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The Impact of Environmental Governance Practices on Sustainable Performance:

An Applied Study in the Plant and Animal Health Sector

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حقوق الطباعة والنشر

حقوق الطباعة والنشر الخاصة برسالة الماجستير هذه مملوكة لجامعة ميد أوشن. لا يجوز إعادة إنتاج أي جزء منها أو توزيعه أو نقله بأي وسيلة، إلكترونية أو ميكانيكية، دون إذن خطي مسبق من الجامعة، باستثناء الاقتباسات القصيرة لأغراض المراجعة النقدية والاستخدامات غير التجارية المسموح بها قانوناً.

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Abstract

This thesis investigates how environmental governance practices shape sustainable performance in organizations operating within the plant and animal health sector. The motivation for the study arose from a noticeable inconsistency in the empirical literature: although environmental governance has been widely examined in manufacturing, banking, and energy contexts, sectors that work directly with biological systems and food-safety chains remain comparatively understudied. Three governance dimensions were identified through the literature review and used as the conceptual pillars of the research: environmental commitment, environmental monitoring and compliance, and environmental transparency and accountability. Sustainable performance was operationalized using a triple bottom line lens that captures economic, social, and environmental outcomes.

A quantitative, cross-sectional design was adopted. A structured questionnaire containing twenty Likert-type items, in addition to seven demographic indicators, was distributed electronically to professionals working across the Saudi plant and animal health sector. A total of 165 valid responses were retained for analysis. Reliability of the four scales was examined using Cronbach's alpha, and the proposed relationships were tested through Pearson correlation analysis and multiple linear regression, with multicollinearity diagnostics and residual checks accompanying the main models.

The findings indicate that all three governance dimensions exert statistically significant positive effects on sustainable performance ($F = 20.43$, $p < .001$), explaining approximately 27.6% of the variance in sustainable performance scores ($R^2 = 0.276$, Adjusted $R^2 = 0.262$). Among the dimensions, environmental commitment showed the strongest standardized effect ($\beta = 0.261$, $p = .001$), followed by environmental monitoring ($\beta = 0.239$, $p = .001$) and environmental transparency ($\beta = 0.206$, $p = .005$). Reliability coefficients ranged between

0.875 and 0.894, supporting the internal consistency of the measurement instrument. The results lend empirical support to a stakeholder-theoretic reading of environmental governance, suggesting that strategic commitment, operational monitoring, and stakeholder-facing transparency act as complementary, rather than substitutable, levers of sustainability outcomes.

Keywords: *Environmental Governance; Environmental Commitment; Environmental Monitoring; Environmental Transparency; Sustainable Performance; Triple Bottom Line; Plant and Animal Health Sector; Saudi Arabia.*

الملخص

تتناول هذه الرسالة دراسة أثر ممارسات الحوكمة البيئية على الأداء المستدام في المنظمات العاملة بقطاع الصحة النباتية والحيوانية. وقد انطلقت الباحثة من ملاحظة منهجية مفادها أن الأدبيات السابقة تناولت الحوكمة البيئية بشكل واسع في قطاعات الصناعة والمصارف والطاقة، في حين أن القطاعات التي تتعامل مباشرة مع النظم الحيوية وسلاسل سلامة الغذاء لم تتل قدرأ مماثلاً من البحث. واعتمدت الدراسة على ثلاثة أبعاد للحوكمة البيئية بوصفها متغيرات مستقلة، وهي: الالتزام البيئي، والرقابة والامتثال البيئي، والشفافية والمساءلة البيئية، فيما تم قياس الأداء المستدام من خلال إطار «المحصلة الثلاثية» الذي يجمع الأبعاد الاقتصادية والاجتماعية والبيئية.

اتبعت الدراسة منهجاً وصفيّاً تحليلياً كمياً بتصميم مقطعي، حيث وُزعت استبانة إلكترونية على المهنيين العاملين في قطاع الصحة النباتية والحيوانية بالمملكة العربية السعودية، وبلغ عدد الاستجابات الصالحة للتحليل ١٦٥ استجابة. واستُخدم معامل ألفا كرونباخ لقياس ثبات الأدوات، وتحليل الانحدار الخطي المتعدد لاختبار الفرضيات، بالإضافة إلى اختبارات الافتراضات الإحصائية المرافقة.

وأظهرت النتائج وجود أثر إيجابي ذي دلالة إحصائية لجميع أبعاد الحوكمة البيئية الثلاثة على الأداء المستدام (ف = ٢٠,٤٣، مستوى الدلالة > ٠,٠٠١)، حيث فسّر النموذج نحو ٢٧,٦٪ من التباين في الأداء المستدام (معامل التحديد المعدّل = ٠,٢٦٢). وكان للالتزام البيئي الأثر الأقوى (بيتا = ٠,٢٦١)، يليه الرقابة البيئية (بيتا = ٠,٢٣٩)، ثم الشفافية البيئية (بيتا = ٠,٢٠٦). وتراوحت قيم ألفا كرونباخ بين ٠,٨٧٥ و ٠,٨٩٤، مما يدل على ثبات داخلي مرتفع لأدوات القياس. وتدعم هذه النتائج رؤية مبنية على نظرية أصحاب المصلحة، إذ تعمل الأبعاد الثلاثة بوصفها روافع متكاملة لا بديلة للأداء المستدام.

الكلمات المفتاحية: الحوكمة البيئية؛ الالتزام البيئي؛ الرقابة البيئية؛ الشفافية البيئية؛ الأداء المستدام؛ المحصلة الثلاثية؛ قطاع الصحة النباتية والحيوانية؛ المملكة العربية السعودية.

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List of Abbreviations

Abbreviation	Full Term
EC	Environmental Commitment
EM	Environmental Monitoring and Compliance
ET	Environmental Transparency and Accountability
EG	Environmental Governance (Overall Composite)
SP	Sustainable Performance
TBL	Triple Bottom Line
ESG	Environmental, Social, and Governance
CSR	Corporate Social Responsibility
EMS	Environmental Management System
SDG	Sustainable Development Goals
KSA	Kingdom of Saudi Arabia
OLS	Ordinary Least Squares
SD	Standard Deviation
VIF	Variance Inflation Factor
ANOVA	Analysis of Variance
APA	American Psychological Association

CHAPTER ONE

GENERAL FRAMEWORK OF THE STUDY

1.1 Introduction

Environmental governance no longer sits quietly in the corner as a simple regulatory requirement. Organizations increasingly treat it as a managerial compass that guides how environmental decisions are made and who carries responsibility for them. Governance, in this sense, stretches far beyond ticking compliance boxes. It functions more like the operating system of environmental management quietly shaping routines, choices, and eventually the sustainability results an organization produces.

Attention to environmental sustainability has intensified across both research communities and organizational practice. Global debates about sustainable development, corporate responsibility, and ESG-oriented governance have pushed institutions to construct more deliberate environmental governance systems. Empirical research indicates that governance frameworks, when intentionally designed to emphasize environmental aims, can influence outcomes at the firm level. This impact is more pronounced when organizations integrate these objectives into their formal policies and monitoring mechanisms, thereby facilitating the assessment and quantification of performance (Ara, 2025).

Environmental governance (EGG) serves as a management structure, bridging environmental objectives with tangible operational and strategic outcomes. This relationship is particularly pronounced in sectors dedicated to the well-being of plants and animals. Organizations within this sphere are in a state of continuous engagement with ecosystems, biological assets, and rigorous regulatory environments. As a result, environmental

responsibility must move beyond abstract principles; it demands tangible implementation through routine operational choices. Decisions made by these entities can significantly affect ecological health, public confidence, and the integrity of regulatory frameworks. Studies support this idea, showing that organizations can improve their environmental performance by strengthening their environmental control systems and including environmental experts in their leadership (Kim et al., 2023).

Within organizations, environmental governance is reflected through several practical mechanisms. Leadership can demonstrate environmental dedication by establishing strategic objectives and directing resources accordingly. Environmental actions are monitored through control and compliance systems, ensuring adherence to established regulations. Furthermore, transparency and accountability mechanisms provide stakeholders with access to pertinent information, thereby clarifying institutional responsibilities. Through these mechanisms, environmental concerns gradually move from peripheral discussions into routine planning, monitoring, and organizational communication.

