not as a reactive response due to the emergence of problems.

In addition, Hazarika and Zhang (2019) affirmed that firms adopting GI practices have the potential to achieve higher profits and also concluded that GI practices positively influence economic performance. In contrast, few studies have claimed that GI negatively influences firm performance; for instance, Tang et al. (2018) indicated that GI is correlated with poor financial performance as it leads to increased costs, and Alsharif and Tong (2019) discussed that the construction industry encounters challenges in achieving economic prosperity through innovative practices as a result of cost issues and time-intensive projects. Despite the fact that the GI concept has conventionally been associated with economic issues, social and environmental forces have promoted the rethinking of GI within the framework of sustainability.

Based on previous literature, this study supports the idea that GI is a valuable organizational asset that firms leverage to enhance their performance and gain the confidence of critical stakeholders. Therefore, it is crucial to study the relationship between GI and sustainable performance within the construction sector in developing countries in order to encourage construction firms to adopt GI practices and thus foster the country's economic growth. To our knowledge, no study in Palestine has explored the correlation between the adoption of GI and sustainable performance in the construction industry. As a result, the following hypothesis is suggested:

H1: The adoption of GI practices has a positive impact on sustainable performance in the Palestinian construction industry.

1.8 Green Organizational Culture as a Moderator

It is clear that awareness of the ecological impacts of daily activities and the adoption of green practices have gained significant attention in recent times as a result of increasing environmental problems (García-Machado & Martínez-Ávila, 2019). Accordingly, recent studies propounded two main concepts related to environmental care: GOC as a guideline to govern employee behavior toward the environment and GI as a form of green practices. In this regard, the majority of research has demonstrated that GOC can impact GI. For instance, Şengüllendi et al. (2024) confirmed that the adoption of GI requires the environmental culture to be dominant throughout the firm; hence, GOC positively impacts GI.

Additionally, the study performed by Qu et al. (2022) in the service sector indicated that GOC encourages firms to incorporate the green approach into their processes to produce innovative green products. Another study by Fang et al. (2022) pointed out that green involvement culture, as one of the GOC indicators, enhances the green behavior of employees, which in turn facilitates the adoption of GI practices within the firm. In this regard, Xiaoyi et al. (2023) conducted a study in the manufacturing sector with a sample of 399 managers, where it was revealed that the firm's integration of eco-friendly practices within its OC leads to motivating employees to come up with innovative green solutions. Furthermore, Xiaoyi et al. (2023) mentioned that GOC has a significant positive effect on green process, product, and organizational innovation. Indeed, GOC can push employees to accept GI as a central value of the firm and thus reduce the resistance to change resulting from adopting a new approach within the firm.

According to Şengüllendi et al. (2024), the success of adopting GI practices depends mainly on the establishment of GOC in advance, where C. H. Wang (2019) declared that a well-defined corporate culture is the driving force behind GI, leading to high levels of innovation within the firm. Similarly, García-Granero et al. (2020) added that there is a clear correlation between GOC and GI, and that this relationship has only been tested in high-tech and industrial sectors. Thus, it is interesting to study this relationship in other dominant sectors, such as construction, especially since there is a lack of studies examining the antecedent effect of GOC on GI in the Palestinian construction industry. Based on the above discussion, the following hypothesis is proposed:

H2: The GOC has a positive impact on the adoption of GI practices in the Palestinian construction industry.

Due to the significance of GOC, several studies have explored how GOC affects sustainable performance, especially environmental performance. Indeed, the study by Onputtha et al. (2023) in the automobile industry asserted that OC creates a climate that promotes sustainable outputs within the firm. In this regard, Fang et al. (2022) revealed that the environmental performance of the firm may improve as a result of its green culture. In more detail, S. Wang et al. (2022) affirmed that a culture of employee involvement and empowerment raises their ecological awareness, and as a consequence, they alter the procedures that consume excess raw materials, enhance projects to reduce waste, and establish recycling initiatives. Consequently, these outcomes of environmental awareness lead to improved environmental performance.

Moreover, Selfiani and Yunita (2022) confirmed that GOC is a modern environmental ideology that leads to enhanced environmental and economic sustainability. Therefore, Küçükoğlu and Pınar (2018) suggested that there would be potential to attain higher performance if the firm integrated its adopted GOC within its functions and operations. The study by Fang et al. (2022) in the Malaysian manufacturing sector found that GOC can mediate the impact of green human resource management on environmental performance, which in turn emphasizes that GOC affects sustainable performance. In sum, it is undoubted that the improvement of firm performance is driven by GOC.

It was noted that the majority of prior studies focused on environmental performance alone in terms of GOC impact. Therefore, this study examined the impact of GOC on all dimensions of sustainability (i.e., environmental, social, and economic performance), as

these metrics should be treated as one integrated part without neglecting any of them. Moreover, literature on the Palestinian construction industry has never explored the relationship between GOC and sustainable performance. Drawing on the prior review, it is obvious that there is a link between GOC and sustainable performance, so the following hypothesis is reached:

H3: The GOC has a positive impact on sustainable performance in the Palestinian construction industry.

Generally, Onputtha et al. (2023) revealed that the presence of GOC can affect GI, environmental performance, and competitive edge. Indeed, Şengüllendi et al. (2024) declared that GOC is considered the most preeminent green driver, as GI and green performance are being led by GOC. In this regard, C. H. Wang (2019) emphasized that firms with a well-structured GOC can improve their ability to adopt GI, thus increasing their green performance. Another study by Li et al. (2023) stated that corporate green responsibility motivates employees to adopt innovative behaviors and abilities that boost the firm's capacity for GI, thus attaining sustainable performance. Similarly, S. Wang et al. (2022) revealed that the green behavior of employees pushes the firm to adopt green product innovation, which results in sustainable performance. In light of the prior discussion, the literature clearly supports the notion that GOC plays a moderator role between GI adoption and sustainable performance.

Several studies have addressed GOC as a moderator variable. For instance, the study by Sangkala et al. (2023) in the chemical industry discussed how green culture moderates the effect of green innovation behavior on green environmental effects. Additionally, Qu et al. (2022) addressed the moderator role of GOC between green absorptive capacity and GI in a sample of Chinese restaurants and hotels. Similarly, Nassani et al. (2022) found in a study within the Pakistani energy industry that GOC has a significant and positive moderating effect between social networks and GI. Following a comprehensive search of existing literature, this study is considered the first to examine the moderator role of GOC in the relationship between the adoption of GI practices and sustainable performance in the Palestinian construction industry. Accordingly, the following hypothesis is suggested:

H4: The GOC moderates the relationship between the adoption of GI practices and sustainable performance in the Palestinian construction industry.

1.9 Construction Industry in Palestine

The construction industry is considered a key economic sector that comprises the whole construction process, from importing manufactured and raw construction materials and providing professional services, like design and project management, to executing actual physical work at construction sites. Obviously, this industry is highly correlated with other industries, particularly manufacturing that supplies construction materials and components like cement, reinforcement steel, electrical machinery, aluminum, glass, etc. Moreover, the construction industry is viewed as highly fragmented, involving four main types of construction: residential, commercial, industrial, and infrastructure construction (Gorbaneva et al., 2024).

In Palestine, the construction industry is considered one of the most dynamic and influential industries due to its significant impact on the national economy. In supporting this notion, the annual statistical report issued by PCBS classified the construction industry among the most important economic activities, contributing 3.1% to the Palestinian GDP during 2024. Additionally, the percentage of the labor force in the Palestinian construction industry, especially in the West Bank, reached 11.8% in 2024 (PCBS, 2024). Despite these positive indicators, Palestine is experiencing an environmental, economic, and humanitarian catastrophe due to the Israeli occupation, leading to a sharp decline in the added value of the majority of economic activities, with construction being the most affected. According to the report published by PCBS in 2024, the construction industry in the West Bank recorded the highest rate of decline at 38% (PCBS, 2024).

In general, the construction industry is among those that have the greatest need for green practices due to its considerable adverse effects on the surrounding environment; however, in the Palestinian context, this need becomes even more urgent. Indeed, Hammad et al. (2021) pointed out that the amount of waste produced throughout the construction of buildings in Palestine ranges from 17 to 81 kg per square meter of building floor. Another study by Gorbaneva et al. (2024) performed a life cost analysis for buildings in Palestine, indicating that the amount of energy consumed during the construction phase equals 40 GJ/m^2. In the same context, Gorbaneva et al. (2024) found that the construction phase accounts for 3.9 tons of greenhouse gas emissions per square meter of building floor as a result of increasing energy consumption.

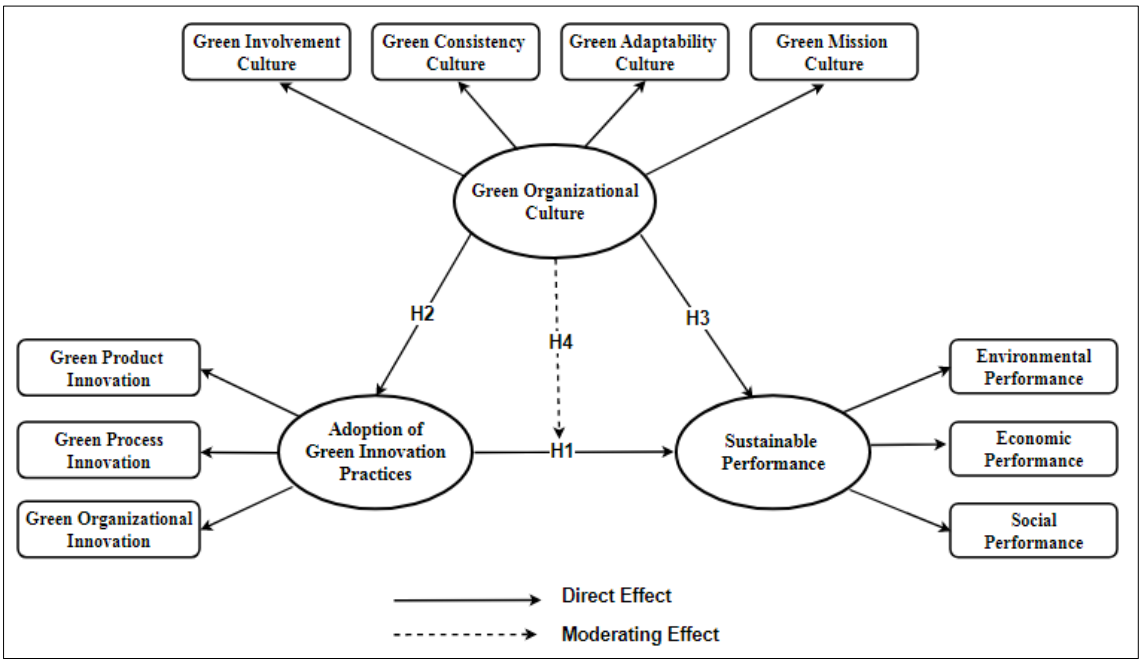
In light of the foregoing, it can be said that greening the Palestinian construction industry is critical. This green transformation is not only essential for capturing the industry's valuable impacts on the Palestinian GDP and economic growth rate but also for avoiding its noticeable environmental effects. Nevertheless, Sadeh (2025) stated that the eco-friendly practices in Palestine face ecological challenges that may hinder their implementation, such as climate change and restricted control over resources, which are made worse by the unstable political situation. More specifically, the adoption of green practices is still in the maturity phase in the Palestinian construction industry and has only been recently implemented in externally funded projects. Therefore, as far as we know, this is the first time that GI practices and green organizational culture have been studied within the construction industry in Palestine.

1.10 Conceptualization of the Proposed Model

The suggested conceptual model was developed in accordance with the literature review that has been presented earlier. As depicted in Figure 1, the model includes three main constructs: adoption of GI practices, sustainable performance, and GOC. Each construct was measured using specific dimensions, and every dimension has its own indicators. Moreover, the model shows the aforementioned hypotheses in order to examine the impact of the adopted constructs on one another.

Figure 1

Research Conceptual Model



Chapter Two

Methodology

2.1 Chapter Overview

This chapter provides a comprehensive description of the methodology followed to complete this thesis. More specifically, the chapter explains the type and approach of research adopted in addition to the sampling plan, which involves the target population, sample size, and sampling method. Furthermore, it illustrates the design of the research instrument used for data collection as well as the techniques used for data analysis.

2.2 Research Type

Generally, Mishra and Alok (2017) defined research as a systematic approach involving gathering and analyzing data to better understand a particular phenomenon. In other words, research is an endeavor to find answers or solutions through applying scientific procedures. It is crucial to note that the research design is the core of the overall research process. In this regard, Olawale et al. (2023) described the research design as a logical plan that outlines the appropriate framework for addressing research questions, including the choice of techniques for data gathering and analysis. Similarly, Olawale et al. (2023) added that well-designed research ensures the credibility of study results and averts drawing insufficient conclusions. In sum, a proper research design contributes to increasing the study's overall value and producing maximal information; therefore, it is imperative to prepare such a design well.

Most scholars agree on classifying research types according to the following criteria: study applications, objectives, and information needed (Taherdoost, 2022). According to the study objectives, Casula et al. (2021) revealed that one of the most common types of research is exploratory research since every research topic was previously "new" and has the potential for continuous "newness." Additionally, Casula et al. (2021) defined exploratory research as a type of research conducted to address problems or issues that have not been thoroughly investigated; in other words, it deals with relatively new subjects with few or no previous studies. Besides, Olawale et al. (2023) asserted that the exploratory research can be employed to identify the relationships between variables in the research model and can be both qualitative and quantitative.

Based on a thorough review of the existing literature on the Palestinian construction industry, there is a lack of studies that examine the issue of the moderating role of GOC between GI adoption and sustainable performance; hence, exploratory research is the most suitable type to be adopted. Indeed, the choice of this research type seems logical because the GOC topic is still in its early stages and requires further investigation. Also, the adoption of GI practices in the Palestinian construction industry has not been explored, although this topic is commonly mentioned among other sectors in the literature.

2.3 Research Approach

The research can be divided according to the type of information needed into qualitative, quantitative, and mixed approaches (Casula et al., 2021). The qualitative approach refers to studying the deep meanings and driving forces of the issues that people face daily, which are not quantifiable, whereas the quantitative approach involves using numerical data to illustrate a specific phenomenon. On the other hand, the mixed approach combines the quantitative and qualitative techniques, depending on the study goal (Taherdoost, 2022). Moreover, Mishra and Alok (2017) stated that research methods comprise the tools used by a researcher to gather the required data.

In this study, the quantitative approach was adopted due to its ability to generalize the study results to the whole target population. In addition, the study by Taherdoost (2022) asserted that the quantitative approach is crucial for any firm's growth, as the conclusions resulting from number analysis are more reliable and dependable. Thus, the quantitative approach in this study would help construction firms gain new realistic insights and make effective decisions. Since selecting the proper research method is one of the most essential factors for conducting research successfully, an electronic questionnaire was employed in this study as a main instrument for collecting data.

2.4 Research Methodology

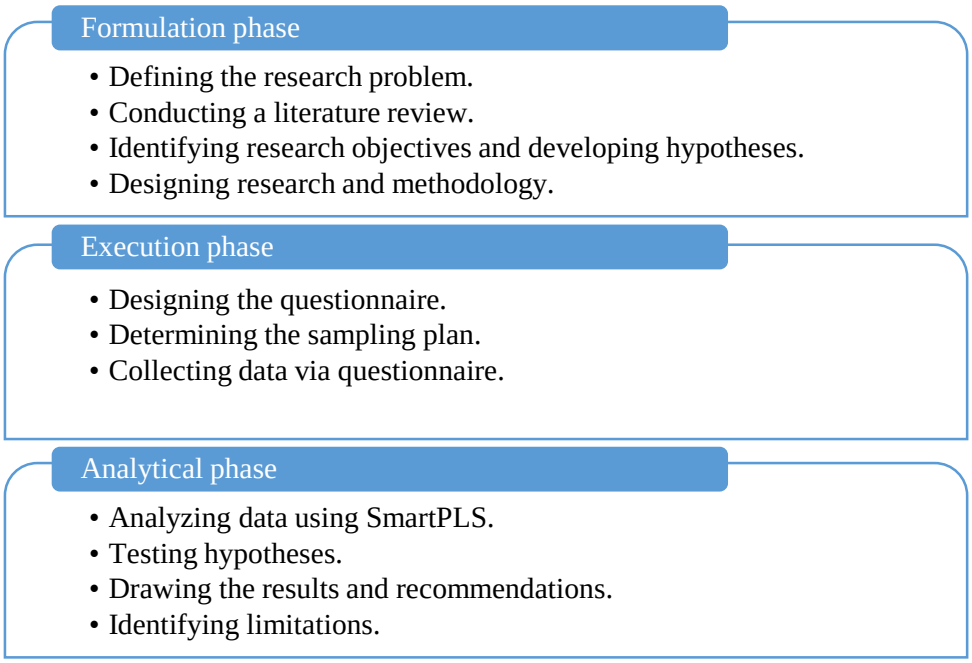
Generally, research methodology refers to the approach used by a researcher to conduct research. According to Mishra and Alok (2017), the research process comprises a set of steps that are followed in a specific sequence to carry out research effectively; however, there is a possibility of moving backward and forward between some steps. Besides that, Mishra and Alok (2017) arranged the research steps as follows: problem definition,

literature review, hypotheses development, research design, data collection, data analysis, and results interpretation.

The methodology adopted in this study consists of three primary phases: formulation, implementation, and analysis. The formulation phase starts with identifying the research problem, followed by a thorough literature review regarding the primary concepts addressed by the research, specifically GI, GOC, and sustainable performance; thus, the knowledge gap is clearly emphasized during this phase. Then, this phase concludes with developing research questions, objectives, and testable hypotheses. The implementation phase entails basically the survey process and data collection; therefore, the questionnaire was designed within this phase and evaluated by academic experts to assure content validity. In addition, this phase involves selecting a sample of the Palestinian construction firms (i.e., contracting firms, consultant firms, and engineering firms) in order to generalize the results to the entire target population, as well as distributing the questionnaire via email, followed by reminder emails and phone calls. Finally, after gathering the required data, the analysis phase begins with the use of Microsoft Excel and SmartPLS software to analyze the collected data, test the proposed hypotheses, and thus draw results, recommendations, and limitations. Figure 2 illustrates the flowchart of the research methodology followed in this study.