In this study, sustainable performance is approached as a multidimensional outcome rather than a single indicator. Improvements may appear in operational efficiency. Environmental costs may decline. Organizational reputation can strengthen as stakeholders observe responsible environmental management. Partner and community satisfaction could also increase. Environmental impacts would decrease, and the scope of social responsibility would expand. Previous studies have consistently shown connections between environmental governance frameworks and measurable improvements in both environmental and economic performance (Soussi et al., 2025). However, the evidence from these studies is not consistent across different sectors.

Despite the growing amount of research, areas like plant and animal health have not been studied much with analytical methods, even though they are important for ecosystems.

Therefore, studying how environmental governance affects sustainable performance in these areas adds to the broader discussion about governance and sustainability management.

This study uses a quantitative, cross-sectional approach to examine the relationships between the variables. The analysis focuses on three key aspects of environmental governance: environmental commitment, environmental control and compliance, and environmental transparency and accountability. To evaluate the connections between these governance mechanisms and sustainable performance, and to determine the nature and strength of these relationships, multiple linear regression analysis is used.

1.2 Statement of the Problem

Environmental governance practices are increasingly prioritized by managerial stakeholders. Nevertheless, a paucity of consistent data persists regarding their impact on sustainable performance across diverse domains. While prior research has established a correlation between governance and environmental outcomes (Souza et al., 2025), these conclusions predominantly originate from public administration or corporate contexts, which differ significantly from the plant and animal health sector. Within this sector, environmental responsibility is inherently embedded in routine operations; however, the strategic integration and sophistication of governance structures may vary considerably.

Environmental commitment, control and compliance systems, and transparency mechanisms are anticipated to impact operational efficiency, environmental cost management, stakeholder satisfaction, and organizational reputation. However, the degree to which these governance dimensions, both collectively and individually, predict sustainable performance is not well-studied within plant and animal health institutions. Consequently, contemporary investigations often prioritize environmental performance indicators in a manner that is isolated, neglecting the conceptualization of sustainable performance as a multifaceted

construct encompassing operational, environmental, and social dimensions (Bauer & Greiling, 2024).

Based on the above, the main research question can be stated as follows: How do environmental governance practices, specifically environmental commitment, environmental control and compliance, and environmental transparency and accountability, affect sustainable performance in the plant and animal health sector?

To address this issue, we need to use empirical testing with a structured quantitative approach. This will help us determine the size and statistical significance of these relationships.

1.3 Research Questions

The study is guided by one main question and three sub-questions. The main question covers the joint relationship. The sub-questions split it along the three governance dimensions identified in the literature review.

Main research question:

To what extent do environmental governance practices, taken together, affect sustainable performance in organizations operating in the plant and animal health sector in the Kingdom of Saudi Arabia?

Sub-questions:

- To what extent does environmental commitment affect sustainable performance in the sector?
- To what extent do environmental monitoring and compliance affect sustainable performance in the sector?

- To what extent do environmental transparency and accountability affect sustainable performance in the sector?

Splitting the question this way serves two purposes. First, it lets the model estimate each dimension's unique contribution while controlling for the others — which mirrors the choice managers actually face when they allocate budget and attention. Second, it pushes the discussion past a generic conclusion about governance, toward a more useful statement about which practices carry more weight in this particular setting.

1.4 Significance of the Study

There are two ways to think about why this study matters: theoretically and practically.

Theoretical significance:

Academically, the thesis extends a body of work that has examined environmental governance across many sectors but has paid little attention to plant and animal health. Testing a three-dimensional governance model in this setting produces a useful point of comparison with results from manufacturing (Tjahjadi et al., 2021), public–private contexts (Ara, 2025), and disclosure-focused studies (Wu et al., 2025). It also brings stakeholder theory (Freeman, 1984) into a setting where the stakeholder map — farmers, veterinarians, regulators, consumers, food processors, ecological systems themselves — is unusually wide. That diversity actually sharpens the test of the theory, rather than diluting it.

A secondary contribution lies in measurement. The instrument used here, while built on prior validated items, has been adapted for the sector. Researchers working on adjacent sectors — food processing, agri-business, veterinary pharmaceuticals — can reuse it or adapt it further.

Practical significance:

On the practical side, three groups of decision-makers stand to gain. Senior managers in sector organizations get locally grounded evidence on which governance levers move performance most. Regulators and policy-makers get a clearer sense of where regulatory effort is likely to pay off, which matters because the three dimensions are not all equally easy to enforce from outside. Training institutions and professional bodies can use the findings to design programs that move beyond generic sustainability content toward specifics that the sector actually needs.

One more practical benefit: the questionnaire itself. Once validated, the instrument can serve as a self-assessment tool for individual organizations. Quality and sustainability managers can use it to spot their weaker dimensions and track progress over time. A small contribution to daily practice, but a concrete one.

1.5 Research Objectives

The study has one general objective and three specific ones, lined up with the research questions.

General objective:

To examine the impact of environmental governance practices on sustainable performance in organizations operating in the plant and animal health sector in Saudi Arabia.

Specific objectives:

- To assess the impact of environmental commitment on sustainable performance.
- To assess the impact of environmental monitoring and compliance on sustainable performance.
- To assess the impact of environmental transparency and accountability on sustainable performance.

Each objective maps onto a composite variable built from five Likert-scale items, and onto a coefficient in the regression model reported in Chapter Four.

1.6 Research Hypotheses

Hypotheses follow from the research questions and objectives, stated in null and alternative form as is standard in deductive quantitative work.

Main hypothesis (H1):

H0: Environmental governance practices, taken together, have no statistically significant impact on sustainable performance in the plant and animal health sector.

H1: Environmental governance practices, taken together, have a statistically significant positive impact on sustainable performance in the plant and animal health sector.

Sub-hypothesis 1 (H1a):

H0a: Environmental commitment has no statistically significant impact on sustainable performance.

H1a: Environmental commitment has a statistically significant positive impact on sustainable performance.

Sub-hypothesis 2 (H1b):

H0b: Environmental monitoring and compliance have no statistically significant impact on sustainable performance.

H1b: Environmental monitoring and compliance have a statistically significant positive impact on sustainable performance.

Sub-hypothesis 3 (H1c):

H0c: Environmental transparency and accountability have no statistically significant impact on sustainable performance.

H1c: Environmental transparency and accountability have a statistically significant positive impact on sustainable performance.

All hypotheses are tested at $\alpha = 0.05$, using multiple linear regression with the three governance dimensions as predictors and sustainable performance as the outcome. The main hypothesis is evaluated through the F-test of the full model; the sub-hypotheses are evaluated through the t-tests on the individual coefficients.

1.7 Research Methodology Overview

The design is quantitative, descriptive–analytical, and cross-sectional. Data were collected at one point in time, through an electronic survey distributed to professionals in plant and animal health organizations across Saudi Arabia. A quantitative design fits the deductive logic of the study, which moves from theory and prior evidence to specific hypotheses, and then tests them with statistical tools.

The questionnaire has two main sections. The first captures background information about the respondent: gender, age group, education, years of experience, current position, organization type, and geographic region. The second contains twenty Likert items, five per construct, covering commitment, monitoring, transparency, and sustainable performance. All Likert items use a five-point scale from Strongly Disagree (1) to Strongly Agree (5), with Neutral at the midpoint.

The target population is professionals in plant and animal health organizations across the Kingdom — public agencies, semi-government bodies, private firms, and research centres. A convenience sampling approach was used, partly because no comprehensive sampling frame

for this population exists in public form. After data cleaning, 165 usable responses remained. With three predictors, the case-to-predictor ratio sits at 55:1, comfortably above the rule-of-thumb minimum of 50:1 for stable multiple regression.

Three analytical procedures form the backbone of the analysis. Descriptive statistics summarize the sample and the variables. Cronbach's alpha checks the internal consistency of each scale, with 0.70 as the acceptable threshold (Fowler, 2013). Multiple linear regression then tests the joint and individual effects of the three governance dimensions on sustainable performance. Correlation analysis, multicollinearity checks, and residual diagnostics travel alongside the regression as standard supporting work. Chapter Three unpacks all of this in detail.

1.8 Scope and Delimitations

Honest scope statements matter. This study has four main boundaries.