Figure 2

Research Methodology Flowchart



2.5 Sampling Plan

In the case of a large study population, it is not feasible to survey the entire population due to time and budget constraints; therefore, a sampling process emerged as a practical solution in such a case. Generally, the sampling process refers to selecting a smaller group (sample) from a large population, where this sample should represent the population under study. Several substantial issues should be addressed during the sampling process, including study population, sampling frame, sampling method, and sample size.

To ensure that the results can be generalized to the entire construction industry, the target population in this study was enlarged to include all the key players in the Palestinian construction firms. Accordingly, the target population consists of contracting, consulting, and engineering firms in Palestine, specifically in the West Bank region. In this regard, the Palestinian Contractors Union (PCU) is a non-profit institution registered with government departments to represent contractors in Palestine. The PCU divides the contracting firms into five classes based on their capital, experience, and the size of executed projects, considering class one is the highest classification. On the other hand, the Engineers Association - Jerusalem Center is the authority that combines all the Palestinian institutions working in the engineering field, which are divided into consultant firms and engineering firms. The latter are further categorized into three classes depending on staff qualifications and workforce size, with class one being the highest.

The sampling frame refers to specific categories of interest within the population and from which the sample is selected. Consequently, the adopted sampling frame includes the contracting firms registered with PCU under the first and second classes in the field of buildings, in addition to the consulting firms and first-class engineering firms that have a valid registration within the Engineers Association. According to the databases of specialized unions, the number of firms that meet the conditions of the sampling frame equals 811, as shown in Table 1. The reason for selecting this sampling frame is to enhance the homogeneity of study participants and ensure their suitability regarding the study topic. In other words, the selected classes of firms share similar experience, capabilities, and work scope, including project supervision and execution.

Table 1

Sampling Frame Distribution

Type of firm	Number
Contracting firms	211
Consulting firms	306
Engineering firms	294
Total	**811**

The sampling method applied in this study is random sampling, as Mishra and Alok (2017) confirmed that this probability technique is typically utilized in quantitative research and ensures the generalization of the results. Therefore, 320 firms were randomly selected from the sampling frame and contacted to participate in the survey, in which every firm was asked to submit one response. Accordingly, 143 valid responses were received out of 320 distributed electronic questionnaires, indicating a response rate of 44.69%. However, this rate can be considered adequate for the study based on Dorkenoo (2019), who stated that the survey results may be biased and inadequate if the response rate is less than 30%. Also, Afzal and Lim (2022) asserted that the response rate in the construction sector is always low compared to other sectors.

Several approaches were followed to increase the response rate. Initially, the link to the questionnaire was sent to the sample firms via email, followed by reminders to take part in the survey. Then, an additional effort was made by searching for the telephone numbers of the sample firms in relevant databases, such as Engineering Firms Guide and Palestinian Construction Guide, with the aim of making telephone calls to induce them to participate in the emailed questionnaire. However, the number of responses received wasn't surprising due to the current unstable political conditions in the country, which directly affect the overall firm's performance and thus its willingness to participate in the survey.

Prior studies have suggested several methods for determining the appropriate sample size for research. For instance, Hair et al. (2021) recommended using power analysis to estimate the sample size, such as G*Power software, due to its dependence on model setups and the reliability of its results. In this study, the recommended settings of the G*Power software were used as follows: significance level = 0.05, effect size = 0.15, power = 0.9, and number of predictors = 3, which indicates the number of independent variables, including the moderator and interaction item (Praharaj & Ameen, 2024; Memon

et al., 2020). Accordingly, the required sample size is 99 participants; thus, the sample size used in this study, i.e., 143, is strongly adequate.

2.6 Questionnaire Design and Measurement Development

Generally, there are key points that should be identified when designing any questionnaire, such as the type of questions and the method of questionnaire administration. In this study, the questionnaire included closed-ended questions and was self-administered by sending an electronic copy to the target participants. The questionnaire was designed using an online Google Form and distributed via email after being reviewed and modified by specialized university professors to ensure the consistency and validity of the study tool.

The study questionnaire was divided into four main sections as follows: the first section collected the demographic data of the respondents, such as gender, years of experience, job position, firm type, firm age, and types of the firm's clients, whereas the other sections measured the research constructs within the targeted firms, including adoption of GI practices, GOC, and sustainable performance. Accordingly, Appendices A and B include the questionnaire in English and Arabic languages, respectively, and Table C.1 in Appendix C includes the names of the questionnaire reviewers.

Following an exhaustive search of the existing literature, the main research constructs were determined, and the measurement items for each construct were developed. Table C.2 in Appendix C shows the questionnaire questions, i.e., measurement items, as well as the corresponding reference for each item. Accordingly, the overall study model comprises a total of 40 items divided among three constructs. The first construct, i.e., adoption of GI practices, was measured using 12 items that were adapted from prior literature (Isa & Abidin, 2021; Judi et al., 2022; Hashim, 2018; Hazarika & Zhang, 2019). More precisely, these measurement items were divided into three equal subgroups to evaluate green product innovation (GPDI), green process innovation (GPCI), and green organizational innovation (GOI).

With respect to the second construct, GOC was assessed using 16 items selected from previous studies (Roscoe et al., 2019; Qu et al., 2022; Piwowar-Sulej, 2020; Shahriari et al., 2023; C. H. Wang, 2019; Al Doghan et al., 2022), in which four items were adopted for each of green involvement culture (GIC), green consistency culture (GCC), green

adaptability culture (GAC), and green mission culture (GMC). Ultimately, in the case of sustainable performance, twelve measurement items were generated from previous literature (H. Wang et al., 2021; Judi et al., 2022; Afzal & Lim, 2022; Zhu et al., 2008), with four items each for environmental performance (ENP), economic performance (EP), and social performance (SP). Moreover, all items were evaluated using a five-point Likert scale according to the following criteria: (1: strongly disagree), (2: disagree), (3: neutral), (4: agree), and (5: strongly agree).

2.7 Data Analysis Techniques

The data collected through the online questionnaire was analyzed using different software tools: Google Forms, Microsoft Excel, and SmartPLS. First, Google Forms was used as a survey administration tool that could analyze the demographic data of respondents and, therefore, provide a statistical analysis of the demographic characteristics of the sample. Second, the data was directly imported from the online Google form to an Excel sheet for the purpose of sorting, organizing, and determining the mean and standard deviation for each construct. Ultimately, the SmartPLS software was used to assess the reliability and validity of the study model and test the proposed hypotheses.

In more detail, the SmartPLS software was used as one of the prominent software tools for partial least squares structural equation modeling (PLS-SEM). By applying SmartPLS (v. 3.2.9), the study model was drawn based on the adopted conceptual framework, and the collected data for each variable was entered, considering the presence of first-order and second-order constructs. After that, the PLS algorithm analysis was performed to evaluate the reliability and validity of the model by comparing the results with the recommended thresholds. Also, bootstrapping analysis was conducted to assess the significance of the relationships so that the research hypotheses could be judged.

It is worth noting that assessing the study model is a two-step process that involves assessing the measurement model and the structural model. The assessment of the reflective measurement model comprises verifying the construct reliability and validity through the following tests: outer loadings, composite reliability, average variance extracted, and Cronbach's alpha, in addition to investigating the discriminant validity through cross-loadings, Heterotrait-monotrait ratio, and Fornell-Larcker. Further, the content validity was assessed by sending the study instrument to a scientific committee for a comprehensive review of its content and elements.

On the other hand, the structural model assessment involves evaluating the coefficient of determination, effect size, predictive relevance, model fit measures, and path coefficients to test the hypothesized relationships between variables. Further, the moderation analysis of GOC was performed according to the study model. All the aforementioned tests were illustrated in-depth in the next chapter, specifically Chapter Three, whereas the results were discussed in the light of the study context in Chapter Five.

Chapter Three

Data Analysis and Results

3.1 Chapter Overview

This chapter presents a detailed analysis of the data gathered through the online questionnaire from construction firms in the West Bank. The statistical analysis of the respondents' demographic data was conducted using the Google Form. Further, the data file was imported to Microsoft Excel to obtain the mean and standard deviation values for each item; therefore, the adoption level of GI practices as well as the level of GOC and sustainable performance can be determined. Then, the reliability and validity of the study model as well as the research hypotheses were evaluated using SmartPLS.

3.2 Analysis of Survey Responses

3.2.1 Response Rate

The electronic questionnaire was emailed to the targeted firms that meet the conditions of the sampling frame, followed by reminder emails and phone calls to encourage more firms to fill out the attached questionnaire and thus increase the response rate. It is noteworthy that this study's survey relied mainly on the acquisition of only one response from each firm; thus, 143 valid responses were obtained out of 320 contacted firms, generating a response rate of 44.69%. The resulting response rate is consistent with previous studies, such as Dorkenoo (2019) and Aghimien et al. (2018), which claimed that the collected data can be regarded as biased and insufficient if the response rate is less than 30–40%. Accordingly, a response rate of 44.69% indicates that the data gathered from the distributed questionnaires is acceptable and sufficient for being analyzed. In addition, Afzal and Lim (2022) asserted that the construction sector is always linked to a low rate of response. Although the data were gathered over a relatively good period of two months, the response rate was affected by several factors, including the current precarious political situation, which in turn led to a deterioration in the economic situation and a decrease in the volume of construction projects. Therefore, the resulting response rate reflects the particularity of the Palestinian context.

3.2.2 Demographic Information

In this study, the Google Forms tool was used to create the online questionnaire since it automatically generates a comprehensive demographic analysis of the respondents using

frequencies and percentages. Accordingly, the statistical analysis of the demographic data showed that 78.3% of the respondents were men, whereas the remaining 21.7% were women. Regarding years of experience in the construction industry, the respondents with more than 15 years of working experience recorded the highest portion at 53.8%. This was followed by 22.4% with 6-10 years of experience, 15.4% with 11-15 years of experience, and 8.4% with less than 6 years. With respect to the respondent's job position in the firm, the majority of the respondents were office engineers with 44.1%, closely followed by general managers and contractors with 39.2%. The remaining respondents were project managers with 14% and site engineers with 2.8%.

Additionally, respondents were asked to provide information related to the demographic characteristics of their firms, considering that every firm was represented by only one response. Consequently, the results of the demographic analysis revealed that 39.2% of the responding firms were consulting firms, 33.6% were contracting firms, and the remaining 27.3% were engineering firms. Pertaining to the firm location, about 42.7% of the firms were located in the northern West Bank provinces, followed by 30.8% and 26.6% in the southern and middle provinces, respectively. In addition, 48.3% of the firms included in the sample had been working for more than 20 years since they were officially registered and classified, whereas 30.1% were less than 11 years old, and 21.7% were between 11 and 20 years old. Furthermore, firms operating in mixed types of construction dominated the survey at 81.9%, while the remaining 18.2% worked in only one type of construction, whether residential, commercial, industrial, or other. With regard to the firm's clients, the data indicated that the vast majority of the firms were serving multiple segments of clients simultaneously (71.4%), while the remaining 28.7% were serving only one sector as follows: 12.6% for the private sector, 8.4% for the public sector, and 7.7% for individuals.

Based on the demographic profile analysis, 87.4% of the sampled firms asserted the importance of making future plans regarding environmental preservation, while a very small percentage, about 4.2%, reported that this matter was not important. Ultimately, according to the above demographic information, it is reasonable to assume that the sampled firms were well-equipped with the knowledge and expertise required to take part in the survey, which enabled them to provide adequate responses that serve the study

objectives. Table C.3 in Appendix C summarizes the demographic characteristics of the sample in terms of frequencies and percentages.

3.2.3 Descriptive Analysis

One of the primary objectives of this study is to generate a broad picture about the level to which Palestinian construction firms are willing to adopt GI practices, in addition to the level to which GOC and sustainable performance are being implemented. In this regard, the measurement scale is commonly used in quantitative research as a systematic and standardized way to measure the variables under investigation. Therefore, an appropriate measurement scale should be adopted to analyze and interpret the collected data using descriptive statistics (i.e., mean and standard deviation), which ensures that the data is comparable and structured, enabling researchers to draw valid conclusions.

In this study, a five-point Likert scale was used as the main measurement scale, which was then divided into three equal intervals with the aim of analyzing the collected data. To determine the interval length, the maximum value of the scale was subtracted from the minimum value, and then the result was divided by the number of required intervals, as follows: (5-1) / (3) = 1.33. Accordingly, the scale used to determine the average response level for each item of the questionnaire is displayed in Table 2.

Table 2

Average Response Level

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

Table 3 depicts the mean and standard deviation values for all first-order and second-order constructs adopted in the study. Regarding the adoption of GI practices, the overall mean is 3.886 and the standard deviation is 0.778. With respect to GOC, the overall mean is 3.591 and the standard deviation is 0.825. Ultimately, the mean and standard deviation values for sustainable performance are 3.805 and 0.806, respectively. As indicated in the results of the second-order constructs, the level of adopting GI practices in construction firms as well as the level of sustainable performance were found to be high, while the overall implementation level of GOC was moderate. On the other hand, the mean values

of all first-order constructs were ranged from moderate to high levels. Table C.4 in Appendix C shows the mean and standard deviation values for all items used in the study.

Table 3

Level of Adopting GI Practices, GOC, and Sustainable Performance

Construct (Latent variable)	Mean	Standard deviation	Implementation level
Green Product Innovation (GPDI)	4.080	0.632	High
Green Process Innovation (GPCI)	4.014	0.752	High
Green Organizational Innovation (GOI)	3.563	0.833	Moderate
Total for Adoption of GI Practices	3.886	0.778	High
Green Involvement Culture (GIC)	3.512	0.850	Moderate
Green Consistency Culture (GCC)	3.633	0.777	Moderate
Green Adaptability Culture (GAC)	3.706	0.758	High
Green Mission Culture (GMC)	3.514	0.894	Moderate
Total for Green Organizational Culture	3.591	0.825	Moderate
Environmental Performance (ENP)	3.977	0.667	High
Economic Performance (EP)	3.507	0.945	Moderate
Social Performance (SP)	3.932	0.690	High
Total for Sustainable Performance	3.805	0.806	High

3.2.4 Non-Response Bias

Non-response bias is a critical phenomenon that should be considered in any survey, as it affects the generalizability of the results. In this regard, non-response bias occurs when the opinions of non-responders to a survey are significantly different from the opinions of those who responded. Due to the unavailability of data from non-respondents, Armstrong and Overton (1977) suggested that the perspectives of people who did not respond at all closely resemble the perspectives of those who responded late after several attempts. Accordingly, the standard approach for testing non-response bias is to compare early responses with late responses using a t-test at the significance level of 5% to determine if there are significant differences between the mean values (Armstrong & Overton, 1977). In short, statistically significant differences between the two groups of responses are considered an indicator for the presence of bias in the collected data.

In this study, the firms contacted were divided into two groups: early respondents and late respondents, depending on their speed of response to the emailed questionnaire. The first

group represented the firms that responded immediately after the first email, whereas the second group included the firms that responded to the questionnaire after sending subsequent reminders, including reminder emails and reminder calls. Consequently, the number of early and late responses was 68 and 75, respectively.

Table 4 displays the mean and standard deviation (SD) values for the two groups of responses, in addition to the p-values for each construct, which were obtained from the t-test. It is noteworthy that these statistical data were estimated for the first-order constructs in the study model, as these constructs were measured directly by the observable indicators. As presented in Table 4, all p-values are greater than the predetermined significance level, i.e., 0.05, indicating that the hypothesis of the presence of statistically significant differences between early and late responses is rejected. Thus, it can be concluded that the non-response bias did not affect the results of this research; hence, the responses obtained reflect the perspectives of the whole target population.

Table 4

Non-Response Bias Test

Construct (Latent variable)	Early response		Late response		P-value
	Mean	SD	Mean	SD	
Green Product Innovation	4.059	0.603	4.100	0.656	0.698
Green Process Innovation	3.993	0.748	4.033	0.756	0.751
Green Organizational Innovation	3.625	0.781	3.507	0.874	0.395
Green Involvement Culture	3.599	0.825	3.433	0.863	0.242
Green Consistency Culture	3.706	0.698	3.567	0.836	0.281
Green Adaptability Culture	3.746	0.746	3.670	0.767	0.549
Green Mission Culture	3.636	0.797	3.403	0.960	0.115
Environmental Performance	3.978	0.535	3.977	0.768	0.993
Economic Performance	3.526	0.831	3.490	1.038	0.819
Social Performance	3.904	0.629	3.957	0.740	0.644

3.3 Analysis of Questionnaires

One of the most popular methods for analyzing quantitative data collected through questionnaires is the PLS-SEM approach, also referred to as PLS path modeling. Indeed, the PLS-SEM approach has gained the attention of most researchers since it can handle non-normally distributed data and complicated models, whether formative or reflective,

in addition to small-sized samples. In this regard, SmartPLS software is considered one of the leading applications for the PLS-SEM (Fauzi, 2022).

In PLS-SEM, the path model consists of two elements: the structural model (called the inner model), which displays the relationships among the constructs themselves, and the measurement model (called the outer model), which displays the relationships among the constructs and their corresponding indicators (Fauzi, 2022). Further, the structural model includes two main types of constructs, namely exogenous and endogenous constructs; the former refers to the constructs that work as independent variables, while the latter refers to those acting as dependent variables. In terms of the measurement model, the constructs may take a reflective or formative form depending on the direction of causality. In other words, if the arrows (i.e., the causality direction) go from the construct toward its indicators, the construct is classified as reflective, whereas the reverse direction indicates a formative construct (Sarstedt et al., 2021).

Since the constructs in this study are capable of being abstracted at different levels, a higher-order model was established as the most suitable type for linking these variables together. More precisely, the adopted model is a second-order model of the reflective-reflective type. Depending on the concept of this type, all second-order constructs were linked to first-order constructs using reflective relationships, and all first-order constructs were measured using reflective indicators. Accordingly, the path model of this study includes 13 constructs distributed between the first-order and second-order. The second-order constructs are adoption of GI practices, sustainable performance, and GOC, which were integrated inside the model as an independent variable, dependent variable, and moderator, respectively. Regarding the indicators, the measurement model comprises a total of 40 items; three items out of the total were omitted to maintain consistency and reliability. The deleted items are related to the following variables: one item for each of green product innovation and green process innovation, and another item for sustainable performance, specifically economic performance.