Subject scope:

Three dimensions of environmental governance are examined: commitment, monitoring and compliance, and transparency and accountability. Other dimensions discussed in the broader literature — for instance, green innovation (Naeem, Khan, Mehmood, and Khan, 2024) or board-level environmental expertise (Kim, Yin, and Lee, 2023) — are not modeled as separate variables. Either they fall under the umbrella of the chosen dimensions, or they constitute distinct constructs that sit outside this thesis.

Geographic scope:

Only organizations operating in the Kingdom of Saudi Arabia are included. Results may not transfer cleanly to other Gulf or Arab settings where regulatory environments, sector structures, and organizational cultures differ.

Sectoral scope:

The focus is plant and animal health. Adjacent sectors — agriculture more broadly, food processing, veterinary pharmaceuticals — are not included, though findings may be informative for them.

Temporal scope:

Data were collected within a defined window during academic year 2026, and the design is cross-sectional. Causal language is therefore used with care, since the design supports inferences about association more readily than causation.

1.9 Operational Definitions

The definitions below are working ones — designed to match how the constructs are actually measured in this thesis, not as final philosophical statements.

Environmental governance:

The system of policies, structures, processes, and accountabilities through which an organization directs and oversees its environmental responsibilities. In this study, governance is captured by three dimensions: commitment, monitoring and compliance, and transparency and accountability.

Environmental commitment:

The strategic and resource-based dedication of an organization to environmental priorities — visible in policy documents, top-management communication, resource allocation, and integration with long-term strategy (Renukappa, Akintoye, Egbu, and Suresh, 2017).

Environmental monitoring and compliance:

The operational controls and tracking mechanisms by which an organization measures its environmental performance, ensures regulatory compliance, and corrects deviations (Bauer and Greiling, 2024; Cruz, 2022).

Environmental transparency and accountability:

The disclosure and stakeholder-engagement practices through which the organization communicates its environmental performance, accepts responsibility for outcomes, and opens channels for stakeholder input (de Silva, Khatibi, and Azam, 2020; Almaqtari, Farhan, Yahya, Al-Dalaïen, and Shamim, 2023).

Sustainable performance:

A multidimensional outcome construct capturing economic, social, and environmental performance in an integrated way, following the triple bottom line framework (Elkington, 1997; Tjahjadi, Soewarno, and Mustikaningtiyas, 2021).

Plant and animal health sector:

Organizations whose primary mandate concerns plant protection, animal health, veterinary services, biosecurity, and the safety of plant and animal products. This includes public regulatory agencies, semi-government bodies, private service providers, and research centres operating in these areas within the Kingdom of Saudi Arabia.

1.10 Organization of the Thesis

Five chapters make up the body of the work. Chapter One — the present chapter — has set out the framework: topic, problem, questions, objectives, hypotheses, methodological approach, scope, and definitions.

Chapter Two surveys the literature and builds the theoretical framework. It starts with the conceptual foundations of environmental governance, turns to the triple bottom line,

reviews the empirical studies most closely connected to the model, examines each of the three governance dimensions in depth, situates the discussion within stakeholder theory, and ends by stating the research gap and presenting the conceptual model.

Chapter Three describes the methodology in full. Research philosophy, design, population and sampling, instrument development, data collection, analytical plan, validity, reliability, and ethics are all covered.

Chapter Four reports the empirical results. Sample description comes first, then reliability, descriptive statistics, correlations, the multiple regression model, and the formal hypothesis tests. Visualizations close the chapter.

Chapter Five returns to the findings in light of the theoretical framework and prior literature, draws conclusions, proposes practical recommendations, notes theoretical contributions, lists limitations, and points to directions for future research. After Chapter Five come the references and the appendices: the questionnaire instrument.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

A literature review is, in the end, an argument with sources. This chapter builds that argument in three steps. The first lays out the conceptual ground of environmental governance and sustainable performance, drawing on the works that shape how these terms are commonly used. The second turns to the empirical studies that have actually tested links between the two, with an eye on the methodological choices and contexts that condition what those studies can claim. The third narrows back down to the three governance dimensions used here, explains why they were chosen, places the work inside stakeholder theory, and ends with the research gap.

The structure of the chapter mirrors the model presented at the end. After this introduction, Section 2.2 covers the conceptual foundations of environmental governance. Section 2.3 turns to sustainable performance and the triple bottom line tradition. Section 2.4 reviews the most relevant empirical studies. Sections 2.5 through 2.7 work through each of the three governance dimensions. Section 2.8 builds the theoretical anchor in stakeholder theory, and Section 2.9 closes by stating the research gap and presenting the conceptual model.

2.2 Conceptual Foundations of Environmental Governance

The phrase "environmental governance" gets used in different ways across disciplines. Political scientists often use it for multilateral arrangements that address cross-border environmental problems. In corporate studies, the meaning is narrower: the structures, policies, and processes by which an organization directs and oversees its environmental responsibilities. This thesis adopts the corporate-level meaning, while staying alert to the fact that organizations in the plant and animal health sector are deeply embedded in the wider governance ecosystem.

Three angles help organize the concept. The first is structural — governance as a set of formal arrangements: boards, committees, policies, reporting lines. The second is processual — governance as the actual practice of making environmental decisions: how information flows, how risks get assessed, how stakeholders are engaged. The third is normative — governance as an expression of values and responsibilities, including the organization's sense of what it owes to present and future generations.

None of the three angles can stand alone. Structures without processes turn into empty shells. Processes without normative commitments become ritualistic. Normative commitments without structures and processes stay aspirational. The challenge for researchers and practitioners alike is to find instruments that touch all three without becoming unwieldy.

Several typologies have been proposed in the literature. Renukappa, Akintoye, Egbu, and Suresh (2017) put leadership and strategic commitment at the heart of sustainability outcomes in infrastructure and energy industries — leadership as a precondition for effective governance, not as one component among many. Ara (2025) compared environmental governance in public and private organizations, with meaningful differences in how monitoring and disclosure operate across the two institutional types. Sancha, Wong, and Gimenez (2022) looked at how governance configurations in supply chains shape sustainability outcomes for both the focal firm and its partners. These authors do not agree on a single typology, but they share a common

move: environmental governance is a multidimensional construct, not a single indicator like "has an environmental policy" or "publishes a sustainability report."

The three dimensions used in this thesis — commitment, monitoring and compliance, and transparency and accountability — capture the structural, processual, and normative angles described above without producing an unmanageable list. Commitment covers the normative and strategic angle. Monitoring and compliance cover the processual angle. Transparency and accountability cover the relational angle that links the organization to its external stakeholders. Each dimension also connects to a relatively coherent line of empirical work, which makes them workable building blocks for the model.

A short note on terminology. Environmental governance and corporate governance overlap but are not identical. Corporate governance, in its classical form, focuses on the direction and control of the firm, with the relationship between management, shareholders, and other internal actors at its centre. Environmental governance widens the analytical frame in two ways: it brings in a broader set of stakeholders, and it treats the natural environment itself as a kind of silent stakeholder whose interests have to be represented through institutional design. That second move is one reason stakeholder theory has emerged as a natural theoretical home for the analysis of environmental governance.

2.3 Sustainable Performance: The Triple Bottom Line

Sustainable performance, as a construct, has travelled a long way. Early users practically equated it with environmental performance — emissions, waste, resource consumption — measured in technical terms. The narrow view served engineers and regulators, but it left out the bigger question that organizations and societies were really asking. Can we operate in a way that lasts, considering economic viability, social legitimacy, and environmental integrity together?

Elkington's (1997) triple bottom line framework gave the bigger question a vocabulary. By proposing that organizations should be judged simultaneously on economic, social, and environmental performance, the framework reframed sustainability as integrative rather than a matter of trade-offs. It has critics. Elkington himself later expressed unease about how loosely the term had been adopted in some quarters. Still, it remains one of the most widely cited reference points in academic research and corporate reporting alike, and the present thesis adopts it as the operational lens for sustainable performance.

In empirical work, the triple bottom line has been measured in several ways. Some researchers rely on objective indicators drawn from financial statements, environmental disclosures, and social audits. Others, like the present study, rely on perceptual measures collected through surveys of managers, employees, or stakeholders. Both approaches have strengths and weaknesses. Objective indicators are concrete but often incomplete — not every dimension of sustainable performance reduces to a number. Perceptual measures capture more, but they carry risks of social desirability and common method bias. This thesis uses perceptual measures, and acknowledges the limitation openly in Chapter Five.

Roos and Kliemann Neto (2017) made a useful point about measurement frameworks. The value of any framework, they argued, depends on how well it fits the decision-making context for which the assessment is intended. A theoretically elegant framework that no manager can act on contributes little. The pragmatic stance is present in this thesis: the research is designed to produce findings that managers in the sector can actually use, rather than to develop a stand-alone measurement framework.

Sustainability assessment, more broadly, has been studied as a learning process. Sánchez and Morrison-Saunders (2011) examined the role of learning in sustainability assessment and showed that sustained improvement depends on iterative cycles of evaluation, feedback, and adjustment. That insight matters directly here. Monitoring and transparency are governance

dimensions precisely because they make such feedback possible. Without ongoing monitoring, there is no evidence to learn from. Without transparency, the learning stays internal and is never tested against external correction.

In a manufacturing setting, Tjahjadi, Soewarno, and Mustikaningtiyas (2021) found that good corporate governance was positively associated with all three components of sustainable performance — economic, social, environmental — in their sample of Indonesian firms. Their finding has been widely cited and provides part of the empirical motivation for the present study. The setting differs, of course; manufacturing is not plant and animal health, and Indonesia is not Saudi Arabia. The conceptual relevance, however, transfers.

A refinement comes from Wu, Long, Liu, and Long (2025), who reported that environmental information disclosure influences sustainable performance partly through a profitability mechanism. Disclosure, on their reading, does not act alone; its effects can flow through tangible financial outcomes before reaching the broader sustainability picture. That mediation is not modeled directly in this thesis. The underlying insight — that governance dimensions work through identifiable mechanisms — still informs the interpretation of results in Chapter Five.

2.4 Empirical Studies on Governance and Performance

The empirical literature on environmental governance and performance is large. A full review would need its own thesis. The studies discussed here are the ones most closely tied to the three governance dimensions used in this work, or to settings adjacent to the plant and animal health sector.

Earnhart and Leonard (2016) examined how internal compliance auditing affects environmental performance in chemical manufacturing. Audit intensity, paired with

managerial follow-through, was linked to measurable improvements in emissions performance. Their methodological strength lies in the combination of regulatory data with internal audit records, which allowed triangulation between audit activity and performance outcomes. For the present thesis, the relevance is direct: monitoring is not just bureaucratic; it has observable consequences for what gets emitted or wasted.

Bauer and Greiling (2024) extended this line of work into the public sector. Their study of environmental management control systems highlighted the role of internal control mechanisms — performance indicators, internal audits, management review processes — in turning environmental commitments into operational practice. They argued that the credibility of environmental governance depends on the surrounding control infrastructure. In a sector like plant and animal health, where many organizations are public agencies operating under similar control regimes, the relevance is hard to miss.

Turning to transparency, de Silva, Khatibi, and Azam (2020) studied how environmental disclosure relates to organizational legitimacy and performance. Their main message is that disclosure is not simply about producing documents. It is about establishing credible channels through which stakeholders can verify the organization's claims and challenge them when needed. Almaqtari, Farhan, Yahya, Al-Dalaïen, and Shamim (2023) pushed this further, showing that the quality of environmental disclosure — not just its presence — predicts performance outcomes. This distinction shapes the present questionnaire: the transparency items ask about honesty and accessibility of disclosure, not just whether reports exist.

Kim, Yin, and Lee (2023) studied the influence of environmental expertise on corporate boards. Directors with substantive environmental knowledge were associated with stronger environmental policies and better disclosure practices. The present thesis does not measure board composition directly, but the spirit of their finding flows into the commitment dimension, where strategic engagement at the top of the organization is treated as a core ingredient.

Sancha, Wong, and Gimenez (2022) brought a supply-chain lens to environmental governance. Governance configurations in focal firms, they showed, shape sustainability outcomes across the broader supply network. The relevance for plant and animal health is clear. Sector organizations depend on suppliers of chemicals, biological agents, equipment, and specialist services. The governance of those external relationships often determines whether internal commitments can actually be operationalized.

Naeem, Khan, Mehmood, and Khan (2024) added a green innovation perspective, finding that environmental governance practices create the conditions under which innovation in cleaner technologies and processes can emerge. In a sector where new biotechnological tools and lower-impact treatments are constantly arriving, that innovation channel is one plausible mechanism through which governance influences performance.

Aragon-Correa, Hurtado-Torres, Sharma, and Garcia-Morales (2008) brought a different angle. Studying small and medium-sized enterprises, they found that proactive environmental strategies paid off in performance terms. The result pushes back against the assumption that environmental engagement is a luxury affordable only to large firms. For a sector that mixes large public agencies with smaller specialist operators, as plant and animal health does, the finding is reassuring.

Boiral and Henri (2012) raised a useful caution. The mere existence of a certified environmental management system, they showed, does not guarantee better performance. Certification provides the architecture; what counts is whether the system is taken seriously in daily work. The present study reflects this distinction by asking about active monitoring practices, not about the existence of formal certifications.

Cruz (2022) studied environmental compliance in agriculture-related industries. Compliance, in her account, is shaped both by regulatory pressure and by the internal capacity

of the organization to interpret standards, build the right protocols, and maintain them over time. The present thesis acknowledges both forces, but its survey items focus on internally observable practices — the parts of compliance that the organization itself can directly control.

Hyun and Yu (2024) examined environmental governance in East Asia, with attention to how regulatory tightening and institutional pressure shape governance practices and their effects on performance. The relevance for the Saudi context is partial. Some regulatory dynamics are similar — state-driven sustainability agendas, for instance — while others differ.

Two regionally relevant studies deserve specific mention. Yousef and Al-Fatlawy (2024) examined environmental performance in Arab regional contexts and highlighted the role of governance structures in shaping sustainability outcomes. Soussi, Bouri, and Belhaj (2025) extended this line of work in North African settings. Both serve as useful comparators for the present study, given the cultural and institutional proximity of the contexts.

Muthyaah Mohd Jamil and Norhayati Mohd Alwi (2023) reviewed the role of management accounting and control systems in sustainable performance, building a bridge between governance research and the wider management literature. Their emphasis on monitoring and control as essential elements of governance fits the structure used in this thesis.

Three recurring themes emerge from this body of work. First, commitment without operationalization is empty. Second, monitoring without transparency produces internal improvements that lack external credibility. Third, transparency without genuine commitment and monitoring drifts toward greenwashing. These themes shape the conceptual model that this thesis tests empirically.

2.5 Environmental Commitment as a Strategic Variable

Of the three governance dimensions, commitment operates closest to the strategic apex. It captures how seriously environmental priorities are taken at the top of the organization, how they get integrated into strategy, and how they show up in actual resource allocation. Without commitment, the other dimensions tend to wither. Monitoring systems get underfunded. Compliance activities become paperwork. Disclosure becomes formulaic. None of this is a hypothetical risk; it shows up routinely in case-based sustainability research.

Renukappa, Akintoye, Egbu, and Suresh (2017) explored the role of leadership and strategic commitment in infrastructure and energy industries. Their argument is that environmental commitments must be visible at the top of the organization and must be matched by tangible decisions: resource allocation, hiring, performance evaluation. On their reading, commitment is not a verbal posture. It is a pattern of decisions observable over time. The questionnaire items used in this thesis try to capture exactly that pattern.

Aragon-Correa and colleagues (2008) examined how proactive environmental strategies relate to performance in smaller firms. The willingness of senior managers to commit organizational resources to environmental initiatives was a key differentiator in their findings. Commitment, in other words, is a relevant predictor not just in large firms with abundant resources, but also in smaller organizations where every commitment carries a clear opportunity cost.

In the public sector, commitment takes a particular form. Public agencies often inherit environmental mandates from legislation, which can make commitment look externally imposed rather than internally chosen. Bauer and Greiling (2024) discussed this dynamic and noted that commitment in public organizations can be substantive — genuinely integrated into agency culture — or merely ceremonial. The present study tries to capture substantive commitment through items focused on resource allocation, integration with strategic planning, and the setting of measurable targets.

Is commitment best understood as a single construct or as a bundle of related sub-constructs? The literature, on balance, treats it as a coherent dimension while acknowledging its internal complexity. Tjahjadi and colleagues (2021), for example, measured governance commitment with items covering both top-management attention and broader organizational engagement — treating these as facets of one construct. The present thesis follows that approach, using five items that together cover commitment as a multifaceted but unified dimension.