Notably, the study's path model was analyzed using version 3.2.9 of the SmartPLS program. Consequently, model evaluation is a two-step process that starts with the assessment of the measurement model to ensure reliability and validity and then concludes with the assessment of the structural model to estimate path coefficients and model parameters.

3.4 Reflective Measurement Model Assessment

The model assessment in PLS-SEM initially concentrates on the measurement models. Consequently, assessing the quality of the reflective measurement model primarily includes examining two elements, namely reliability and validity. As for the reliability, it refers to the degree of consistency and stability of the results obtained from the measurement instrument; in addition, it is evaluated at both the indicator level (i.e., indicator reliability) and at the construct level (i.e., internal consistency reliability). On the other hand, validity relates to the assessment of whether the construct measures what it is supposed to measure; hence, construct validity is evaluated by examining convergent validity and discriminant validity.

3.4.1 Indicator Reliability

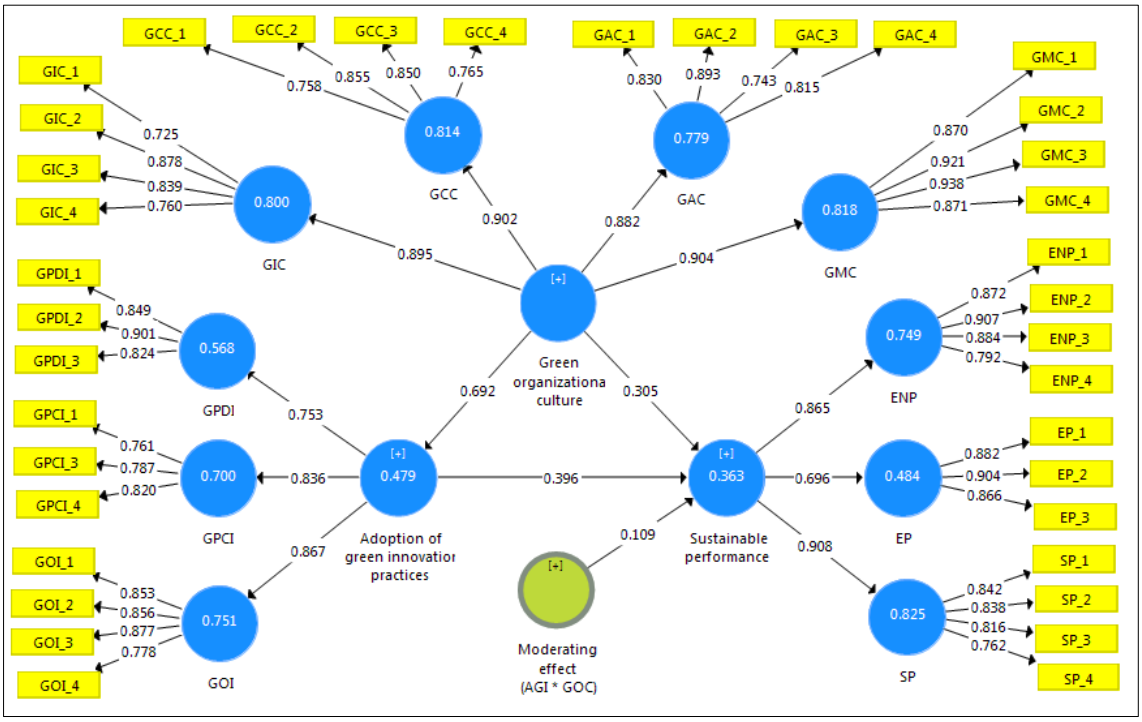
The first step in the process of assessing the reflective measurement model is typically examining indicator reliability. Generally, indicator reliability reveals how much variance in an individual indicator is explained by its assigned construct. The reliability at the indicator level is measured using outer loadings; thus, Hair et al. (2021) indicated that the indicator loadings should be equal to or higher than 0.708 in order to demonstrate that the indicator has a satisfactory degree of reliability. As a result, three indicators (GPDI_4, GPCI_2, EP_4) were eliminated from the study's measurement model as their outer loadings were less than the recommended threshold. As shown in Figure 3, all outer loading values are clearly above the required minimum threshold, indicating that all individual indicators adopted are sufficiently reliable.

3.4.2 Internal Consistency Reliability

In the reflective measurement model, internal consistency reliability is related to construct-level reliability, so it is called construct reliability. It can be defined as the degree to which indicators measuring the same latent variable are correlated with each other. According to Fauzi (2022), two main measures are used to evaluate construct reliability: composite reliability (CR) and Cronbach's alpha. The reflective constructs should have values greater than 0.6 or 0.7 for both CR and Cronbach's alpha, as this threshold exhibits a sufficient level of construct reliability. As illustrated in Table 5, the reliability of all reflectively measured constructs is demonstrated since the Cronbach's alpha and CR values exceed the acceptable minimum limit.

Figure 3

Measurement Model (Outer Model)



3.4.3 Convergent Validity

Once the reliability of the reflective measurement model has been confirmed, the next step is to assess its convergent validity, which can be defined as the degree to which the reflective construct converges in its respective indicators by explaining the variance among them. According to Hair et al. (2012), the most common metric used for assessing convergent validity is average variance extracted (AVE), which postulates that the reflective construct should explain at least 50% of each item's variance. Referring to Table 5, all reflectively measured constructs adopted in this study have AVE values ranging from 0.624 to 0.811, indicating high levels of convergent validity.

3.4.4 Discriminant Validity

The last step in assessing the reflective measurement model is to examine discriminant validity, which refers to the degree to which a construct is actually distinct from other constructs. Thus, discriminant validity ensures the uniqueness of the construct; in other words, the construct describes phenomena not addressed by other constructs in the same PLS model. In order to establish discriminant validity, Fauzi (2022) proposed three metrics: cross-loadings, Fornell-Larcker, and heterotrait-monotrait ratio (HTMT). Notably, the first approach measures the discriminant validity of indicators, whereas the

remaining approaches are concerned with constructs. Regarding the first metric, known as cross-loadings, it postulates that the correlation (i.e., its outer loading) among the indicator and its associated construct should be higher than the correlation of that indicator with other constructs in the model (Wetzels et al., 2009). Depending on the results of cross-loadings illustrated in Table C.5 in Appendix C, it is clear the discriminant validity of all indicators has been demonstrated.

The second metric (i.e., the Fornell-Larcker criterion) indicates that the square root of the AVE of a construct should be greater than the highest correlation of that construct with other constructs in the same model. Referring to Table C.6 in Appendix C, the constructs' discriminant validity based on the Fornell-Larcker criterion was established. The last metric for evaluating the constructs' discriminant validity is the HTMT criterion, which estimates the true correlation among pairs of constructs, also referred to as the disattenuated correlation (Sarstedt et al., 2021). As shown in Table C.7 in Appendix C, the HTMT values for each pair of constructs are below the acceptable maximum level of 1, as reported by Henseler et al. (2015), suggesting that discriminant validity has been successfully established for all reflectively measured constructs.

Table 5

Cronbach's Alpha, Composite Reliability, and AVE of Constructs

Construct	Number of items	Cronbach's Alpha	Composite Reliability	AVE
ENP	4	0.887	0.922	0.748
EP	3	0.861	0.915	0.782
GAC	4	0.839	0.892	0.676
GCC	4	0.822	0.883	0.653
GIC	4	0.814	0.878	0.645
GMC	4	0.922	0.945	0.811
GOI	4	0.862	0.907	0.709
GPCI	3	0.698	0.832	0.624
GPDI	3	0.821	0.894	0.737
SP	4	0.831	0.888	0.664

3.5 Structural Model Assessment

Once the quality criteria of the measurement model (i.e., reliability and validity) have been verified and confirmed, the subsequent step is to evaluate the structural model. It is noteworthy that examining the hypothesized relationships between the constructs in order to be accepted or rejected constitutes the primary goal of the structural model assessment process. In addition, assessing the structural model involves examining a set of indices, such as the coefficient of determination, effect size, predictive relevance, and goodness of fit.

3.5.1 Constructs Collinearity Assessment

Assessing the structural model in terms of collinearity issues is imperative, as the presence of collinearity between constructs in advance affects the estimation of path coefficients (i.e., structural model relationships), leading to potential bias in the path coefficients. Therefore, the variance inflation factor (VIF) can be employed to verify the presence of collinearity between constructs, where the value of VIF should not exceed a limit of 3 to avoid the collinearity problem (Sarstedt et al., 2021). As shown in Table 6, all VIF values are clearly below the conservative threshold, which ascertains that the structural model is devoid of critical levels of collinearity among the latent variables.

Table 6

Values of Variance Inflation Factor

Construct	VIF
Adoption of green innovation practices → Sustainable performance	2.159
Green organizational culture → Adoption of green innovation practices	1.000
Green organizational culture → Sustainable performance	1.921

3.5.2 Coefficient of Determination (R^2)

The coefficient of determination indicates the proportion of variance in the endogenous construct that can be explained by the exogenous constructs associated with it; thus, it is considered a measure of the explanatory ability of the model. The values of R^2 range from 0 to 1; however, a rule of thumb for evaluating R^2 has been suggested as follows: the values of 0.75, 0.50, and 0.25 for endogenous constructs are regarded as substantial, moderate, and weak, respectively (Wetzels et al., 2009).

Depending on the results obtained from the SmartPLS program, 36.3% of the variance in the endogenous construct, i.e., sustainable performance (SUP), can be explained by the two exogenous constructs, which are the adoption of green innovation practices and GOC. In other words, this R^2 value (36.3%) represents the combined effect of all exogenous constructs on the endogenous construct in the structural model. On the other hand, 47.9% of the variance in the adoption of green innovation practices (AGI practices) can be explained by GOC. Table 7 summarizes the results of R^2 for the endogenous constructs in the structural model.

3.5.3 Effect Size (f^2)

The effect size is a widely used metric that evaluates the effect of removing a specific predictor construct (i.e., an exogenous construct) from the model on the R^2 value of the endogenous constructs. Hence, f^2 is an indicator of the importance of the exogenous construct. In addition, Hair et al. (2012) proposed a general guideline for assessing f^2, where the values of 0.02, 0.15, and 0.35 indicate a small, medium, and large effect of an exogenous construct, respectively. It is worth noting that the values below 0.02 imply no effect. Table 7 displays the f^2 values for all exogenous constructs in the model; more specifically, it can be concluded that removing any of the exogenous constructs may result in a small effect on the R^2 value of SUP.

Table 7

Values of R^2 and f^2

Construct	R^2	R^2 adjusted	Result	f^2	Result
AGI practices	0.479	0.475	Weak	0.114	Small effect
SUP	0.363	0.350	Weak	-	-
GOC	-	-	-	0.076	Small effect

3.5.4 Predictive Relevance (Q^2)

The Q^2 value measures the extent to which the exogenous construct can predict the endogenous construct; therefore, it is referred to as a measure of the model's predictive power (i.e., predictive relevance). The blindfolding procedure is used to estimate the value of Q^2; Hair et al. (2012) asserted that the Q^2 values for a reflective endogenous construct must exceed zero in order to demonstrate that the model has sufficient predictive power for that construct. Table C.8 in Appendix C displays the Q^2 values for the reflective endogenous constructs in the model. As illustrated in the results, all values are above the

recommended threshold of 0, implying that the exogenous constructs have predictive significance for the endogenous construct. Besides, the Q^2 values in all seven cases in the SmartPLS program are higher than zero.

3.5.5 Model Fit Measures

The model fit measures are a set of indices used to judge how well a postulated model fits empirical data. In this regard, one of the most suitable measures for PLS path modeling is the goodness of fit (GOF) index, which can be defined as the geometric mean of the average AVE and the average R^2 of the endogenous latent variables, as shown in equation (3.1). Generally, GOF values range between 0 and 1. The assessment criterion of the model fit based on the GOF values was proposed by Wetzels et al. (2009) as follows: a GOF value less than 0.1 reveals no fit, whereas GOF values of 0.1, 0.25, and 0.36 indicate a small, medium, and large fit, respectively.

$$\text{GoF} = \sqrt{\text{average } R^2 \times \text{average AVE}} \tag{3.1}$$

In this study, the GOF value = $\sqrt{0.421 \times 0.705}$ = 0.545

Based on the calculated GOF value of 0.545, the model demonstrates a strong overall fit with the observed data, indicating sufficient model validity.

3.5.6 Significance of the Path Coefficients

Once the path model parameters have been estimated using the PLS-SEM algorithm, the next step is to assess the relevance and significance of the path coefficients (i.e., structural relationships) using a bootstrapping procedure with 5000 bootstrap subsamples and a 5% significance level. In terms of relevance, the values of path coefficients range between -1 and +1 for every relationship, where values closer to +1 indicate strong positive relationships and values closer to -1 indicate strong negative relationships. Table 8 presents the values of path coefficients, referred to as β values, for all structural model relationships. As indicated in the results, the estimated coefficients range from 0.30 to 0.69, indicating moderately strong to strong positive relationships. For instance, in the case of the relationship between AGI practices and SUP, the path coefficient of 0.396 indicates that increasing the AGI practices by one standard deviation unit leads to an increase in SUP by 0.396 standard deviation units.

The assessment of the significance of path coefficients implies testing the hypothesized relationships between constructs in the structural model using p-values and t-values. More precisely, the relationship is statistically significant when the p-value and t-value are less than 0.05 and equal to 1.96 or greater, respectively. The analysis results of all hypotheses in the path model are illustrated in Table 8. In more detail, H1 was performed to test whether AGI practices positively impact SUP, and thus H1 is supported by the following results: ($\beta = 0.396$, $t = 3.694$, $p = 0.000 < 0.05$). On the other hand, H2 revealed that GOC has a positive impact on AGI practices according to the following results ($\beta = 0.692$, $t = 13.976$, $p = 0.000 < 0.05$), so H2 is supported. In addition, H3 is supported, confirming that GOC is positively associated with SUP based on the following analysis results ($\beta = 0.305$, $t = 2.934$, $p = 0.003 < 0.05$). In sum, the results of the bootstrapping procedure emphasize that all the relationships hypothesized in the structural model are positive and significant.

Table 8

Results of Path Coefficients and Hypotheses Testing

Structural Path	Hyp.	Original Sample (β)	Standard Deviation	T-value	P-value	Result
AGI practices ➔ SUP	H1	0.396	0.107	3.694	0.000	Supported
GOC ➔ AGI practices	H2	0.692	0.049	13.976	0.000	Supported
GOC ➔ SUP	H3	0.305	0.104	2.934	0.003	Supported

3.6 Moderation Analysis

In general, moderation is a case where the nature of the relationship between two constructs depends on a third variable, referred to as a moderator variable. Consequently, the moderator variable can affect the strength and/or direction of the relation between the constructs (Hair et al., 2012). According to the relevant literature of PLS-SEM, the notion of an "interaction term" was introduced to represent the moderating effect within the PLS path model, and it is constructed using the following formula (independent variable x moderator variable).

In the PLS path modeling, the moderation analysis mainly involves determining the significance and strength of the moderating effect. This study examined the moderating effect of GOC on the relationship between AGI practices and SUP. Regarding the

significance of the moderating effect, the results of the bootstrapping procedure showed that the moderating effect (AGI practices x GOC) is statistically significant based on the following results (t-value = 2.032, p-value = 0.042), implying that H4 is supported. Hence, GOC moderates the relationship between AGI practices and SUP. On the other hand, the positive sign of the estimated path coefficient for the GOC moderating effect (i.e., $\beta = 0.109$) demonstrates that GOC strengthens the direct relationship between AGI practices and SUP without changing its direction. In other words, as GOC increases, the effect of AGI practices on SUP becomes stronger; i.e., increasing the GOC level by one standard deviation leads to increasing the impact of AGI practices on SUP by 0.109. Table 9 displays the bootstrapping results that are previously discussed, which, in short, indicate that GOC has a positive and statistically significant moderating effect.

Table 9

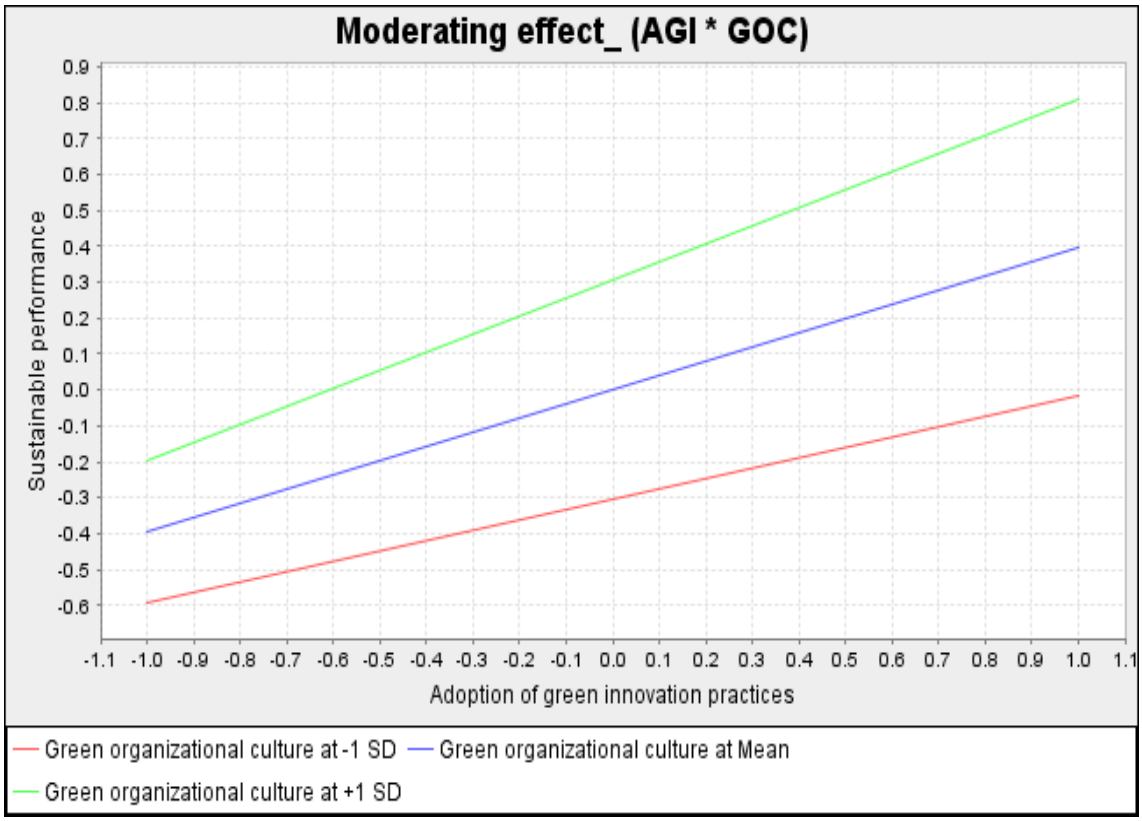
Bootstrapping Analysis Results of Moderating Effect

Structural Path	Hyp.	Original Sample (β)	Standard Deviation	T-value	P-value	Result
(AGI practices x GOC) ➔ SUP	H4	0.109	0.054	2.032	0.042	Supported

Moreover, slope analysis is considered another important indicator for assessing the role of the moderator variable, as it presents an explicit comparison between the effect of low and high levels of the moderator variable. In this regard, the diagram related to the slope analysis is generated using SmartPLS software. As shown in Figure 4, the green line indicates high levels of GOC; in contrast, the red line indicates low levels of GOC. Since the green line is much steeper, it can be said that at high levels of GOC, the effect of AGI practices on SUP is much greater than at low levels of GOC. Therefore, lower levels of GOC weaken the relationship between AGI practices and SUP.