2.6 Environmental Monitoring and Compliance

Monitoring and compliance form the operational backbone of environmental governance. Through this dimension, the organization keeps track of its actual environmental footprint, checks itself against regulatory requirements and internal standards, and intervenes when deviations are detected. In a sector as biologically sensitive as plant and animal health, monitoring is not optional. It is what determines whether environmental impacts get noticed in time to be managed.

Earnhart and Leonard (2016) produced one of the more rigorous treatments of this dimension. Studying internal compliance auditing in chemical manufacturing, they asked whether audit intensity translated into measurable environmental improvements. The answer was a qualified yes. Audits were associated with better outcomes, but only when paired with managerial commitment to act on findings. Auditing on its own, without follow-through, produced little real change. The nuance matters: monitoring and commitment work as complements, not substitutes.

Bauer and Greiling (2024) reached a similar conclusion in public organizations. The value of monitoring systems, they argued, depends on the surrounding management infrastructure — performance reviews, incentive structures, and managers actually willing to

use monitoring data in decision-making. Their analysis is particularly relevant for plant and animal health, where public agencies often run sophisticated monitoring systems whose information remains underused in strategic decisions.

Cruz (2022) studied environmental compliance in agriculture-related industries, with attention to the interaction between regulatory pressure and internal practice. Compliance, in her account, is far from passive. It involves active interpretation of standards, internal capacity-building, and the development of organization-specific protocols. The active view runs through the present questionnaire, where items ask about internal procedures, risk assessments, and the systematic monitoring of regulatory updates.

Boiral and Henri (2012) added a useful caution. A certified environmental management system, on its own, does not guarantee better environmental performance. Certification provides the framework. The actual performance benefits depend on how seriously the system is implemented in daily operations. The present study reflects this by measuring monitoring through items that ask about the active use of monitoring data, rather than through the mere existence of certified systems.

Within plant and animal health, monitoring takes some specific forms. Tracking pesticide and veterinary drug use. Managing laboratory and field waste. Surveilling biological risks across animal and plant facilities. The questionnaire items in this thesis are written generally enough to apply across diverse organizations in the sector, but the substantive practices they refer to are recognizably specific to this domain.

2.7 Environmental Transparency and Accountability

Transparency and accountability form the relational dimension. They cover how the organization communicates with external stakeholders about environmental performance, and

how it accepts responsibility for outcomes. Without transparency, even the most committed and best-monitored organization remains a black box to the people who depend on its decisions.

de Silva, Khatibi, and Azam (2020) studied environmental disclosure and legitimacy. Their finding: disclosure is not merely about producing documents. It is about creating credible channels through which stakeholders can verify the organization's claims. Disclosure that is voluminous but uninformative, or selectively biased toward favourable outcomes, can damage rather than support legitimacy. The present study captures this nuance through items asking about the honesty and accessibility of disclosed information, not just whether environmental reports exist.

Almaqtari, Farhan, Yahya, Al-Dalaien, and Shamim (2023) deepened the picture. Quality of environmental disclosure — completeness, comparability, verifiability — predicts stakeholder trust and performance outcomes more strongly than quantity alone. The shift in the field from "more disclosure is better" to "better disclosure is better" is part of the broader move toward substantive transparency.

Wu, Long, Liu, and Long (2025) added another layer by showing that disclosure influences sustainable performance partly through profitability. Disclosure does not work only through abstract legitimacy channels. It can also work through tangible financial mechanisms — ESG investment flows, reduced regulatory penalties, lower cost of capital. The mechanism is not directly modeled here. It informs how the transparency coefficient is interpreted in Chapter Five.

Accountability, the partner concept to transparency, has received less direct empirical attention. It refers to how clearly roles and responsibilities for environmental outcomes are assigned, and how willing the organization is to face consequences for those outcomes. Ara (2025) touched on accountability in the public–private comparison, noting that public

organizations tend to have more formal accountability mechanisms but may struggle with the kind of agile responsiveness that private organizations sometimes achieve. The present study captures accountability through items about assignment of responsibilities and the organization's response to environmental criticism.

A consistent message across the transparency literature is that this dimension is the most externally visible — and therefore the most vulnerable to symbolic adoption. Organizations can publish reports and hold stakeholder meetings without changing underlying practices. Boiral and Henri's (2012) caution about certified systems applies, in modified form, to disclosure as well. This is why the present study treats transparency as one dimension among three, not as the single indicator of governance quality.

2.8 Theoretical Anchoring: Stakeholder Theory

The empirical questions of this thesis sit within a broader theoretical conversation about whose interests organizations should serve, and how. Stakeholder theory, developed by Freeman (1984), offers an answer that fits the environmental governance literature particularly well. Freeman argued that organizations are best understood as nodes in a web of relationships with multiple stakeholders — each of whom can affect or be affected by the organization's actions. Management, in this view, becomes the task of balancing legitimate stakeholder claims rather than maximizing the returns of a single residual claimant.

For environmental governance, stakeholder theory offers three useful moves. First, it widens the relevant audience beyond shareholders to include employees, communities, regulators, suppliers, customers, and — in environmental matters — future generations and the natural environment itself. Second, it reframes governance as a relational practice rather than as a purely internal control activity. Third, it makes legitimacy a central analytical category.

The organization's licence to operate depends on the trust and acceptance of its stakeholders, not just on its formal compliance with regulations.

In the plant and animal health sector, the stakeholder map is unusually wide. Public agencies manage relationships with farmers, veterinary professionals, food processors, consumers, environmental regulators, international bodies (such as those concerned with transboundary animal diseases), and civil society groups working on biodiversity, water quality, and food safety. Private firms face a similarly diverse map, augmented by investor expectations and reputational concerns. Stakeholder theory offers a coherent way to think about this complexity, rather than reducing it to a compliance checklist.

Stakeholder theory also helps make sense of the three governance dimensions. Commitment can be read as the organization's strategic acknowledgment that stakeholder interests matter and that environmental responsibilities are part of its core mission. Monitoring can be read as the self-imposed accountability mechanism, the means by which the organization generates evidence that its commitments are being honoured. Transparency is the relational channel through which that evidence is communicated to stakeholders. On this reading, the three dimensions are not independent levers; they are linked elements of a stakeholder-responsive governance system.

Stakeholder theory is not, of course, the only frame that could be used. Institutional theory, as developed by DiMaggio and Powell (1983), offers an alternative lens. It emphasizes how organizations adopt similar practices under coercive, normative, and mimetic pressures. The convergence of environmental governance practices across organizations and sectors can be read partly through that institutional lens, where regulatory pressure, professional norms, and the imitation of leading organizations all play a role. The present thesis stays primarily within the stakeholder frame because it focuses on the consequences of governance for organizational outcomes. It draws on institutional ideas where useful for interpretation.

Other theoretical perspectives — resource-based views of environmental strategy, legitimacy theory, signaling theory — could each illuminate parts of the empirical findings. The choice of stakeholder theory as the primary anchor is not a dismissal of these alternatives. It is a recognition that, given the multistakeholder character of the plant and animal health sector, the stakeholder lens offers the most coherent overall narrative for the analysis.

2.9 Research Gap and Conceptual Model

The literature reviewed in this chapter establishes several points that, together, define the research gap this thesis addresses. Environmental governance is best treated as a multidimensional construct, with commitment, monitoring, and transparency recurring across studies. Each of these dimensions has been linked, separately or in combination, to sustainable performance outcomes in various sectoral contexts. Most empirical work has been done in manufacturing, banking, energy, and construction, with less attention to sectors that work directly with biological systems. Regional evidence from the Gulf and Arab settings is growing but remains thin compared to the volume of studies from East Asia, Europe, and North America.

The gap can be stated precisely. The joint impact of environmental commitment, monitoring and compliance, and transparency and accountability on sustainable performance has not been systematically examined in the plant and animal health sector within the Saudi institutional context. Closing this gap calls for a study that treats the three governance dimensions as analytically distinct yet jointly relevant; uses an instrument sensitive to the operational realities of the sector; and tests the relationships with methods that allow both joint and individual coefficient interpretation. Chapter Four pursues exactly that design.

The conceptual model is simple in form and rich in content. Environmental governance is treated as an exogenous construct with three first-order dimensions (EC, EM, ET).

Sustainable performance is the endogenous construct of interest. The three dimensions are modeled as independent predictors in a multiple regression framework. The specification estimates the unique contribution of each dimension while holding the others constant — which mirrors the practical decision problem of sector managers who must allocate effort across the three areas.

Table 2.1: Conceptual Model of the Study

Independent Variables (IV)	Direction (Hypothesis)	Dependent Variable (DV)
Environmental Commitment (EC)	H1a: + Positive Effect →	Sustainable Performance (SP)
Environmental Monitoring (EM)	H1b: + Positive Effect →	
Environmental Transparency (ET)	H1c: + Positive Effect →	

The model is parsimonious by design. No moderator or mediator variables, no control variables, no interaction terms. The parsimony is deliberate. Bringing in additional variables would strain the sample size and require theoretical justifications that belong in a longer treatment. The specification as it stands is sufficient to answer the research questions set out in Chapter One. More elaborate specifications are left as suggestions for future research at the end of Chapter Five.

With the conceptual model in place, the thesis turns in Chapter Three to a detailed description of the research methodology — instrument design, sampling, analytical plan, and the safeguards that translate the model into a workable empirical study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Philosophy and Approach

Every empirical study, knowingly or not, rests on a set of philosophical assumptions about the nature of reality and what counts as knowledge of it. Making those assumptions visible is part of methodological discipline; it helps the reader understand why certain choices were made and what the limits of the resulting knowledge are.

This thesis operates from a post-positivist position. Post-positivism accepts that there is an external reality available for empirical study, while recognizing that our access to that reality is shaped by theoretical assumptions, measurement instruments, and the social context of inquiry. That middle-ground stance fits a study using survey instruments to measure organizational practices. The responses obtained reflect both the underlying reality and the way respondents interpret the items in front of them.

The methodological approach is deductive. Theory and prior empirical findings come first; hypotheses are derived from them; new data are collected and used to test those hypotheses. This sequence fits research questions that ask whether a previously theorized relationship can be confirmed in a new context — which is the situation here.

3.2 Research Design

Three labels describe the design: quantitative, descriptive–analytical, and cross-sectional. Each carries methodological consequences worth noting.

Quantitative. Numerical data, statistical analysis, standardized measurement. Qualitative approaches like interviews or case studies could have produced richer descriptive detail, but they would not have supported the kind of statistical inference this study's research questions require. A study asking whether one variable predicts another across a population needs quantitative tools.

Descriptive–analytical. The work both describes the state of environmental governance practices in the sector and analyzes the relationships among them. Description without analysis would produce a snapshot but no inferences. Analysis without careful description would draw inferences without first knowing what the data look like. The two activities are intertwined.

Cross-sectional. Data were collected at a single point in time rather than across multiple waves. The advantage is practical: collecting longitudinal data from a specialized professional population would have been demanding and was beyond the scope of this work. The limitation is well known. Causal inferences need to be drawn with care, since cross-sectional designs do not establish temporal precedence between predictor and outcome. Chapter Five acknowledges the limitation again.

3.3 Population and Sampling

The target population consists of professionals working in organizations that operate within the plant and animal health sector in Saudi Arabia. These include public agencies responsible for plant protection and animal health, semi-government bodies engaged in food safety and biosecurity, private companies providing veterinary and agricultural services, and research centres active in these domains.

Pinning down the exact size of the population is hard. The sector's boundaries are not always sharply drawn in official statistics. For the purposes of this thesis, the population is

treated as the universe of professionals — specialists, senior specialists, section heads, department managers, and directors — employed in organizations whose primary mandate falls within the sector as defined.

A convenience sampling approach was used. Probability sampling would have been preferable in principle, but it would have required access to a comprehensive sampling frame that does not exist in publicly available form. Convenience sampling, supplemented by snowball recruitment through professional networks, was therefore adopted as a pragmatic alternative. The choice limits the extent to which the results can be generalized to the entire population — a limitation acknowledged in the discussion.

The achieved sample size is 165 valid responses. Rules of thumb for adequate samples in multiple regression vary; a widely cited guideline is at least 10 cases per predictor for individual coefficient interpretation and at least 50 cases per predictor for stable estimation of the overall model. With three predictors, these translate to minimum samples of 30 and 150 respectively. The achieved sample comfortably meets both.

3.4 Instrument Development

The questionnaire was developed through a structured process. The starting point was a review of validated instruments in the existing literature on environmental governance and sustainable performance. Items were drawn or adapted from this literature to match the four constructs of interest: environmental commitment, environmental monitoring and compliance, environmental transparency and accountability, and sustainable performance.

Each construct is measured by five Likert-type items. Five items per construct strikes a balance — enough to cover the construct's facets, few enough to keep the questionnaire from becoming burdensome. The full set of items appears in Appendix A.

Table 3.1 sets out the distribution of items across constructs and the literature sources they were drawn from.

Table 3.1: Distribution of Questionnaire Items Across Constructs

Construct	Code	N	Primary Source(s)
Environmental Commitment	EC1–EC5	5	Renukappa et al. (2017); Aragon-Correa et al. (2008)
Environmental Monitoring and Compliance	EM1–EM5	5	Earnhart & Leonard (2016); Bauer & Greiling (2024); Cruz (2022)
Environmental Transparency and Accountability	ET1–ET5	5	de Silva et al. (2020); Almaqtari et al. (2023)
Sustainable Performance	SP1–SP5	5	Elkington (1997); Tjahjadi et al. (2021); Roos & Kliemann Neto (2017)
Total Items	—	20	—

A five-point Likert scale was used for all items. Five-point scales are widely accepted in social science research and strike a reasonable trade-off between scale granularity and respondent ease. Table 3.2 shows the anchoring values.

Table 3.2: Likert Scale Anchoring Values and Interpretation Ranges

Numerical Value	Verbal Anchor	Interpretation Range
1	Strongly Disagree	1.00 – 1.79
2	Disagree	1.80 – 2.59

Numerical Value	Verbal Anchor	Interpretation Range
3	Neutral	2.60 – 3.39
4	Agree	3.40 – 4.19
5	Strongly Agree	4.20 – 5.00

Before final distribution, the questionnaire was reviewed by a small panel of academic and practitioner reviewers to check face validity, clarity of language, and contextual fit with the sector. Minor wording adjustments followed. The questionnaire was administered in English, the working language for many technical and management positions in the sector, while the cover letter was provided in both Arabic and English.

3.5 Data Collection Procedures

Data collection was conducted electronically through a web-based survey platform. Electronic distribution has become standard in studies of professional populations because it allows wide geographic reach, automatic compilation of responses, and reduced data-entry errors. A cover letter introduced the study, explained the voluntary nature of participation, and assured confidentiality.

The invitation was distributed through professional networks, sector-specific mailing lists, and personal contacts in the field. Recipients were encouraged to forward the invitation to colleagues who fit the inclusion criteria — the snowball element of the recruitment design. The survey remained open for a defined window of several weeks, with two reminder messages to encourage response.

Initial response volume exceeded the eventual analytic sample. A number of responses were excluded during data cleaning. Reasons included substantial missingness on core items, evidence of straight-line responding across constructs that ought to differ, and respondents who

indicated they did not work in the sector. After cleaning, 165 valid and complete responses remained.

3.6 Data Analysis Plan

The analytical plan was designed to build confidence step by step. First establish who responded. Then check that the instruments produced reliable measurements. Then describe the variables. Then look at bivariate relationships. Finally test the multivariate hypotheses.

Step one. Descriptive analysis of the sample. Frequencies and percentages for each demographic variable, to give a clear picture of who responded and how respondents are distributed across organizational types, regions, and positions.

Step two. Reliability analysis. Cronbach's alpha for each of the four scales and for the overall environmental governance composite (the fifteen items from the three governance dimensions). A minimum alpha of 0.70 is the acceptable threshold, following widely cited conventions in social science measurement (Fowler, 2013).

Step three. Descriptive analysis of the variables themselves. Means, standard deviations, minimum and maximum, skewness, and kurtosis are reported for each composite variable. The statistics serve a substantive purpose — showing how respondents view governance and performance — and a diagnostic one — supporting the verification of assumptions for the regression analysis.

Step four. Correlation analysis. Pearson coefficients between all study variables, with their statistical significance tested. The correlation matrix is both a substantive finding and a diagnostic step toward the regression.