Figure 4

Slope Analysis



Since the moderation relationship has already been asserted, the next step involves determining the strength of the moderating effect by examining the values of R^2 and f^2. Regarding R^2, in the absence of the moderating effect (AGI practices x GOC), 33.7% of the variance in SUP is explained by AGI practices and GOC. On the other hand, when the moderating effect is added to the PLS model, the R^2 value reached 36.3%. Thus, the moderating effect increases the explained variance in SUP by 2.6%.

The second metric for assessing the strength of the moderating effect is f^2. According to Chin et al. (2003), the f^2 assessment of the moderating effect depends mainly on the R^2 values of both the main effect model (i.e., the model without the moderation effect) and the full model including the moderation effect. In addition, the moderating effect with f^2 values of 0.02, 0.15, and 0.35 can be described as small, medium, and large, respectively. Thus, the f^2 value is determined using the equation (3.2) below.

$$f^2 = \frac{R^2 model\ with\ modrator - R^2 model\ without\ moderator}{1 - R^2 model\ with\ modrator} \qquad (3.2)$$

Table 10 summarizes the analysis results for the strength of the moderating effect. As illustrated in the results, the moderation effect size of GOC is small with a value of 0.041. It is important to note that this small effect does not reflect any negative connotation regarding the moderating effect. In supporting this notion, Chin et al. (2003) claimed that the small effect size does not necessarily mean that the moderating effect is not important and can be neglected; rather, the small moderating effect can have useful meanings under extreme moderation circumstances if the estimated path coefficient changes are significant. Thereby, this claim is consistent with our study, as the change in the estimated path coefficient (i.e., β value) is positive with a value of 0.109, indicating that the small effect size of the moderating effect is important. Ultimately, Figure 4 displays the results of the PLS bootstrapping analysis.

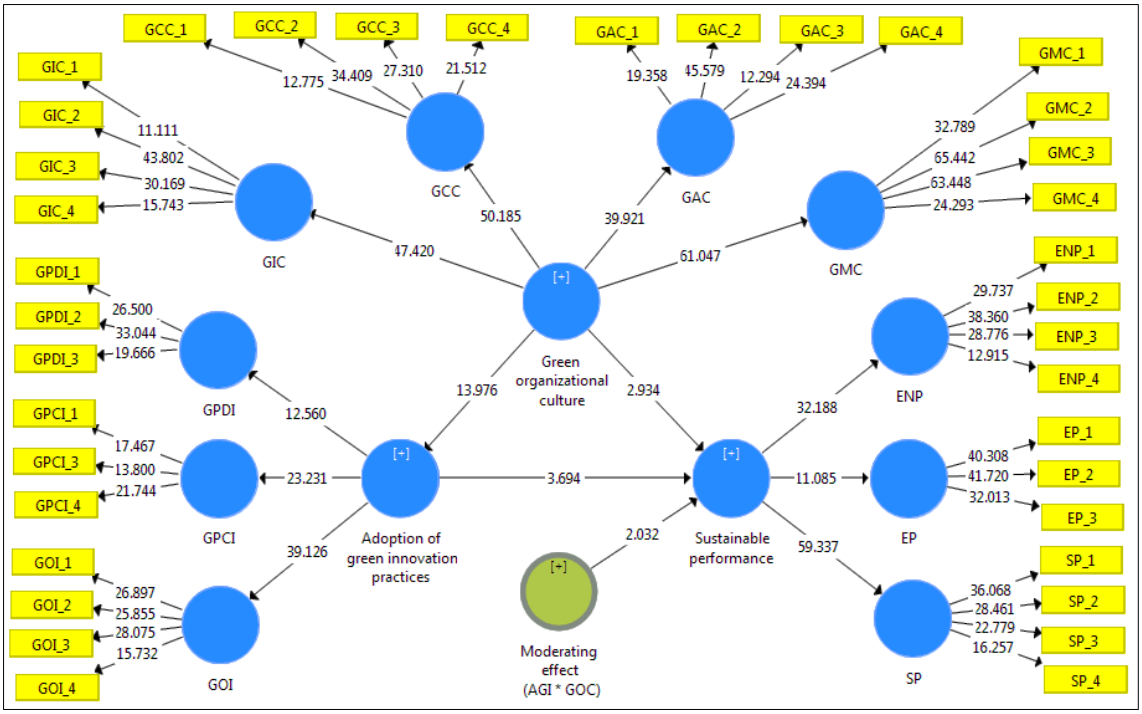
Table 10

Strength of Moderating Effect

Moderator	R^2 Included	R^2 Excluded	f^2	Effect Size
GOC	0.363	0.337	0.041	Small

Figure 5

Bootstrapping Analysis Results of the Structural Model



Chapter Four

Discussion, Conclusion, and Recommendations

4.1 Chapter Overview

This chapter offers a comprehensive discussion of the study results related to the adoption of GI practices, sustainable performance, and GOC in the Palestinian construction industry. Furthermore, the chapter discusses the results of hypotheses testing and the study's implications at both the theoretical and practical levels; it then provides an overall conclusion of the study findings and some recommendations for construction firms to take advantage of these findings. Ultimately, the chapter ends by highlighting the study's limitations and suggesting future research directions.

4.2 Discussion of Results

This study examines the effect of adopting GI practices on sustainable performance, as well as the moderating effect of GOC on the relationship between the adoption of GI practices and sustainable performance in the Palestinian construction industry. The proposed model includes three practices for measuring the adoption level of GI, namely green product innovation, green process innovation, and green organizational innovation. In addition, the model comprises all pillars of sustainable performance, i.e., environmental performance, economic performance, and social performance. Pertaining to the moderator variable, i.e., GOC, it encompasses four cultural traits, including green involvement culture, green consistency culture, green adaptability culture, and green mission culture.

4.2.1 Discussion of the Adoption Level of GI Practices in Palestine

The first objective of this study is to assess the adoption level of GI practices by Palestinian construction firms; in other words, to measure to what extent the construction firms are willing to implement GI practices. The adoption level was determined by calculating the mean and standard deviation of all responses to the questionnaire items regarding GI practices. Consequently, the overall adoption level of GI practices in Palestinian construction firms is high, with an arithmetic mean of 3.886. In other words, the construction firms showed a high willingness to adopt and implement GI practices. This is consistent with the findings of Yusof et al. (2015), which indicated that the implementation level of eco-friendly practices within construction projects is considered

high. Likewise, Isa and Abidin (2021) pointed out that adopting GI is one of the most practical means of facing ecological threats in the construction industry.

Furthermore, the results revealed that green product innovation and green process innovation generated higher mean values, with an arithmetic mean of 4.080 and 4.014, respectively, compared to green organizational innovation with a moderate arithmetic mean of 3.563. Correspondingly, the previous average values clearly show the ranking of GI practices based on firms' willingness to adopt them, with the first ranking given to green product innovation and the last ranking to green organizational innovation. This result is somewhat consistent with the claims of Hashim (2018), who declared that green process and product innovation are the most frequently adopted practices by construction firms. Similarly, Li et al. (2023) acknowledged that green process and product innovation complement each other; green process innovation meets the consumers' needs and thus promotes developing eco-friendly products.

In terms of green product innovation, it was found to be the most influential practice from the perspective of construction firms, with all related indicators recording high mean values between 3.93 and 4.21. In particular, the results indicated that construction firms are willing to use locally sourced materials in their construction activities to reduce the energy used for materials transport from external suppliers. Further, construction firms have emphasized their willingness to utilize materials that require less energy to produce or use during the construction process, as well as utilize recyclable, reusable, and eco-innovative construction materials. Regarding green process innovation, it involves many aspects, such as adopting various plans for water and energy saving, preventing air pollution, and waste management at the construction site. Moreover, it comprises the use of eco-friendly equipment during the construction process, in addition to modern construction methods, such as BIM and 3D printing, to protect and conserve limited resources, including water, energy, and land. It is notable that all indicators of green process innovation have a high average response ranging from 3.671 to 4.301. These results are in line with Owusu-Manu et al. (2023) and Yusof et al. (2015), who pointed out that all the previous indicators regarding green product and process innovation are practiced in construction projects at a high frequency.

With respect to green organizational innovation, the descriptive analysis found that the highest priority for the construction firms is to secure good relationships within the supply

chain to keep up with the latest green products and technologies. On the other hand, the remaining related indicators recorded moderate mean values between 3.441 and 3.517, confirming that construction firms have a moderate tendency to develop written environmental documentation, conduct regular environmental audits at the firm and project levels, and reward and promote employees based on their environmental initiatives. This result coincides with the study conducted by Hashim (2018) on a sample of building firms, which found that green organizational innovation is the least adopted practice among other GI practices due to its indirect impact on the firm's performance. Correspondingly, construction firms should pay more attention to the issue of adopting green organizational innovation, as this type of innovation helps integrate green practices into firm operations and fosters green thinking among employees, thus facilitating green innovation in products and processes.

4.2.2 Discussion of the level of Green Organizational Culture in Palestine

This study examines the extent to which GOC dimensions are applied in Palestinian construction firms in order to assess their combined effect on the adoption of GI. In this regard, statistical analysis of the collected data revealed that the overall implementation level of GOC is moderate with an arithmetic mean of 3.591. Regarding the individual dimensions of GOC, the results showed that green adaptability culture has the highest implementation level with a mean value of 3.706, followed by green consistency culture, which has a moderate mean value of 3.633. The lowest levels of implementation were observed for green mission culture and green involvement culture, with moderate mean values of 3.514 and 3.512, respectively.

Regarding green adaptability culture, it was found to be the most implemented dimension of GOC in construction firms, which involves several measures with mean values ranging from 3.51 to 3.79. The measures with the highest scores stated that construction firms constantly adapt to changes and new information to improve their performance in accordance with environmental policies. In addition, construction firms listen to the stakeholders' opinions, which can lead to organizational changes. Meanwhile, the last measure recorded a moderate score and stated that construction firms make changes in their management practices to enhance environmental protection. These results are supported by García-Machado and Martínez-Ávila (2019).

As for green consistency culture, all of its relevant indicators received an average response between 3.364 and 3.853. More specifically, construction firms emphasized that they are environmentally aware in terms of the effect of their activities on the environment; in addition, they take established environmental policy into consideration when conducting their businesses. This result is consistent with the study by Maqsoom et al. (2023) on a sample of 150 construction firms, which emphasized the importance of environmental awareness within the firm. Moreover, construction firms revealed that they have a set of values that determine how employees behave regarding environmental care, with a moderate response rate of 3.601. Interestingly, the statement "The firm is keen to choose partners committed to environmental values and policies" is the weakest of all the measures of green consistency culture, with an average response rate of 3.364. Conversely, the research participants in the study by Piwowar-Sulej (2020) confirmed the need for firms' partners to adhere to environmental rules.

Additionally, the results found that green mission culture and green involvement culture have the lowest implementation levels compared to all GOC dimensions; they obtained almost the same mean values with negligible differences. On the side of green mission culture, construction firms declared that environmental preservation is the top priority, yielding a high average response of 3.692. This priority has been underlined by Maqsoom et al. (2023) as an important factor in shaping green mission culture. Besides, construction firms are concerned with continuous environmental improvement as part of their mission, achieving a moderate average response of 3.531. Although the overall implementation level of green mission culture is moderate, there are some aspects that need to be developed, such as integrating environmental protection within the firm's mission and linking environmental objectives with other firm goals, since these two items received the lowest average response score of 3.42. Consequently, putting more efforts from the firm towards these items would enhance the level of green mission culture and thus the overall level of GOC.

Pertaining to the green involvement culture, the analysis of the collected data revealed that the average response level for all related indicators is between 3.126 and 3.734. In more detail, two indicators received a high average response, indicating that managers and employees of construction firms make decisions that contribute to environmental protection; in addition, the firms encourage their employees to share green knowledge

among themselves, as highlighted by Piwowar-Sulej (2020). Besides, construction firms confirmed that they train employees to preserve and care for the environment, generating a moderate average response. It is remarkable that the statement "The firm provides financial support to projects and initiatives that aim to preserve the environment" is the least implemented among all the measures of green involvement culture. This result is attributed to the political instability that has adversely affected the financial aspect of Palestinian construction firms, leading to project delays due to curfews or military operations and hindering the delivery of construction materials due to frequent closures at military checkpoints. Meanwhile, García-Granero et al. (2020) emphasized the importance of investing in environmental initiatives, as this item received a high average response from research participants. As a result, construction firms should pay more attention to investment in such initiatives, which in turn contribute to raising the current level of GOC from moderate to high.

4.2.3 Discussion of the level of Sustainable Performance in Palestine

The second objective of this study is to examine the relationship between the adoption of GI practices and sustainable performance in the Palestinian construction industry. Accordingly, the results confirmed the presence of a positive and strong relationship between adopting GI practices and sustainable performance in its three dimensions.

In addition, the descriptive analysis of the questionnaire responses revealed that the overall implementation level of sustainable performance is high, with an arithmetic mean of 3.805. In other words, the results indicated that the adoption and implementation of GI practices have a highly positive impact on the overall sustainable performance from the viewpoint of respondent construction firms. As for the individual metrics of sustainable performance, the implementation level of environmental and social performance is high with an arithmetic mean of 3.977 and 3.932, respectively, while the implementation level of economic performance is moderate with an arithmetic mean of 3.507. Accordingly, it can be concluded that adopting and implementing GI practices positively influences environmental and social performance more than economic performance, as proven by the participating construction firms in the data collection process.

Notably, environmental performance was found to be the most positively affected metric as a result of the adoption and implementation of GI practices, where each of its individual indicators recorded a high average response. In particular, the statement that received the

highest average response of 4.056 is "The firm's adoption and implementation of GI practices lead to the use of renewable energy such as solar energy." Furthermore, construction firms emphasized that adopting and implementing GI practices improves compliance with environmental standards, in addition to reducing harmful air emissions and waste generated from the construction process, resulting in an average response of 3.986 and 3.965, respectively. Moreover, the adoption and implementation of GI practices lead to a decrease in the frequency of environmental accidents, yielding an average response of 3.902. With regard to social performance, all relevant indicators obtained a high average response level. In more detail, statements claiming that adopting and implementing GI practices improves living quality for community members as well as workers' occupational health and safety at the construction site received average response scores of 4.119 and 4.063, respectively. This is followed by the claim that the firm's adoption and implementation of GI practices leads to developing projects in the local community and creating more job opportunities, with an average response score of 3.832, in addition to improving job satisfaction levels among employees, with a score of 3.713. In sum, the results clearly indicate that firms recognize the impact of adopting GI practices on environmental and social performance in the context of the construction industry. This result is supported by the claims of previous studies such as Nguyen et al. (2022), Chishti et al. (2022), and H. Wang et al. (2021).

On the other hand, the results revealed that economic performance is the least influenced by the adoption of GI practices, compared to other metrics of sustainable performance. More specifically, the economic performance indicator with the highest score of 3.951 stated that the firm's adoption and implementation of GI practices reduces the cost of energy consumption. On the other hand, all other indicators received moderate average response scores between 3.315 and 3.413, confirming that adopting and implementing GI practices increases the firm's market share and profit margin and reduces the cost of purchasing construction materials. Consequently, these results are considered an explicit call for construction firms to somewhat rethink the impact of adopting GI practices on economic performance, which is no less important than other pillars of sustainability. This is consistent with many studies that proved the role of GI practices in enhancing economic performance by reducing unnecessary costs and increasing profitability (Nguyen et al., 2022; Xie et al., 2019). It is noteworthy that the result related to economic performance is closely linked to the research context. Unlike firms in other countries,

Palestinian construction firms face severe constraints, including limited sources of income due to a decline in the volume of externally funded projects and the Israeli government's prohibition on the import of new innovative materials.

4.2.4 Discussion of Hypotheses Testing

In this study, four main hypotheses were tested to examine the relationships between the following variables: adoption of GI practices, sustainable performance, and GOC, as explained in the previous sections. The first hypothesis aimed to investigate to what extent adopting GI practices affects sustainable performance in the Palestinian construction industry. Consequently, the results showed a positive and significant relationship between the adoption of GI practices and overall sustainable performance, including its three dimensions: environmental, economic, and social. Hence, H1 is supported. This result agrees with previous studies conducted in the construction industry, such as Halicioglu (2020), Marcelline et al. (2022), and Feng et al. (2024). On the other hand, the remaining hypotheses addressed the effect of GOC on both the adoption of GI practices and sustainable performance. Based on the available literature, there is a lack of studies on this effect in the construction sector; therefore, the research findings were supported using studies conducted in similar polluting sectors, such as manufacturing.

Furthermore, the results demonstrated that GOC positively affects the adoption of GI practices; this is consistent with the study by Roespinoedji et al. (2019) in the Malaysian manufacturing sector, which revealed that GOC has a highly significant effect on the adoption of both green process and product innovation. Thus, H2 is supported. Also, other previous studies confirmed the positive and significant relationship between GOC and GI (Xiaoyi et al., 2023; C. H. Wang, 2019). Additionally, the results affirmed that GOC has a positive and significant impact on sustainable performance; therefore, H3 is supported. This coincides with the results obtained in previous studies in the automobile and manufacturing industries (Onputtha et al., 2023; Selfiani & Yunita, 2022).

Ultimately, the results showed that GOC moderates the relationship between the adoption of GI practices and sustainable performance; thus, H4 is supported. In this regard, it was found that GOC has a positive and significant moderating effect, i.e., it strengthens the relationship between the adoption of GI practices and sustainable performance. In other words, GOC facilitates the adoption and implementation of GI practices because it helps formulate green policies and ensures a positive attitude among employees toward green

behavior, thereby enhancing the firm's sustainable performance. As a result, the higher the GOC level, the stronger the impact of GI adoption on sustainable performance. On the other hand, the results revealed that GOC has a small moderating effect, indicating that the interaction term explains a small additional proportion of the variance in sustainable performance. More precisely, GOC changes the causal relationship between the adoption of GI practices and sustainable performance, but the amount of this change is small; i.e., a higher GOC level slightly strengthens the predetermined relationship. Despite GOC's modest moderating influence, it may have meaningful implications for real-world applications in developing countries, especially in Palestine, which faces extreme challenges due to Israeli policies, including limited resources, restricted access to new technologies, and political instability. Therefore, firms operating in such a unique context need this modest effect to enhance the impact of GI practices on their sustainable performance.

Several studies have demonstrated that GOC could play a moderating role among variables related to the green concept, which can be used to support the results obtained in light of the scarcity of studies regarding H4. In the context of supporting this notion, the study by S. Wang et al. (2022) on a sample of service and manufacturing firms confirmed that GOC moderates the effect of green knowledge management on GI. In addition, other studies addressed various green concepts in the presence of GOC as a moderator, such as Qu et al. (2022) and Pham et al. (2018).

4.3 Theoretical and Practical Implications

Regarding theoretical implications, the study highlighted the critical green concepts for highly polluting industries, such as the construction industry. Initially, a comprehensive review of the adopted variables was provided to ensure a deep understanding of their nature. The study model linked all the adopted variables in a manner that has not been previously studied within the construction industry. First, the study explored the direct relationship between the adoption of GI practices and sustainable performance. Based on the available literature, this appears to be one of the first studies to explore this relationship in the Palestinian construction industry. Second, the study contributed to the development of the existing literature by examining the antecedent effect of GOC on both GI adoption and sustainable performance. Notably, there is a lack of studies regarding this effect within the construction industry, although it has been investigated in various

industries such as manufacturing. Third, sustainable performance was examined in terms of its three dimensions, in contrast to the majority of studies that focused on only one dimension, often environmental performance. Ultimately, this study has contributed mainly to bridging the notable knowledge gap regarding the moderating role of GOC in the relationship between the adoption of GI practices and sustainable performance in the construction industry. In short, it is undeniable that this study serves as a cornerstone that bridges all the aforementioned gaps regarding the study variables.

In terms of practical implications, the study offers valuable insights into the degree to which construction firms are willing to adopt GI practices. These insights could encourage governmental bodies and authorities to support and fund eco-friendly projects, as well as motivate suppliers to produce green construction materials as a result of firms' interest in adopting green practices. Moreover, the study helps construction firms to recognize the positive impact of GI adoption on sustainable performance, which in turn induces firms to incorporate GI practices into their processes and compete to be among the early adopters of GI. Further, adopting and implementing GI practices generates additional revenues by converting the construction waste into useful products, enhancing firm reputation, and increasing the firm's chance of winning bids. On the other hand, the results showed that sustainable performance is positively influenced by GOC alongside GI. Therefore, construction firms should pay attention to transforming traditional OC into GOC to enhance their sustainability, facilitate greening the construction process, handle environmental problems effectively, and reduce employees' resistance to adopting green practices.

4.4 Conclusion

Generally, interest in green concepts is steadily increasing across various industries as a proactive response to environmental threats. This, in turn, pushes firms to embrace green practices in order to gain a sustainable competitive advantage over their rivals in the same industry. When it comes to polluting and resource-intensive industries, such as construction, and specifically in developing countries, the importance of these green practices involving GI becomes even more prominent. This study primarily aims to explore the impact of adopting GI practices on firms' sustainable performance, as well as to examine the moderating effect of GOC on the relationship between GI adoption and sustainable performance, particularly within the Palestinian construction industry.

This study enriches our understanding of the willingness and intention of Palestinian construction firms to implement GI practices. More specifically, the results indicated that there is a high inclination to implement GI practices and that firms engaging in these practices will achieve a high level of sustainable performance. In this regard, construction firms showed a greater willingness to implement green product innovation, followed by green process innovation, considering them the most significant GI practices. With respect to sustainable performance, firms revealed that environmental performance is most positively impacted by the adoption of GI practices. On the other hand, the results showed that the overall implementation level of GOC is moderate, with a green adaptability culture being the most implemented dimension.

According to the study results, there is a theoretically and statistically supported causal relationship between adopting GI practices and sustainable performance in its three dimensions, meaning that the former variable has a positive and statistically significant impact on the latter. Consequently, GI practices reduce waste generated during construction processes, reduce energy consumption and costs through the use of recycled materials, and improve the firm's image in the public eye. Furthermore, the effect of GOC on both the adoption of GI practices and sustainable performance was found to be positive and statistically significant, confirming that GOC is considered an antecedent for GI and sustainable performance. Therefore, firms with a green culture encourage their employees to explore innovative green solutions that reduce the firm's environmental footprint, in addition to increasing employees' commitment and responsibility toward environmental preservation during their daily activities.

Moreover, the results revealed that GOC moderates the relationship between the adoption of GI practices and sustainable performance, such that the relationship is stronger when the GOC level is high and vice versa. Indeed, the green values and beliefs prevalent in the workplace drive firms to pursue GI, which enhances the firm's sustainable performance. Based on the available literature, this is the first study to explore how GOC moderates the effect of adopting GI practices on sustainable performance in the Palestinian construction industry. In sum, the findings obtained are immensely useful in understanding the importance of developing GOC within construction firms, in addition to its relationship with GI and sustainable performance.

4.5 Recommendations

Green concepts are still under development in the construction industry, specifically in developing countries such as Palestine. Moreover, the Palestinian context has some uniqueness compared to other research contexts due to its unstable economic and political conditions, import restrictions imposed by the Israeli government, and limited access to resources, as these factors may hinder the adoption of GI practices. Nevertheless, it is crucial to overcome these obstacles and adopt GI practices to reduce the ecological impact of the construction industry and improve the firm's sustainable performance. As firms operating in the construction industry have shown a high willingness to adopt GI practices, they should consider the following thematically grouped recommendations to ensure successful adoption:

- Operations: Implement regular environmental audits for all engineering works to ensure compliance with environmental policies throughout all construction stages and select partners concerned with environmental preservation, such as green suppliers who develop construction products using recycled materials.
- Human resources: Establish a reward system for employees based on their environmental contributions and provide training and educational programs to raise their environmental awareness.
- Strategy: Conduct market research to gather information on the latest eco-innovative technologies, including products and processes, for use in construction activities.

Given the proven and significant causal relationship between GI practices and sustainable performance, construction firms are recommended to integrate GI practices into their operational and managerial strategies as an effective tool for improving their environmental, economic, and social performance in a holistic manner. Moreover, Palestinian construction firms should follow specific strategies to strengthen GOC, such as formulating a green mission statement that aligns green goals with other firm goals and allocating financial resources to support projects and initiatives aimed at environmental protection. To further enhance the moderating effect of GOC, firms should incorporate environmental values and principles into internal policies and encourage green leadership behaviors, thereby reinforcing the impact of GI on sustainable performance. Ultimately, the government and union bodies are recommended to adopt incentive policies that support the dissemination of the GI concept within the construction industry and raise

awareness among construction firms about the positive impacts of adopting GI practices on their future sustainable performance.

4.6 Limitations and Future Research Directions

A few limitations were faced while conducting this research. First, the sample size is relatively small compared to the overall size of the adopted sampling frame, although its adequacy has been proved based on previous studies. As a future research direction, when carrying out other studies in similar contexts, scholars are recommended to enlarge the sample size in order to enhance the reliability and generalizability of results. In addition, the snowball sampling method can be used in low-responsive industries, such as construction, since this method ensures access to the largest number of representative practitioners for the industry, resulting in larger samples.

Second, the study witnessed a remarkable decline in the response rate despite sending reminders to complete the questionnaire. This low response rate is mainly attributed to the unstable political situation in the country, which directly impacted the firms' business volume and psychological state, leading to a lack of interest or engagement in the research. In future research directions, a set of strategies is recommended to improve the response rate, such as conducting interviews alongside surveys, i.e., a mixed approach, to enhance firms' response in such conflict-affected countries. Another recommended strategy is to conduct a pilot study to understand the respondent's behavior and its speed of response, thereby reshaping the sampling frame to ensure a high response rate.

Third, the Gaza Strip was not included in the target population as a result of the ongoing unprecedented war in the strip, thus obstructing all forms of life. Therefore, the study findings represent only the West Bank region. In future research, it is important to conduct a research collaboration with other researchers in the Gaza Strip in order to implement a similar study using a sample that covers all Palestinian areas, generating a holistic view of the Palestinian construction industry as a whole. Thus, in light of the current situation in the strip, the study's practical implications can be considered during the reconstruction process of the strip to enhance the sustainability of construction projects.

Along with the above research directions, it would be good to carry out similar studies in other developing countries in order to gain more valuable and applicable insights in the region. Also, it is interesting to investigate the challenges that Palestinian construction

firms may face when adopting GI practices, as well as to explore the role of the Palestinian government in the relationship between GI adoption and sustainable performance. Another worthy research direction is to explore the mediating role of emerging research concepts, such as AI tools and green knowledge management, between the adoption of GI practices and sustainable performance within the construction industry.

List of Abbreviations

Abbreviations	Meaning
AGI	Adoption of Green Innovation
AI	Artificial Intelligence
AVE	Average Variance Extracted
CR	Composite Reliability
ENP	Environmental Performance
EP	Economic Performance
f^2	Effect Size
GAC	Green Adaptability Culture
GCC	Green Consistency Culture
GDP	Gross Domestic Product
GI	Green Innovation
GIC	Green Involvement Culture
GMC	Green Mission Culture
GOC	Green Organizational Culture
GOF	Goodness of Fit
GOI	Green Organizational Innovation
GPCI	Green Process Innovation
GPDI	Green Product Innovation
HTMT	Heterotrait-Monotrait Ratio
OC	Organizational Culture
PCBS	Palestinian Central Bureau of Statistics
PCU	Palestinian Contractors Union
PLS-SEM	Partial Least Squares Structural Equation Modeling
Q^2	Predictive Relevance
R^2	Coefficient of Determination
SP	Social Performance
SUP	Sustainable Performance
VIF	Variance Inflation Factor
WCED	World Commission on Environment and Development

References

Afzal, F., & Lim, B. (2022). Organizational factors influencing the sustainability performance of construction organizations. *Sustainability*, *14*(16), 10449. https://doi.org/10.3390/su141610449

Aggarwal, P., & Agarwala, T. (2021). Green organizational culture: An exploration of dimensions. *Global Business Review*, 1–24. https://doi.org/10.1177/09721509211049890

Aggarwal, P., & Agarwala, T. (2023). Relationship of green human resource management with environmental performance: Mediating effect of green organizational culture. *Benchmarking: An International Journal*, *30*(7), 2351–2376. https://doi.org/10.1108/BIJ-08-2021-0474

Aghimien, D. O., Adegbembo, T. F., Aghimien, E. I., & Awodele, O. A. (2018). Challenges of sustainable construction: A study of educational buildings in Nigeria. *International Journal of Built Environment and Sustainability*, *5*(1), 33–46. https://doi.org/10.11113/ijbes.v5.n1.244

Aigbavboa, C., Ohiomah, I., & Zwane, T. (2017). Sustainable construction p ractices : " a lazy view " of construction professionals in the South Africa construction industry. *Energy Procedia*, *105*, 3003–3010. https://doi.org/10.1016/j.egypro.2017.03.743

Al Doghan, M. A., Abdelwahed, N. A. A., Soomro, B. A., & Ali Alayis, M. M. H. (2022). Organizational environmental culture, environmental sustainability and performance: The mediating role of green HRM and green innovation. *Sustainability*, *14*(12), 7510. https://doi.org/10.3390/su14127510

Alkahtani, A., & Nordin, N. (2020). Conceptual framework of green-building adoption among construction companies in Saudi Arabia: The effect of proactive entrepreneurial behavior, green product innovation, and government support. *International Journal of Industrial Management*, *8*(1), 35–42. https://doi.org/10.15282/ijim.8.0.2020.5761

Alsharif, H. Z. H., & Tong, S. (2019). Green product innovation strategies for environmental sustainability in the construction sector. *Journal of Contemporary Research in Social Sciences*, *1*(6), 126–135. https://doi.org/10.33094/26410249.2019.16.126.135

Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, *14*(3), 396–402. https://doi.org/10.2307/3150783

Bamgbade, J. A., Kamaruddeen, A. M., & Nawi, M. N. M. (2017). Towards environmental sustainability adoption in construction firms: An empirical analysis of market orientation and organizational innovativeness impacts. *Sustainable Cities and Society*, *32*, 486–495. https://doi.org/10.1016/J.SCS.2017.04.015

Bamigboye, G. O., Davies, I., Nwanko, C., Michaels, T., Adeyemi, G., & Ozuor, O. (2019). Innovation in construction materials- A review. *IOP Conference Series: Materials Science and Engineering*, *640*(1), 012070. https://doi.org/10.1088/1757-899X/640/1/012070

Bohari, A. A. M., Skitmore, M., Xia, B., & Zhang, X. (2016). Insights into the adoption of green construction in Malaysia: The drivers and challenges. *Environment – Behaviour Proceedings Journal*, *1*(4), 37–46. https://doi.org/10.21834/e-bpj.v1i4.165

Brundtland, G. H. (1987). *Our common future*. World Commission on Environment and Development. Retrieved from https://www.brundtland.co.za/other-publication/

Burki, U., & Dahlstrom, R. (2017). Mediating effects of green innovations on interfirm cooperation. *Australasian Marketing Journal*, *25*(2), 149–156. https://doi.org/10.1016/j.ausmj.2017.05.001

Casula, M., Rangarajan, N., & Shields, P. (2021). The potential of working hypotheses for deductive exploratory research. *Quality and Quantity*, *55*(5), 1703–1725. https://doi.org/10.1007/s11135-020-01072-9

Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a monte carlo simulation study and an electronic-mail emotion/adoption study. *Information Systems Research*, *14*(2), 189–217. https://doi.org/10.1287/isre.14.2.189.16018

Chishti, M., Bashir, R., Safdar, S., & Mancinelli, T. (2022). Sustainability consciousness, green innovation initiatives and CSR practices: A way forward for developing countries [Preprint]. Research Square. https://doi.org/10.21203/rs.3.rs-1595603/v1

Dorkenoo, E. S. (2019). *Influence of organisational culture on performance of construction managers* [Kwame Nkrumah University of Science and Technology]. Retrieved from KNUST theses and dissertations collection. https://ir.knust.edu.gh/handle/123456789/14076

Duong, L. N. K., Wang, J. X., Wood, L. C., Reiners, T., & Koushan, M. (2021). The value of incremental environmental sustainability innovation in the construction industry: An event study. *Construction Management and Economics*, *39*(5), 398–418. https://doi.org/10.1080/01446193.2021.1901950

Fang, L., Shi, S., Gao, J., & Li, X. (2022). The mediating role of green innovation and green culture in the relationship between green human resource management and environmental performance. *PLOS One*, *17*(9), e0274820. https://doi.org/10.1371/journal.pone.0274820

Fauzi, M. A. (2022). Partial least square structural equation modelling (PLS- SEM) in knowledge management studies: Knowledge sharing in virtual communities. *Knowledge Management and E-Learning*, *14*(1), 103–124. https://doi.org/10.34105/j.kmel.2022.14.007

Feng, S., Liu, G., Shan, T., Li, K., & Lai, S. (2024). Predicting green technology innovation in the construction field from a technology convergence perspective: A two-stage predictive approach based on interpretable machine learning. *Journal of Environmental Management*, *372*(3), 123203. https://doi.org/10.1016/J.JENVMAN.2024.123203

García-Granero, E. M., Piedra-Muñoz, L., & Galdeano-Gómez, E. (2020). Measuring eco-innovation dimensions: The role of environmental corporate culture and commercial orientation. *Research Policy*, *49*(8), 104028. https://doi.org/10.1016/j.respol.2020.104028

García-Machado, J. J., & Martínez-Ávila, M. (2019). Environmental performance and green culture: The mediating effect of green innovation. An application to the automotive industry. *Sustainability*, *11*(18), 4874. https://doi.org/10.3390/su11184874

Gorbaneva, E., Vinogradova, E., Hamdan, M. A. M., & Abuasad, M. M. H. (2024). Energy consumption analysis during the life cycle of buildings in Palestine. In N. Vatin, E. G. Pakhomova, & D. Kukaras (Eds.), *Modern Problems in Construction (MPC 2022)* (pp. 321–331). Springer Nature. https://doi.org/10.1007/978-3-031-36723-6_31

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer Nature. https://doi.org/10.1007/978-3-030-80519-7

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, *40*(3), 414–433. https://doi.org/10.1007/s11747-011-0261-6

Halicioglu, F. H. (2020). The relationship between eco-innovation and sustainability in the construction industry: Exploring knowledge networks from the perspective of ANT. *IOP Conference Series: Earth and Environmental Science*, *588*(5), 052059. https://doi.org/10.1088/1755-1315/588/5/052059