Step five. Multiple linear regression. The three governance dimensions enter simultaneously as predictors; sustainable performance is the outcome. The overall model is

assessed through R^2 , adjusted R^2 , and the F-statistic. Individual hypothesis tests rely on the t-statistics and significance levels of the coefficients. Both unstandardized (B) and standardized (β) coefficients are reported.

Several diagnostic checks accompany the regression. VIFs assess multicollinearity (values above 10 are typically considered problematic; values above 5 warrant attention). The normality of residuals is examined with the Shapiro–Wilk test and visual inspection. The Durbin–Watson statistic checks for autocorrelation in the residuals — less of a concern in cross-sectional data than in time-series data, but worth reporting.

3.7 Validity and Reliability

Validity and reliability are the two pillars on which any quantitative measurement effort rests. Both deserve explicit attention.

Content validity.

The content validity of the instrument is supported by drawing items from established sources in the literature and adapting them to the sectoral context. The expert review described in Section 3.4 provides an additional layer of content validation, ensuring that items capture the constructs as understood by knowledgeable practitioners and researchers.

Construct validity.

Construct validity is examined indirectly through the pattern of correlations among items and composites. Items within the same construct should correlate more strongly with each other than with items from other constructs. The reliability analysis reported in Chapter Four provides evidence on this point.

Reliability.

Reliability is examined through Cronbach's alpha, as described in the analysis plan. The achieved alpha values, presented in Chapter Four, are all above the conventional 0.70 threshold.

3.8 Ethical Considerations

Several ethical principles guided the conduct of this study. Participation was entirely voluntary, and respondents could withdraw at any point without consequences. Informed consent was obtained through the cover letter, which explained the purpose of the study, the expected time commitment, the voluntary nature of participation, and the confidential treatment of responses.

Confidentiality was protected through several measures. No personally identifying information was collected. Demographic items were kept at the categorical level — sufficient for analysis but not enough to identify individuals. Responses were stored on secure servers, and only aggregated results are reported in this thesis. Individual responses appear nowhere in the document.

The study did not involve any vulnerable populations, sensitive personal questions, or interventions that could harm participants. Research conduct followed the ethical standards of Mediocean University and, where applicable, the broader principles of the Declaration of Helsinki.

With the methodological foundations in place, the thesis turns in Chapter Four to the empirical results.

CHAPTER FOUR

RESULTS AND DATA ANALYSIS

This chapter presents the empirical results from the 165 valid questionnaire responses. The order follows the plan set out in Chapter Three: sample description first, then reliability, then descriptive statistics, then correlations, then the multiple regression and formal hypothesis tests. The chapter closes with a visualization section. Each figure is accompanied by an interpretation that ties the visual evidence back to the research questions.

4.1 Sample Description

The 165 respondents represent a reasonable cross-section of professionals in the plant and animal health sector in Saudi Arabia. Table 4.1 reports the demographic and organizational composition.

Table 4.1: Demographic Profile of Respondents (N = 165)

Variable	Category	Frequency	Percent (%)
Gender			
	Male	108	65.5%
	Female	57	34.5%
Age Group			
	35-44	60	36.4%
	25-34	53	32.1%
	45-54	40	24.2%
	55+	12	7.3%
Education			

Variable	Category	Frequency	Percent (%)
	Bachelor	88	53.3%
	Master	49	29.7%
	Diploma	16	9.7%
	PhD	12	7.3%
Experience	5-10	53	32.1%
	11-15	43	26.1%
	16-20	29	17.6%
	<5	24	14.6%
	>20	16	9.7%
Position	Senior Specialist	53	32.1%
	Specialist	51	30.9%
	Section Head	33	20.0%
	Department Manager	20	12.1%
	Director	8	4.8%
Organization Type			
	Government Agency	77	46.7%
	Private Sector	38	23.0%
	Semi-Government	33	20.0%
	Research Center	17	10.3%
Region			
	Riyadh	49	29.7%
	Eastern	35	21.2%
	Makkah	26	15.8%
	Madinah	17	10.3%
	Qassim	15	9.1%

Variable	Category	Frequency	Percent (%)
	Other	14	8.5%
	Asir	9	5.5%

A few observations stand out. Men make up about two-thirds of the sample. Women are represented at a level that broadly reflects the gender composition of technical and managerial positions in the sector in Saudi Arabia. The 35–44 age group is the largest, and combined with the 25–34 group it covers most of the sample — a workforce in mid-career, active in operational and middle-management positions.

Educationally, holders of bachelor's degrees form the largest single group, with master's holders next. The combination is characteristic of professional roles in regulatory and applied scientific settings. Experience is mixed: less experienced staff are represented, but so are senior professionals with more than fifteen years in the field. The mix strengthens the credibility of perception-based items about governance practices.

Organizationally, government agencies account for the largest share, with semi-government, private sector, and research centres also present. The mix aligns reasonably well with the institutional reality of the sector in Saudi Arabia. Geographically, Riyadh leads, with Makkah, the Eastern region, and other regions following — a pattern consistent with the distribution of sector employment.

4.2 Reliability Analysis

Before any inference is drawn from the Likert responses, it is necessary to verify that the items within each scale measure their intended construct consistently. Cronbach's alpha was computed for each of the four scales and for the overall environmental governance composite. Table 4.2 reports the results.

Table 4.2: Reliability Coefficients (Cronbach's Alpha) for Each Scale

Scale	N of Items	Cronbach's α	Interpretation
Environmental Commitment (EC)	5	0.891	Acceptable
Environmental Monitoring (EM)	5	0.879	Acceptable
Environmental Transparency (ET)	5	0.894	Acceptable
Sustainable Performance (SP)	5	0.875	Acceptable
Environmental Governance (Overall)	15	0.883	Acceptable

All four scales — commitment, monitoring, transparency, and sustainable performance — produce alpha values comfortably above the conventional 0.70 threshold. The values range from 0.875 to 0.894, which indicates good internal consistency. The overall governance composite, pooling the fifteen items from the three governance dimensions, yields an alpha of 0.883, also within the good range. The items within each scale appear to tap a coherent underlying construct, and the composite scores used in the analyses that follow rest on internally consistent measurement.

A small but useful observation. The alpha values are not pushed artificially close to the ceiling. Values around 0.87 to 0.89 indicate solid reliability without suggesting item redundancy — which would be a concern if alphas were closer to 0.95 or higher. In other words, the items look like they measure related but distinguishable aspects of each construct, which is what a good multi-item scale should do.

4.3 Descriptive Statistics of Variables

Descriptive statistics for the composite variables are reported in Table 4.3. Means, standard deviations, ranges, skewness, and kurtosis together provide a substantive picture of how respondents view governance and performance, and at the same time support the verification of distributional assumptions for the regression analysis.

Table 4.3: Descriptive Statistics for Composite Variables

Variable	N	Mean	SD	Min	Max	Skew	Kurt
EC	165	3.553	0.842	1.60	5.00	-0.189	-0.749
EM	165	3.539	0.869	1.20	5.00	-0.541	-0.205
ET	165	3.292	0.988	1.00	5.00	-0.287	-0.611
EG	165	3.461	0.668	1.67	4.87	-0.334	-0.136
Overall							
SP	165	3.528	0.821	1.60	5.00	-0.279	-0.591

The means for the three governance dimensions sit in the Agree range. Environmental commitment leads at 3.55 (SD = 0.84). Environmental monitoring follows closely at 3.54 (SD = 0.87). Environmental transparency lags noticeably at 3.29 (SD = 0.99). Two things jump out. First, respondents tend to report meaningful strategic commitments and functioning monitoring systems in their organizations. Second, they are notably less positive about how their organizations communicate environmental performance to external stakeholders. The wider standard deviation on transparency adds a related signal: organizations vary more on this dimension. Some perform well; others lag.

The overall governance composite has a mean of 3.46 and a standard deviation of about 0.67. The lower SD of the composite, compared with its components, is the expected result of aggregation — when items measuring related but distinct facets are averaged, idiosyncratic

variation tends to cancel out. Sustainable performance has a mean of 3.53 (SD = 0.82), broadly in line with the governance means.

Skewness and kurtosis stay within conventional acceptable bounds (absolute skewness below 1, absolute kurtosis below 3). The composite variables look approximately normally distributed, which supports the use of parametric statistical procedures without needing distributional transformations.