Hammad, N., Yoshida, M., & Mfarreh, S. A. (2021). Construction and demolition waste and its management in West Bank, Palestine. *Proceedings of the 4th International E-Conference on Advances in Engineering, Technology and Management (ICETM)*, 131–137. https://doi.org/10.15224/978-1-63248-191-7-17

Hashim, R. (2018). *Green innovation adoption in the construction sector: The role of absorptive capacity and the effect of environmental requirements* [The University of Edinburgh]. Retrieved from Edinburgh Research Archive. http://hdl.handle.net/1842/33255

Hazarika, N., & Zhang, X. (2019). Factors that drive and sustain eco-innovation in the construction industry: The case of Hong Kong. *Journal of Cleaner Production*, *238*(2), 117816. https://doi.org/10.1016/j.jclepro.2019.117816

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Imran, M., Arshad, I., & Ismail, F. (2021). Green organizational culture and organizational performance: The mediating role of green innovation and environmental performance. *Jurnal Pendidikan IPA Indonesia*, *10*(4), 515–530. https://doi.org/10.15294/jpii.v10i4.32386

Imran, M., & Jingzu, G. (2022). Green organizational culture, organizational performance, green innovation, environmental performance: A mediation-moderation model. *Journal of Asia-Pacific Business*, *23*(2), 161–182. https://doi.org/10.1080/10599231.2022.2072493

Isa, S. S. M., & Abidin, N. Z. (2021). Eco-innovation adoption in Malaysian contractor firms: Understanding the components and drivers. *Construction Economics and Building*, *21*(3), 221–242. https://doi.org/10.5130/AJCEB.V21I3.7660

Isa, S. S. M., Abidin, N. Z., & Yahaya, I. (2019). Conceptualising eco-innovation practices in contractor firms - the dynamic capability approaches. *IOP Conference Series: Materials Science and Engineering*, *601*, 012030. https://doi.org/10.1088/1757-899X/601/1/012030

Judi, T. E., Darmawan, A., & Rochim, A. I. (2022). The public role of green performance and competitive advantages on sustainability: Analysis of the importance of green organizational culture and green innovation in companies. *Jurnal Administrasi Publik*, *20*(2), 351–374. https://doi.org/10.30996/dia.v20i02.7155

Khan, A. N., Mehmood, K., & Kwan, H. K. (2024). Green knowledge management: A key driver of green technology innovation and sustainable performance in the construction organizations. *Journal of Innovation and Knowledge*, *9*(1), 100455. https://doi.org/10.1016/j.jik.2023.100455

Küçükoğlu, M. T., & Pınar, R. I. (2018). The mediating role of green organizational culture between sustainability and green innovation: A research in Turkish companies. *Business & Management Studies: An International Journal*, *6*(1), 64–85. https://doi.org/10.15295/bmij.v6i1.208

Li, H., Li, Y., Sarfarz, M., & Ozturk, I. (2023). Enhancing firms' green innovation and sustainable performance through the mediating role of green product innovation and moderating role of employees' green behavior. *Economic Research-Ekonomska Istraživanja*, *36*(2), 2142263. https://doi.org/10.1080/1331677X.2022.2142263

Maqsoom, A., Umer, M., Alaloul, W. S., Salman, A., Ullah, F., Ashraf, H., & Musarat, M. A. (2023). Adopting green behaviors in the construction sector: The role of behavioral intention, motivation, and environmental consciousness. *Buildings*, *13*(4), 1036. https://doi.org/10.3390/buildings13041036

Marcelline, T. R. S., Chengang, Y., Avotra, A. A. R. N., Hussain, Z., Zonia, J. E., & Nawaz, A. (2022). Impact of green construction procurement on achieving sustainable economic growth influencing green logistic services management and innovation practices. *Frontiers in Environmental Science*, *9*, 815928. https://doi.org/10.3389/fenvs.2021.815928

Mavi, R. K., Gengatharen, D., Mavi, N. K., Hughes, R., Campbell, A., & Yates, R. (2021). Sustainability in construction projects: A systematic literature review. *Sustainability*, *13*(4), 1932. https://doi.org/10.3390/su13041932

Memon, M. A., Ting, H., Cheah, J. H., Thurasamy, R., Chuah, F., & Cham, T. H. (2020). Sample size for survey research: Review and recommendations. *Journal of Applied Structural Equation Modeling*, *4*(2), i–xx. https://doi.org/10.47263/jasem.4(2)01

Miozzo, M., & Dewick, P. (2004). *Innovation in construction: A European analysis*. Edward Elgar Publishing, Inc. https://doi.org/10.4337/9781845420734

Mishra, S. B., & Alok, S. (2017). *Handbook of research methodology*. Educreation Publishing. https://www.researchgate.net/publication/319207471

Nassani, A. A., Javed, A., Radulescu, M., Yousaf, Z., Secara, C. G., & Tolea, C. (2022). Achieving green innovation in energy industry through social networks, green dynamic capabilities, and green organizational culture. *Energies*, *15*(16), 5925. https://doi.org/10.3390/en15165925

Nguyen, X. H., Nguyen, K. L., Nguyen, T. V. H., & Nguyen, T. T. H. (2022). The green innovation of construction enterprises in Vietnam. *Journal of Economics and Sustainable Development*, *13*(8). https://doi.org/10.7176/jesd/13-8-01

Olawale, S. R., Chinagozi, O. G., & Joe, O. N. (2023). Exploratory research design in management science: A review of literature on conduct and application. *International Journal of Research and Innovation in Social Science (IJRISS)*, *VII*(IV), 1384–1395. https://doi.org/10.47772/IJRISS.2023.7515

Onputtha, S., Phophan, K., Iamsomboon, N., Bhumkittipich, P., & Sathiankomsorakrai, T. (2023). Sustainable performance of Thai automobile industry: The impact from green organizational culture and green transportation. *E3S Web of Conferences*, *389*, 05014. https://doi.org/10.1051/e3sconf/202338905014

Owusu-Manu, D. G., Babon-Ayeng, P., Kissi, E., Edwards, D. J., Okyere-Antwi, D., & Elgohary, H. (2023). Green construction and environmental performance: An assessment framework. *Smart and Sustainable Built Environment*, *12*(3), 565–583. https://doi.org/10.1108/SASBE-07-2021-0120

Palestinian Central Bureau of Statistics (PCBS). (2024). *The performance of the Palestinian economy during 2024*. Retrieved from https://www.pcbs.gov.ps/default.aspx

Pero, M., Moretto, A., Bottani, E., & Bigliardi, B. (2017). Environmental collaboration for sustainability in the construction industry: An exploratory study in Italy. *Sustainability*, *9*(1), 125. https://doi.org/10.3390/su9010125

Pham, N. T., Phan, Q. P. T., Tučková, Z., Vo, N., & Nguyen, L. H. L. (2018). Enhancing the organizational citizenship behavior for the environment: The roles of green training and organizational culture. *Management and Marketing*, *13*(4), 1174–1189. https://doi.org/10.2478/mmcks-2018-0030

Piwowar-Sulej, K. (2020). Pro-environmental organizational culture: Its essence and a concept for its operationalization. *Sustainability*, *12*(10), 4197. https://doi.org/10.3390/su12104197

Praharaj, S. K., & Ameen, S. (2024). Sample size estimation in research: Necessity or compromise? *Kerala Journal of Psychiatry*, *37*(1), 66–71. https://doi.org/10.30834/KJP.37.1.2024.463

Qu, X., Khan, A., Yahya, S., Zafar, A. U., & Shahzad, M. (2022). Green core competencies to prompt green absorptive capacity and bolster green innovation: The moderating role of organization's green culture. *Journal of Environmental Planning and Management*, *65*(3), 536–561. https://doi.org/10.1080/09640568.2021.1891029

Regona, M., Yigitcanlar, T., Xia, B., & Li, R. Y. M. (2022). Opportunities and adoption challenges of AI in the construction industry: A PRISMA review. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(1), 45. https://doi.org/10.3390/joitmc8010045

Roespinoedji, R., Saudi, M. H. M., Hardika, A. L., & Rashid, A. Z. A. (2019). The effect of green organizational culture and green innovation in influencing competitive advantage and environmental performance. *International Journal of Supply Chain Management*, *8*(1), 278–286. https://doi.org/10.59160/ijscm.v8i1.2893

Roscoe, S., Subramanian, N., Jabbour, C. J. C., & Chong, T. (2019). Green human resource management and the enablers of green organisational culture: Enhancing a firm's environmental performance for sustainable development. *Business Strategy and the Environment*, *28*(5), 737–749. https://doi.org/10.1002/bse.2277

Sadeh, H. (2025). Fostering eco-friendly consumption: Advancing sustainable practices in Palestine. *Technium Social Sciences Journal*, *68*(1), 332–349. https://doi.org/10.47577/tssj.v68i1.12381

Sangkala, M., Meddour, H., Anwer, D. A., Aziz, A., Shahrizal, B., & Abro, R. (2023). Impact of moderating role of green cultures over green environmental effects [Preprint]. EarthArxiv. https://doi.org/10.31223/X5C398

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2021). Partial least squares structural equation modeling. In C. Homburg, M. Klarmann, & A. E. Vomberg (Eds.), *Handbook of Market Research* (pp. 1–47). Springer Nature. https://doi.org/10.1007/978-3-319-05542-8_15-2

Selfiani, S., & Yunita, I. (2022). The effect of green culture and CSR on financial performance with XBRL application as moderating variables. *International Journal of Educational Research & Social Sciences*, *3*(4), 1797–1807. https://doi.org/10.51601/ijersc.v3i4.479

Şengüllendi, M. F., Bilgetürk, M., & Fındıklı, M. A. (2024). Ethical leadership and green innovation: the mediating role of green organizational culture. *Journal of Environmental Planning and Management*, *67*(8), 1702–1723. https://doi.org/10.1080/09640568.2023.2180347

Sezen, B., & Çankaya, S. Y. (2013). Effects of green manufacturing and eco-innovation on sustainability performance. *Procedia - Social and Behavioral Sciences*, *99*(6), 154–163. https://doi.org/10.1016/j.sbspro.2013.10.481

Shahriari, M., Riahi, M. T., Azizan, O., & Rasti-Barzoki, M. (2023). The effect of green organizational culture on organizational commitment: The mediating role of job satisfaction. *Journal of Human Behavior in the Social Environment*, *33*(2), 180–197. https://doi.org/10.1080/10911359.2022.2029789

Shamsuzzoha, A., Tran, G., & Jovanovski, B. (2022). Fostering green innovation in organizations: Accompanied opportunities and challenges. *Proceedings of the 5th International Conference on Industrial & Mechanical Engineering and Operations Management (IMEOM)*, 900–908. https://doi.org/10.46254/bd05.20220262

Taherdoost, H. (2022). What are different research approaches? Comprehensive review of qualitative, quantitative, and mixed method research, their applications, types, and limitations. *Journal of Management Science & Engineering Research*, *5*(1), 53–63. https://doi.org/10.30564/jmser.v5i1.4538

Tajuddin, M. Z. M., Iberahim, H., & Ismail, N. (2015). Relationship between innovation and organizational performance in construction industry in Malaysia. *Universal Journal of Industrial and Business Management*, *3*(4), 87–99. https://doi.org/10.13189/ujibm.2015.030402

Tang, M., Walsh, G., Lerner, D., Fitza, M. A., & Li, Q. (2018). Green innovation, managerial concern and firm performance: An empirical study. *Business Strategy and the Environment*, *27*(1), 39–51. https://doi.org/10.1002/bse.1981

Wang, C. H. (2019). How organizational green culture influences green performance and competitive advantage: The mediating role of green innovation. *Journal of Manufacturing Technology Management*, *30*(4), 666–683. https://doi.org/10.1108/JMTM-09-2018-0314

Wang, H., Khan, M. A. S., Anwar, F., Shahzad, F., Adu, D., & Murad, M. (2021). Green innovation practices and its impacts on environmental and organizational performance. *Frontiers in Psychology*, *11*, 553625. https://doi.org/10.3389/fpsyg.2020.553625

Wang, S., Abbas, J., Sial, M. S., Álvarez-Otero, S., & Cioca, L. I. (2022). Achieving green innovation and sustainable development goals through green knowledge management: Moderating role of organizational green culture. *Journal of Innovation and Knowledge*, *7*(4), 100272. https://doi.org/10.1016/j.jik.2022.100272

Wetzels, M., Odekerken-Schröder, G., & Oppen, V. C. (2009). Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly*, *33*(1), 177–195. https://doi.org/10.2307/20650284

World Green Building Council (WGBC). (2023). *Advancing net zero status report*. Retrieved from https://worldgbc.org/

Xiaoyi, Z., Yang, H., Kumar, N., Bhutto, M. H., Kun, W., & Hu, T. (2023). Assessing Chinese textile and apparel industry business sustainability: The role of organization green culture, green dynamic capabilities, and green innovation in relation to environmental orientation and business sustainability. *Sustainability*, *15*(11), 8588. https://doi.org/10.3390/su15118588

Xie, X., Huo, J., & Zou, H. (2019). Green process innovation, green product innovation, and corporate financial performance: A content analysis method. *Journal of Business Research*, *101*(4), 697–706. https://doi.org/10.1016/j.jbusres.2019.01.010

Xue, X., Zhang, R., Yang, R. J., & Dai, J. (2014). Innovation in construction: A critical review and future research. *International Journal of Innovation Science*, *6*(2), 111–126. https://doi.org/10.1260/1757-2223.6.2.111

Yang, Z., Sun, J., Zhang, Y., & Wang, Y. (2017). Green, green, it's green: A triad model of technology, culture, and innovation for corporate sustainability. *Sustainability*, *9*(8), 1369. https://doi.org/10.3390/su9081369

Yılmaz, M., & Bakış, A. (2015). Sustainability in construction sector. *Procedia - Social and Behavioral Sciences*, *195*, 2253–2262. https://doi.org/10.1016/j.sbspro.2015.06.312

Yusof, N., Iranmanesh, M., & Awang, H. (2015). Pro-environmental practices among Malaysian construction practitioners. *Advances in Environmental Biology*, *9*(5), 117–119. https://doi.org/10.6084/M9.FIGSHARE.1437780

Zhu, Q., Sarkis, J., & Lai, K. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics*, *111*(2), 261–273. https://doi.org/10.1016/j.ijpe.2006.11.029

Appendices

Appendix A

Questionnaire

An-Najah National University

Faculty of Graduate Studies

Engineering Management Program

Questionnaire about Assessing the Impact of Adopting Green Innovation Practices on Sustainable Performance in the Palestinian Construction Industry: Green Organizational Culture as a Moderator

Dear respondents,

Thank you for your time to participate in this questionnaire. This study aims to assess the willingness of Palestinian construction firms to adopt green innovation practices, in addition to examining the impact of adopting these practices on the firms' sustainable performance in the presence of green organizational culture. Please note that this information will be used for the purpose of scientific research to fulfill the requirements for the master's degree in engineering management at An-Najah National University.

The questionnaire consists of four sections, as follows:
The first section aims to collect general information about the respondent and the firm. The other sections aim to assess the adoption level of green innovation practices in the construction firms classified by the Palestinian Contractors Union and the Engineering Association, in addition to assessing the firm's sustainable performance and the extent to which aspects of green organizational culture are implemented.

The survey will take 10 minutes to complete. Please read all sections carefully and choose the appropriate answer accurately and impartially. Your participation is fully appreciated.

Maryana Naser Faour
Master of Engineering Management
Email: maryana.faour@hotmail.com
Mobile number: 0595-704798

Section One: General Information

Please answer the following questions by marking X with the appropriate option:

1. Gender
   ( ) Male ( ) Female

2. Years of experience in the construction industry:
   ( ) 0-5 Years ( ) 6-10 Years ( ) 11-15 Years ( ) Over 15 years

3. Current job position in the firm:
   ( ) Contractor/General manager ( ) Office engineer (civil/ building engineer)
   ( ) Project manager ( ) Site engineer

4. Firm type:
   ( ) Contracting firm ( ) Consulting firm/office ( ) Engineering firm/office

5. Firm location:
   ( ) Jenin ( )Tullkarm ( ) Nablus ( ) Ramallah ( ) Jerusalem ( ) Hebron ( ) Bethlehem ( ) Salfit ( ) Qalqilya ( ) Jericho ( ) Tubas

6. Firm age (i.e., number of firm's working years since its official registration and classification):
   ( ) 0-10 Years ( ) 11-20 Years ( ) Over 20 Years

7. Types of construction projects that the company works on (You can choose more than one answer):
   ( ) Residential construction ( ) Commercial construction ( ) Industrial construction ( ) Other (please specify)

8. Types of the firm's clients (You can choose more than one answer):
   ( ) Individuals ( ) Private sector ( ) Public sector

9. From the firm's perspective, how important is it to make future plans regarding environmental preservation?
   ( ) Important ( ) Not important ( ) Not sure

Section Two: Adopting Green Innovation Practices

Green innovation refers to environmentally friendly innovation (eco-friendly innovation). It includes a set of practices that reduce the negative impacts on the environment through green product innovation, green process innovation, and green organizational innovation.

This section aims to measure the adoption level of green innovation practices by construction firms. Please choose the extent to which you agree with the following items in terms of your firm's willingness and intention to implement each item by marking the appropriate column with x.

No.	Item	Strongly disagree	Disagree	Neutral (Don't know)	Agree	Strongly agree
	Green product innovation					
1	The firm is willing to use eco-innovative construction materials such as recycled steel and green concrete.					
2	The firm is willing to use recyclable and reusable materials.					
3	The firm is willing to use materials that require less energy to produce or use during construction.					
4	The firm is willing to use locally sourced materials in construction activities to reduce energy consumption in transporting materials from external suppliers.					
	Green process innovation					
5	The firm is willing to use green equipment and technology during the construction process.					
6	The firm is willing to use modern construction methods, such as 3D printing, to protect finite resources.					
7	The firm is willing to adopt plans to manage waste generated from its activities at the construction site (i.e., site waste management plans).					
8	The firm is willing to adopt plans to save water and energy and prevent air pollution at the construction site.					

No.	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Green organizational innovation					
9	The firm has a tendency to implement regular environmental auditing at the level of the firm and its implemented projects.					
10	The firm has a tendency to reward and promote employees based on participation in implementing environmental initiatives.					
11	The firm has a tendency to develop written environmental documents, such as policies and procedures, to protect the environment.					
12	The firm has a tendency to maintain collaboration and good relationships within the supply chain to keep up with the latest green products and technologies.					

Section Three: Green Organizational Culture

Green organizational culture refers to a set of values and standards that determine how a firm's employees behave toward the environment, and it is measured by four dimensions: green involvement culture, green consistency culture, green adaptability culture, and green mission culture.

This section aims to measure the implementation level of green organizational culture practices within construction firms. Please choose the extent to which you agree with the following items in terms of the degree to which each is applied in your firm by marking the appropriate column with x.

No.	Item	Strongly disagree	Disagree	Neutral (Don't know)	Agree	Strongly agree
	Green involvement culture					
1	The firm's managers and employees make decisions that contribute to protecting the environment.					
2	The firm trains its employees to preserve and care for the environment.					
3	The firm encourages employees to share green knowledge among themselves.					
4	The firm provides financial support to projects and that aim to preserve the environment. initiatives					

No.	Item	Strongly disagree	Disagree	Neutral (Don't know)	Agree	Strongly agree
	Green consistency culture					
5	The firm has an environmental awareness in terms of the impact of its activities on the environment.					
6	The firm has a set of values that determine how employees act regarding environmental care.					
7	The firm takes established environmental policy into consideration when conducting its businesses.					
8	The firm is keen to choose partners committed to environmental values and policies.					
	Green adaptability culture					
9	The firm adapts well to changes in order to preserve the environment.					
10	The firm constantly adapts to new information in order to improve its performance in accordance with environmental policies.					
11	The firm listens to the opinions of customers and other stakeholders, which can lead to organizational changes within the firm.					
12	The firm makes changes in its management practices to enhance environmental protection.					
	Green mission culture					
13	Environmental preservation is a high priority in the firm.					
14	The firm's mission statement includes environmental protection.					
15	Continuous environmental improvement is part of the firm's mission.					
16	The firm links environmental objectives with its other goals.					

Section Four: Sustainable Performance

Sustainable performance consists of three main pillars: environmental, economic, and social performance. Environmental sustainability addresses the impact of a firm's business and activities on the environment, while economic sustainability addresses the firm's economic performance. Social sustainability represents a firm's responsibility toward society and individuals.

This section aims to reveal the impact of adopting and implementing green innovation practices on the firm's sustainable performance by measuring the firm's environmental, economic, and social performance. Please choose the extent to which you agree with the following results in terms of changes to your firm's performance by marking the appropriate column with x.

No.	Item	Strongly disagree	Disagree	Neutral (Don't know)	Agree	Strongly agree
	Environmental performance					
1	The firm's adoption and implementation of GI practices reduces harmful air emissions and waste resulting from the construction process.					
2	The firm's adoption and implementation of GI practices lead to a decrease in the frequency of environmental accidents.					
3	The firm's adoption and implementation of GI practices improves compliance with environmental standards during the construction process.					
4	The firm's adoption and implementation of GI practices lead to the use of renewable energy, such as solar energy.					
	Economic performance					
5	The firm's adoption and implementation of GI practices increases the firm's market share.					
6	The firm's adoption and implementation of GI practices increases the firm's profit margin.					
7	The firm's adoption and implementation of GI practices reduces the cost of purchasing construction materials.					
8	The firm's adoption and implementation of GI practices reduces the cost of energy consumption.					
	Social performance					
9	The firm's adoption and implementation of GI practices improves workers' occupational health and safety at the construction site.					
10	The firm's adoption and implementation of GI practices improves job satisfaction levels among employees.					
11	The firm's adoption and implementation of GI practices improves living quality for community members.					
12	The firm's adoption and implementation of GI practices lead to developing projects in the local community and creating more job opportunities.					

Any notes: ……....

Thank you

Appendix B

الاستبانة

جامعة النجاح الوطنية

كلية الدراسات العليا

برنامج ماجستير الإدارة الهندسية

استبيان حول تقييم أثر تبني ممارسات الابتكار الأخضر على الأداء المستدام في قطاع البناء والتشييد الفلسطيني: الثقافة المؤسساتية الخضراء كمُيسر

عزيزي القارئ/ عزيزتي القارئة،

تحية طيبة وبعد،

شكراً لك على تخصيص جزء من وقتك للمشاركة في هذا الاستبيان، حيث تهدف هذه الدراسة إلى تقييم مستوى استعداد شركات البناء الفلسطينية لتبني ممارسات الابتكار الأخضر بالإضافة إلى دراسة تأثير تبني هذه الممارسات على الأداء المستدام للشركات في ظل وجود الثقافة المؤسساتية الخضراء. علماً أنه سيتم استخدام هذه المعلومات لأغراض البحث العلمي من أجل استكمال متطلبات الحصول على درجة الماجستير في الإدارة الهندسية من جامعة النجاح الوطنية.

يتكون الاستبيان من أربعة أقسام على النحو التالي:

القسم الأول يهدف إلى جمع معلومات عامة عن المُجيب والشركة، بينما تهدف الأقسام الأخرى إلى تقييم مستوى تبني ممارسات الابتكار الأخضر في شركات البناء المُصنفة من قِبل اتحاد المقاولين ونقابة المهندسين، بالإضافة إلى تقييم مدى تطبيق جوانب الثقافة المؤسساتية الخضراء والأداء المستدام للشركة.

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

الباحثة مريانه ناصر فاعور

ماجستير الإدارة الهندسية

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القسم الأول: معلومات عامة

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

1- الجنس:

( ) ذكر ( ) أنثى

2- عدد سنوات خبرتك في قطاع البناء والتشييد:

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

3- الموقع الوظيفي الحالي في الشركة:

( ) مقاول/ مدير عام ( ) مهندس مكتب (مدني/ بناء) ( ) مدير مشروع ( ) مهندس موقع

4- نوع الشركة:

( ) شركة مقاولات ( ) شركة/ مكتب استشاري ( ) شركة/ مكتب هندسي

5- موقع الشركة:

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

6- عمر الشركة أي عدد سنوات عمل الشركة منذ تسجيلها وتصنيفها رسمياً:

( ) 0-10 سنوات ( ) 11-20 سنوات ( ) أكثر من 20 سنة

7- أنواع مشاريع الأبنية التي تعمل بها الشركة (يمكن اختيار أكثر من إجابة):

( ) البناء السكني ( ) البناء التجاري ( ) البناء الصناعي ( ) غير ذلك (حددها رجاءً):_____

8- أنواع عملاء الشركة (يمكن اختيار أكثر من إجابة):

( ) أفراد ( ) قطاع خاص ( ) قطاع عام

9- من وجهة نظر الشركة، ما مدى أهمية وضع خطط مستقبلية فيما يتعلق بالحفاظ على البيئة؟

( ) مهم ( ) غير مهم ( ) لست متأكداً

القسم الثاني: تبني ممارسات الابتكار الأخضر

يُشير الابتكار الأخضر إلى الابتكار الصديق للبيئة حيث يتضمن مجموعة من الممارسات التي تُقلل التأثيرات السلبية على البيئة، وذلك من خلال ابتكار المنتجات الخضراء وابتكار العملية الأخضر والابتكار التنظيمي الأخضر.

يهدف هذا القسم إلى قياس مستوى تبني شركات البناء لممارسات الابتكار الأخضر (الصديق للبيئة). يُرجى اختيار لأي مدى توافق على العبارات التالية من حيث درجة رغبة واستعداد مؤسستك لتطبيق كل منها، وذلك بوضع إشارة (×) في العمود المناسب.

الرقم	ابتكار المنتجات الخضراء الجملة	أعارض بشدة	أعارض	محايد (لا أعلم)	أوافق	أوافق بشدة
1	تُبدي الشركة استعداداً لاستخدام مواد البناء المُبتكرة الصديقة للبيئة مثل الحديد المُعاد تدويره والخرسانة الخضراء.					
2	تُبدي الشركة استعداداً لاستخدام المواد القابلة لإعادة التدوير وإعادة الاستخدام.					
3	تُبدي الشركة استعداداً لاستخدام المواد التي تتطلب طاقة أقل لإنتاجها أو استخدامها خلال البناء.					
4	تُبدي الشركة استعداداً لاستخدام المواد محلية المصدر في أنشطة البناء لتقليل استهلاك الطاقة في نقل المواد من الموردين الخارجيين.					
	ابتكار العملية الخضراء					
5	تُبدي الشركة استعداداً لاستخدام المعدات والتكنولوجيا الخضراء (الصديقة للبيئة) خلال عملية البناء.					
6	تُبدي الشركة استعداداً لاستخدام أساليب البناء الحديثة لحماية الموارد المحدودة (مثل الطباعة ثلاثية الأبعاد).					
7	تُبدي الشركة استعداداً لتبني خطط لإدارة النفايات الناتجة عن نشاطاتها في موقع البناء.					
8	تُبدي الشركة استعداداً لتبني خطط لترشيد استهلاك المياه والطاقة والحد من تلوث الهواء في موقع البناء.					
	الابتكار التنظيمي الأخضر					
9	لدى الشركة توجه إلى تنفيذ تدقيق بيئي منتظم على مستوى الشركة والمشاريع التي تنفذها.					
10	لدى الشركة توجه إلى مكافئة وترقية الموظفين بناءً على المشاركة بتنفيذ المبادرات البيئية.					
11	لدى الشركة توجه إلى تطوير وثائق بيئية مكتوبة مثل السياسات أو الإجراءات لحماية البيئة.					
12	لدى الشركة توجه إلى الحفاظ على التعاون والعلاقات الجيدة داخل سلسلة التوريد لمواكبة أحدث المنتجات والتقنيات الخضراء.					

القسم الثالث: الثقافة المؤسساتية الخضراء

تُشير الثقافة المؤسساتية الخضراء إلى مجموعة من القيم والمعايير التي تُحدد كيفية تصرف موظفي الشركة تجاه البيئة، حيث يتم قياسها من خلال أربعة مؤشرات وهي ثقافة المشاركة الخضراء، ثقافة الاتساق الأخضر، ثقافة التكيف الأخضر، وثقافة الرسالة الخضراء.

يهدف هذا القسم إلى قياس مستوى تطبيق شركات البناء لممارسات الثقافة المؤسساتية الخضراء (الصديقة للبيئة). يُرجى اختيار لأي مدى توافق على العبارات التالية من حيث درجة تطبيق كل منها في مؤسستك، وذلك بوضع إشارة (×) في العمود المناسب.

الرقم	ثقافة المشاركة الخضراء الجملة	أعارض بشدة	أعارض	محايد (لا أعلم)	أوافق	أوافق بشدة
1	يتخذ مدراء وموظفو الشركة قرارات تساهم في حماية البيئة.					
2	تعمل الشركة على تدريب موظفيها للحفاظ والعناية بالبيئة.					
3	تعمل الشركة على تشجيع الموظفين على تبادل المعرفة الخضراء فيما بينهم.					
4	تقوم الشركة بتقديم دعم مادي للمشاريع والمبادرات التي تهدف إلى الحفاظ على البيئة.					
	ثقافة الاتساق الأخضر					
5	تتمتع الشركة بالوعي البيئي من حيث تأثير أنشطتها على البيئة.					
6	لدى الشركة مجموعة من القيم التي تُحدد كيفية تصرف الموظفين فيما يتعلق بالعناية بالبيئة.					
7	تأخذ الشركة السياسة البيئية المعمول بها في الاعتبار عند ممارسة أعمالها.					
8	تحرص الشركة على اختيار شُركاء يلتزمون بالقيم والسياسات البيئية.					
	ثقافة التكيف الأخضر					
9	تتكيف الشركة بشكل جيد مع التغيرات من أجل الحفاظ على البيئة.					
10	تتكيف الشركة باستمرار مع المعلومات الجديدة من أجل تحسين أدائها وفقاً للسياسات البيئية.					
11	تستمع الشركة إلى آراء العملاء وأصحاب المنفعة الآخرين والتي يمكن أن تؤدي إلى تغييرات تنظيمية داخل الشركة.					
12	تقوم الشركة بإجراء تغييرات في ممارساتها الإدارية لتعزيز حماية البيئة.					
	ثقافة الرسالة الخضراء					
13	الحفاظ على البيئة هو أولوية عالية في الشركة.					
14	ينص بيان الرسالة الخاص بالشركة على حماية البيئة.					
15	التحسين البيئي المستمر هو جزء من رسالة الشركة.					
16	تقوم الشركة بربط الأهداف البيئية بأهدافها الأخرى.					

القسم الرابع: الأداء المستدام

يتكون الأداء المستدام من ثلاثة ركائز أساسية وهي الأداء البيئي والاقتصادي والاجتماعي، تهتم الاستدامة البيئية بتأثير أعمال وأنشطة الشركة على البيئة في حين تهتم الاستدامة الاقتصادية بالأداء الاقتصادي للشركة، وتمثل الاستدامة الاجتماعية مسؤولية الشركة نحو المجتمع والأفراد.

يهدف هذا القسم إلى الكشف عن تأثير تبني وتنفيذ ممارسات الابتكار الأخضر على الأداء المستدام للشركة وذلك من خلال قياس أداء الشركة بيئياً واقتصادياً واجتماعياً. يُرجى اختيار لأي مدى توافق على النتائج التالية من حيث صلتها بالتغيرات في أداء مؤسستك وذلك بوضع إشارة (×) في العمود المناسب.

الرقم	الأداء البيئي الجملة	أعارض بشدة	أعارض	محايد (لا أعلم)	أوافق	أوافق بشدة
1	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى تقليل انبعاثات الهواء الضارة والنفايات الناتجة عن عملية البناء.					
2	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى انخفاض في وتيرة الحوادث البيئية.					
3	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى تحسين الالتزام بالمعايير البيئية خلال عملية البناء.					
4	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى استخدام الطاقة المتجددة مثل الطاقة الشمسية.					
	الأداء الاقتصادي					
5	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى زيادة حصة الشركة السوقية.					
6	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى زيادة هامش ربح الشركة.					
7	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى خفض تكلفة شراء مواد البناء.					
8	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى خفض تكلفة استهلاك الطاقة.					
	الأداء الاجتماعي					
9	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى تحسين الصحة والسلامة المهنية للعمال في موقع البناء.					
10	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى تحسين مستويات الرضى الوظيفي لدى الموظفين.					
11	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى تحسين جودة الحياة لأفراد المجتمع.					
12	إن تبني وتنفيذ الشركة لممارسات الابتكار الأخضر يؤدي إلى تطوير مشاريع في المجتمع المحلي وتوفير المزيد من فرص العمل.					

أية ملاحظات أخرى تودون إضافتها:

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شكراً لتعاونكم

Appendix C

Tables

Table C.1

Names of Questionnaire Reviewers

Number	Name	Position
6	Dr. Yahya Salahat, Dr. Ramiz Assaf, Dr. Muawia Ramadan, Dr. Sameh Monna, Dr. Nidal Dwaikat, Dr. Basheer Shaheen	Teaching staff at An-Najah university

Table C.2

Operationalization of Model Constructs

Constructs	Items	Reference
Green product innovation (GPDI)	GPDI1: The firm is willing to use eco-innovative construction materials such as recycled steel and green concrete.	(Isa & Abidin, 2021)
	GPDI2: The firm is willing to use recyclable and reusable materials.	(Judi et al., 2022)
	GPDI3: The firm is willing to use materials that require less energy to produce or use during construction.	
	GPDI4: The firm is willing to use locally sourced materials in construction activities to reduce energy consumption in transporting materials from external suppliers.	(Isa & Abidin, 2021)
Green process innovation (GPCI)	GPCI1: The firm is willing to use green equipment and technology during the construction process.	(Hazarika & Zhang, 2019)
	GPCI2: The firm is willing to use modern construction methods, such as 3D printing, to protect finite resources.	(Isa & Abidin, 2021)
	GPCI3: The firm is willing to adopt plans to manage waste generated from its activities at the construction site (i.e., site waste management plans).	(Hashim, 2018)
	GPCI4: The firm is willing to adopt plans to save water and energy and prevent air pollution at the construction site.	(Hazarika & Zhang, 2019)
Green organizational innovation (GOI)	GOI1: The firm has a tendency to implement regular environmental auditing at the level of the firm and its implemented projects.	(Isa & Abidin, 2021)

Green organizational innovation (GOI)	GOI2: The firm has a tendency to reward and promote employees based on participation in implementing environmental initiatives.	(Hashim, 2018)
	GOI3: The firm has a tendency to develop written environmental documents, such as policies and procedures, to protect the environment.	(Hashim, 2018)
	GOI4: The firm has a tendency to maintain collaboration and good relationships within the supply chain to keep up with the latest green products and technologies.	(Isa & Abidin, 2021)
Green involvement culture (GIC)	GIC1: The firm's managers and employees make decisions that contribute to protecting the environment.	(García-Machado & Martínez-Ávila, 2019)
	GIC2: The firm trains its employees to preserve and care for the environment.	
	GIC3: The firm encourages employees to share green knowledge among themselves.	(Roscoe et al., 2019)
	GIC4: The firm provides financial support to projects and initiatives that aim to preserve the environment.	(García-Granero et al., 2020)
Green consistency culture (GCC)	GCC1: The firm has an environmental awareness in terms of the impact of its activities on the environment.	(Qu et al., 2022)
	GCC2: The firm has a set of values that determine how employees act regarding environmental care.	(García-Machado & Martínez-Ávila, 2019)
	GCC3: The firm takes established environmental policy into consideration when conducting its businesses.	
	GCC4: The firm is keen to choose partners committed to environmental values and policies.	(Piwowar-Sulej, 2020)
Green adaptability culture (GAC)	GAC1: The firm adapts well to changes in order to preserve the environment.	
	GAC2: The firm constantly adapts to new information in order to improve its performance in accordance with environmental policies.	(García-Machado & Martínez-Ávila, 2019)
	GAC3: The firm listens to the opinions of customers and other stakeholders, which can lead to organizational changes within the firm.	
	GAC4: The firm makes changes in its management practices to enhance environmental protection.	(Shahriari et al., 2023)
Green mission culture (GMC)	GMC1: Environmental preservation is a high priority in the firm.	(C. H. Wang, 2019)

Green mission culture (GMC)	GMC2: The firm's mission statement includes environmental protection.	(García-Machado & Martínez-Ávila, 2019)
	GMC3: Continuous environmental improvement is part of the firm's mission.	(Al Doghan et al., 2022)
	GMC4: The firm links environmental objectives with its other goals.	(C. H. Wang, 2019)
Environmental performance (ENP)	ENP1: The firm's adoption and implementation of GI practices reduces harmful air emissions and waste resulting from the construction process.	(Judi et al., 2022)
	ENP2: The firm's adoption and implementation of GI practices lead to a decrease in the frequency of environmental accidents.	
	ENP3: The firm's adoption and implementation of GI practices improves compliance with environmental standards during the construction process.	(H. Wang et al., 2021)
	ENP4: The firm's adoption and implementation of GI practices lead to the use of renewable energy, such as solar energy.	(Afzal & Lim, 2022)
Economic performance (EP)	EP1: The firm's adoption and implementation of GI practices increases the firm's market share.	(Afzal & Lim, 2022)
	EP2: The firm's adoption and implementation of GI practices increases the firm's profit margin.	
	EP3: The firm's adoption and implementation of GI practices reduces the cost of purchasing construction materials.	(Zhu et al., 2008)
	EP4: The firm's adoption and implementation of GI practices reduces the cost of energy consumption.	
Social performance (SP)	SP1: The firm's adoption and implementation of GI practices improves workers' occupational health and safety at the construction site.	
	SP2: The firm's adoption and implementation of GI practices improves job satisfaction levels among employees.	(Judi et al., 2022)
	SP3: The firm's adoption and implementation of GI practices improves living quality for community members.	
	SP4: The firm's adoption and implementation of GI practices lead to developing projects in the local community and creating more job opportunities.	(Afzal & Lim, 2022)

Table C.3

Respondents Profile Summary

No.	Items	Option	Frequency (n = 143)	Percentage
1.	Gender	Male	112	78.3%
		Female	31	21.7%
2.	Years of experience in the construction industry	0 - 5 Years	12	8.4%
		6 - 10 Years	32	22.4%
		11 - 15	22	15.4%
		More than 15 years	77	53.8%
3.	Current job position in the firm	Contractor/ General manager	56	39.2%
		Office engineer	63	44.1%
		Project manager	20	14%
		Site engineer	4	2.8%
4.	Firm type	Contracting firm	48	33.6%
		Consulting firm/office	56	39.2%
		Engineering firm/office	39	27.3%
5.	Firm location	Jenin	5	3.5%
		Tullkarm	11	7.7%
		Nablus	41	28.7%
		Ramallah	33	23.1%
		Jerusalem	1	0.7%
		Hebron	38	26.6%
		Bethlehem	6	4.2%
		Salfit	3	2.1%
		Qalqilya	2	1.4%
		Jericho	1	0.7%
		Tubas	2	1.4%
6.	Firm age (i.e., number of firm's working years since its official registration and classification)	0 - 10 Years	43	30.1%
		11 - 20 Years	31	21.7%
		More than 20 years	69	48.3%

7.	Types of construction projects that the company works on (You can choose more than one answer)	Residential construction	10	7%
		Commercial construction	5	3.5%
		Industrial construction	1	0.7%
		Other	10	7%
		Residential and commercial	38	26.6%
		Residential and industrial	1	0.7%
		Residential and other	2	1.4%
		Commercial and industrial	1	0.7%
		Residential, commercial, industrial, other	16	11.2%
		Residential, commercial, industrial	50	35%
		Residential, commercial, other	7	4.9%
		Residential, industrial, other	1	0.7%
		Commercial, industrial, other	1	0.7%
8.	Types of the firm's clients (You can choose more than one answer)	Individual	11	7.7%
		Private sector	18	12.6%
		Public sector	12	8.4%
		Individual and private sector	30	21%
		Individual and public sector	3	2.1%
		Private and public sector	13	9.1%
		Individual, private sector, and public sector	56	39.2%
9.	From the firm's perspective, how important is it to make future plans regarding environmental preservation?	Important	125	87.4%
		Not important	6	4.2%
		Not sure	12	8.4%

Table C.4

Descriptive Analysis of All Questionnaire Items

Indicator	Items	Mean	Standard deviation
GPDI_1	The firm is willing to use eco-innovative construction materials such as recycled steel and green concrete.	3.93	0.644
GPDI_2	The firm is willing to use recyclable and reusable materials.	4.028	0.515
GPDI_3	The firm is willing to use materials that require less energy to produce or use during construction.	4.154	0.571
GPDI_4	The firm is willing to use locally sourced materials in construction activities to reduce energy consumption in transporting materials from external suppliers.	4.21	0.737
GPCI_1	The firm is willing to use green equipment and technology during the construction process.	4.07	0.599
GPCI_2	The firm is willing to use modern construction methods, such as 3D printing, to protect finite resources.	3.671	0.843
GPCI_3	The firm is willing to adopt plans to manage waste generated from its activities at the construction site (i.e., site waste management plans).	4.014	0.766
GPCI_4	The firm is willing to adopt plans to save water and energy and prevent air pollution at the construction site.	4.301	0.637
GOI_1	The firm has a tendency to implement regular environmental auditing at the level of the firm and its implemented projects.	3.483	0.86
GOI_2	The firm has a tendency to reward and promote employees based on participation in implementing environmental initiatives.	3.441	0.825
GOI_3	The firm has a tendency to develop written environmental documents, such as policies and procedures, to protect the environment.	3.517	0.868
GOI_4	The firm has a tendency to maintain collaboration and good relationships within the supply chain to keep up with the latest green products and technologies.	3.811	0.719
GIC_1	The firm's managers and employees make decisions that contribute to protecting the environment.	3.734	0.709
GIC_2	The firm trains its employees to preserve and care for the environment.	3.469	0.826

GIC_3	The firm encourages employees to share green knowledge among themselves.	3.72	0.848
GIC_4	The firm provides financial support to projects and initiatives that aim to preserve the environment.	3.126	0.86
GCC_1	The firm has an environmental awareness in terms of the impact of its activities on the environment.	3.853	0.647
GCC_2	The firm has a set of values that determine how employees act regarding environmental care.	3.601	0.821
GCC_3	The firm takes established environmental policy into consideration when conducting its businesses.	3.713	0.735
GCC_4	The firm is keen to choose partners committed to environmental values and policies.	3.364	0.807
GAC_1	The firm adapts well to changes in order to preserve the environment.	3.79	0.678
GAC_2	The firm constantly adapts to new information in order to improve its performance in accordance with environmental policies.	3.762	0.729
GAC_3	The firm listens to the opinions of customers and other stakeholders, which can lead to organizational changes within the firm.	3.762	0.793
GAC_4	The firm makes changes in its management practices to enhance environmental protection.	3.51	0.792
GMC_1	Environmental preservation is a high priority in the firm.	3.692	0.838
GMC_2	The firm's mission statement includes environmental protection.	3.42	0.919
GMC_3	Continuous environmental improvement is part of the firm's mission.	3.531	0.915
GMC_4	The firm links environmental objectives with its other goals.	3.413	0.872
ENP_1	The firm's adoption and implementation of GI practices reduces harmful air emissions and waste resulting from the construction process.	3.965	0.704
ENP_2	The firm's adoption and implementation of GI practices lead to a decrease in the frequency of environmental accidents.	3.902	0.683

ENP_3	The firm's adoption and implementation of GI practices improves compliance with environmental standards during the construction process.	3.986	0.637
ENP_4	The firm's adoption and implementation of GI practices lead to the use of renewable energy, such as solar energy.	4.056	0.634
EP_1	The firm's adoption and implementation of GI practices increases the firm's market share.	3.413	0.941
EP_2	The firm's adoption and implementation of GI practices increases the firm's profit margin.	3.35	0.97
EP_3	The firm's adoption and implementation of GI practices reduces the cost of purchasing construction materials.	3.315	0.992
EP_4	The firm's adoption and implementation of GI practices reduces the cost of energy consumption.	3.951	0.703
SP_1	The firm's adoption and implementation of GI practices improves workers' occupational health and safety at the construction site.	4.063	0.628
SP_2	The firm's adoption and implementation of GI practices improves job satisfaction levels among employees.	3.713	0.716
SP_3	The firm's adoption and implementation of GI practices improves living quality for community members.	4.119	0.585
SP_4	The firm's adoption and implementation of GI practices lead to developing projects in the local community and creating more job opportunities.	3.832	0.738

Table C.5

Results of Cross Loadings

Variable	ENP	EP	GAC	GCC	GIC	GMC	GOI	GPCI	GPDI	SP
ENP_1	0.872	0.284	0.431	0.288	0.324	0.352	0.315	0.333	0.374	0.597
ENP_2	0.907	0.277	0.437	0.269	0.305	0.296	0.343	0.346	0.430	0.607
ENP_3	0.884	0.392	0.428	0.342	0.310	0.329	0.423	0.340	0.385	0.655
ENP_4	0.792	0.329	0.313	0.281	0.301	0.221	0.321	0.307	0.283	0.552
EP_1	0.417	0.882	0.384	0.418	0.459	0.414	0.445	0.202	0.163	0.545
EP_2	0.283	0.904	0.302	0.436	0.450	0.317	0.393	0.154	0.146	0.399
EP_3	0.268	0.866	0.262	0.322	0.316	0.291	0.358	0.092	0.149	0.427

GAC_1	0.279	0.203	0.830	0.612	0.605	0.553	0.567	0.409	0.432	0.371
GAC_2	0.396	0.272	0.893	0.645	0.673	0.637	0.643	0.430	0.427	0.466
GAC_3	0.419	0.251	0.743	0.456	0.504	0.400	0.485	0.385	0.379	0.442
GAC_4	0.450	0.452	0.815	0.626	0.678	0.669	0.676	0.454	0.286	0.544
GCC_1	0.325	0.178	0.504	0.758	0.560	0.583	0.406	0.279	0.275	0.375
GCC_2	0.300	0.424	0.650	0.855	0.648	0.711	0.537	0.343	0.267	0.455
GCC_3	0.136	0.381	0.558	0.850	0.601	0.571	0.507	0.290	0.261	0.310
GCC_4	0.345	0.434	0.600	0.765	0.590	0.654	0.534	0.305	0.231	0.414
GIC_1	0.270	0.223	0.497	0.523	0.725	0.483	0.466	0.428	0.311	0.279
GIC_2	0.362	0.524	0.708	0.661	0.878	0.664	0.675	0.420	0.263	0.406
GIC_3	0.290	0.328	0.648	0.606	0.839	0.552	0.663	0.478	0.386	0.329
GIC_4	0.220	0.387	0.549	0.591	0.760	0.621	0.617	0.310	0.139	0.239
GMC_1	0.249	0.355	0.618	0.708	0.643	0.870	0.534	0.380	0.278	0.348
GMC_2	0.251	0.450	0.636	0.726	0.709	0.921	0.583	0.291	0.183	0.284
GMC_3	0.346	0.309	0.644	0.701	0.685	0.938	0.631	0.374	0.296	0.307
GMC_4	0.413	0.289	0.615	0.684	0.575	0.871	0.527	0.265	0.267	0.373
GOI_1	0.416	0.456	0.632	0.540	0.606	0.579	0.853	0.439	0.375	0.432
GOI_2	0.262	0.372	0.571	0.471	0.638	0.522	0.856	0.513	0.352	0.282
GOI_3	0.328	0.406	0.654	0.592	0.693	0.563	0.877	0.435	0.289	0.425
GOI_4	0.364	0.298	0.592	0.474	0.618	0.467	0.778	0.568	0.468	0.325
GPCI_1	0.311	0.256	0.357	0.293	0.479	0.222	0.514	0.761	0.453	0.247
GPCI_3	0.303	0.042	0.442	0.293	0.401	0.349	0.423	0.787	0.444	0.298
GPCI_4	0.293	0.102	0.415	0.308	0.316	0.296	0.439	0.820	0.388	0.338
GPDI_1	0.374	0.170	0.385	0.257	0.331	0.223	0.397	0.422	0.849	0.298
GPDI_2	0.341	0.119	0.415	0.302	0.312	0.280	0.415	0.457	0.901	0.312
GPDI_3	0.388	0.159	0.387	0.262	0.232	0.226	0.327	0.523	0.824	0.359
SP_1	0.650	0.420	0.467	0.375	0.283	0.281	0.380	0.322	0.368	0.842
SP_2	0.537	0.457	0.470	0.408	0.358	0.286	0.404	0.309	0.281	0.838
SP_3	0.581	0.300	0.414	0.372	0.235	0.221	0.201	0.251	0.299	0.816
SP_4	0.503	0.530	0.457	0.422	0.414	0.399	0.425	0.328	0.270	0.762

Table C.6

Results of Fornell-Larcker Criterion

Construct	ENP	EP	GAC	GCC	GIC	GMC	GOI	GPCI	GPDI	SP
ENP	0.865									
EP	0.372	0.884								
GAC	0.467	0.362	0.822							
GCC	0.342	0.445	0.719	0.808						
GIC	0.358	0.465	0.755	0.744	0.803					
GMC	0.348	0.391	0.698	0.782	0.727	0.900				
GOI	0.407	0.454	0.728	0.617	0.760	0.633	0.842			
GPCI	0.384	0.173	0.511	0.378	0.508	0.364	0.583	0.790		
GPDI	0.427	0.173	0.461	0.319	0.341	0.284	0.443	0.544	0.859	
SP	0.699	0.523	0.555	0.483	0.395	0.363	0.434	0.372	0.375	0.815

Table C.7

Results of Heterotrait-Monotrait Ratio (HTMT) Criterion

Construct	ENP	EP	GAC	GCC	GIC	GMC	GOI	GPCI	GPDI	SP
ENP										
EP	0.416									
GAC	0.543	0.416								
GCC	0.400	0.520	0.855							
GIC	0.420	0.540	0.900	0.908						
GMC	0.386	0.431	0.782	0.897	0.834					
GOI	0.464	0.524	0.849	0.731	0.901	0.710				
GPCI	0.487	0.219	0.669	0.497	0.673	0.456	0.746			
GPDI	0.500	0.206	0.559	0.390	0.419	0.327	0.523	0.718		
SP	0.811	0.611	0.664	0.584	0.477	0.418	0.513	0.489	0.454	

Table C.8

Predictive Relevance (Q^2) Values

Construct	SSO	SSE	Q^2 (=1-SSE/SSO)
AGI practices	1716.000	1388.660	0.191
SUP	1716.000	1416.643	0.174

جامعة النجاح الوطنية
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الملخص

يُعد قطاع البناء والتشييد من أكبر القطاعات المساهمة في التدهور البيئي؛ ولذلك يسعى معظم الباحثين مؤخراً إلى دمج الممارسات الخضراء في هذا القطاع لتحقيق مستقبل مستدام. وبناءً على ذلك، تهدف هذه الدراسة إلى دراسة أثر تبني ممارسات الابتكار الأخضر على الأداء المستدام في ركائزه الثلاثة (البيئية والاقتصادية والاجتماعية) في قطاع البناء والتشييد الفلسطيني، بالإضافة إلى استكشاف الأثر المُعدِّل للثقافة المؤسساتية الخضراء على هذه العلاقة. ولهذا الغرض، تم اعتماد نهج بحث كمي باستخدام استبيانات يتم ملؤها ذاتياً من قبل المشارك. يتكون مجتمع الدراسة المستهدف من الممارسين الرئيسيين في قطاع البناء والتشييد الفلسطيني، أي شركات المقاولات والشركات الاستشارية والشركات الهندسية، حيث تم تحديد تصنيفات محددة لهذه الشركات لإدراجها في إطار العينة. وعليه، تم الحصول على 143 إجابة صالحة، بواقع إجابة واحدة من كل شركة، وتم استخدام برنامج SmartPLS لتحليل نموذج الدراسة واختبار الفرضيات المقترحة. تُظهر النتائج أن مستوى كل من تبني ممارسات الابتكار الأخضر والأداء المستدام في شركات البناء الفلسطينية مرتفع، بينما يتم تطبيق الثقافة المؤسساتية الخضراء بمستوى متوسط. بالإضافة إلى ذلك، تُشير النتائج إلى وجود علاقة إيجابية ذات دلالة إحصائية بين تبني ممارسات الابتكار الأخضر والأداء المستدام. كما تُؤثر الثقافة المؤسساتية الخضراء إيجاباً على كل من تبني ممارسات الابتكار الأخضر والأداء المستدام وتعمل أيضاً على تحسين العلاقة بينهما بشكل إيجابي.

لا شك أن تسليط الضوء على المفاهيم الخضراء في سياقٍ مليءٍ بالتحديات كفلسطين، التي تعاني من عدم الاستقرار السياسي والصراع المستمر ومحدودية الموارد، له آثارٌ بالغة الأهمية. وبمزيد من التفصيل، تُساهم الدراسة في نظرية الابتكار الأخضر من خلال التأكيد على أهمية وفعالية تبني ممارسات الابتكار الأخضر في السياقات محدودة الموارد والمتأثرة بالنزاعات، كما تساهم في نظرية الثقافة المؤسساتية الخضراء من خلال تأكيد قدرتها على تسهيل تبني ممارسات الابتكار الأخضر وتحقيق الأداء المستدام. تُشجع الدراسة صانعي السياسات وأصحاب المصلحة على تحويل أنشطة البناء التقليدية إلى أنشطة صديقة للبيئة، وتُساهم في سد الفجوة فيما يتعلق بالتصور الخاطئ حول الابتكار الأخضر وأثره على الأداء المستدام في قطاع البناء والتشييد. وفقاً لما توفر من أدبيات، تُعد هذه الدراسة الأولى التي تستكشف الدور المُعدِّل للثقافة المؤسساتية الخضراء بين تبني ممارسات الابتكار الأخضر والأداء المستدام في قطاع البناء والتشييد الفلسطيني.

الكلمات المفتاحية: الابتكار الأخضر، الأداء المستدام، الثقافة المؤسساتية الخضراء، قطاع البناء والتشييد.