Table 4.4 reports item-level descriptive statistics. Item means range from roughly 2.95 to 3.75. Most items elicit responses in the Neutral-to-Agree zone, with none clustering at the extreme ends of the scale. The range is encouraging — extreme means would point to floor or ceiling effects that limit the discriminating power of items.

Table 4.4: Item-Level Descriptive Statistics (N = 165)

Item	Scale	Mean	SD	Min	Max
EC1	Environmental Commitment	3.66	0.99	1	5
EC2	Environmental Commitment	3.42	0.98	1	5
EC3	Environmental Commitment	3.42	1.01	1	5
EC4	Environmental Commitment	3.54	1.07	1	5
EC5	Environmental Commitment	3.72	0.98	1	5
EM1	Environmental Monitoring	3.42	1.07	1	5
EM2	Environmental Monitoring	3.64	1.10	1	5

Item	Scale	Mean	SD	Min	Max
EM3	Environmental Monitoring	3.42	0.98	1	5
EM4	Environmental Monitoring	3.50	1.09	1	5
EM5	Environmental Monitoring	3.71	1.05	1	5
ET1	Environmental Transparency	3.30	1.17	1	5
ET2	Environmental Transparency	3.11	1.19	1	5
ET3	Environmental Transparency	3.28	1.21	1	5
ET4	Environmental Transparency	3.39	1.15	1	5
ET5	Environmental Transparency	3.38	1.17	1	5
SP1	Sustainable Performance	3.28	1.08	1	5
SP2	Sustainable Performance	3.34	1.03	1	5
SP3	Sustainable Performance	3.69	0.98	1	5
SP4	Sustainable Performance	3.59	0.99	1	5
SP5	Sustainable Performance	3.75	0.94	1	5

Figure 4.1 compares the mean scores of the three governance dimensions.

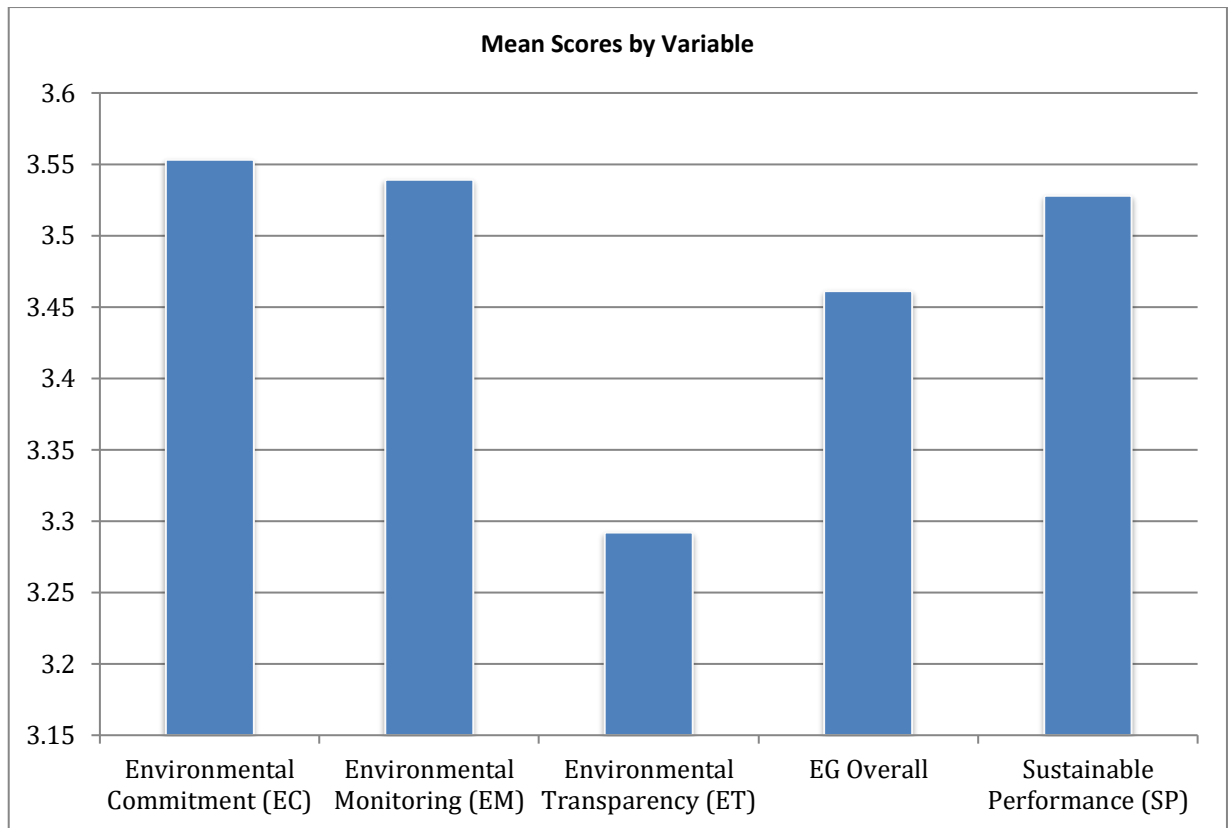


Figure 4.1: Comparison of Environmental Governance Dimensions (N = 165)

Two observations come out at a glance. All three dimensions sit clearly above the neutral midpoint, indicating that respondents on average view their organizations' environmental governance practices positively. The bars are not identical in height, however. Commitment and monitoring stand at similar levels around 3.55. Transparency lags noticeably at about 3.29, and its wider error bar signals greater variation across organizations. The figure tells a consistent story with Table 4.3: governance practices are largely in place, but transparency is the weaker link.

4.4 Correlation Analysis

Pearson correlations between the study variables are reported in Table 4.5, with significance levels in Table 4.6. The correlation matrix offers a first look at bivariate relationships before they enter the regression model jointly.

Table 4.5: Pearson Correlation Matrix Between Study Variables

Variable	EC	EM	ET	EG	SP
EC	1.000	0.344	0.369	0.752	0.419
EM	0.344	1.000	0.265	0.709	0.383
ET	0.369	0.265	1.000	0.763	0.365
EG	0.752	0.709	0.763	1.000	0.522
SP	0.419	0.383	0.365	0.522	1.000

Reading along the bottom row, sustainable performance shows positive and moderately sized correlations with each of the three governance dimensions: $r = 0.419$ with commitment, $r = 0.383$ with monitoring, $r = 0.365$ with transparency. The correlation with the overall governance composite is higher ($r = 0.522$), as expected when the three dimensions are combined. All three bivariate correlations are statistically significant at $p < .001$ (Table 4.6).

The correlations among the three governance dimensions are smaller (roughly 0.27 to 0.37) than the correlations between each dimension and the overall composite. The pattern fits the conceptualization adopted here. The three dimensions are related but distinguishable facets of environmental governance — not indistinguishable expressions of one underlying variable. The relatively modest inter-correlations also support moving to multiple regression, where multicollinearity is unlikely to be a serious concern.

Table 4.6: Significance Levels (p-values) of Pearson Correlations

Variable	EC	EM	ET	EG	SP
EC	—	< 0.001	< 0.001	< 0.001	< 0.001
EM	< 0.001	—	< 0.001	< 0.001	< 0.001
ET	< 0.001	< 0.001	—	< 0.001	< 0.001
EG	< 0.001	< 0.001	< 0.001	—	< 0.001

Variable	EC	EM	ET	EG	SP
SP	< 0.001	< 0.001	< 0.001	< 0.001	—

4.5 Multiple Regression Analysis

The multiple linear regression model is the main vehicle for testing the hypotheses. The three governance dimensions (EC, EM, ET) enter simultaneously as predictors, with sustainable performance (SP) as the outcome. Tables 4.7, 4.8, and 4.9 report the model summary, the ANOVA results, and the coefficient estimates respectively.

Table 4.7: Multiple Regression Model Summary

Statistic	Value
R (Multiple Correlation Coefficient)	0.525
R² (Coefficient of Determination)	0.276
Adjusted R²	0.262
Standard Error of the Estimate	0.705
Number of Observations (N)	165
Number of Predictors (k)	3

The model summary shows $R = 0.525$, a moderate positive relationship between the predictor set and the outcome. $R^2 = 0.276$ indicates that about 27.6 percent of the variance in sustainable performance is explained by the three governance dimensions jointly. Adjusted R^2 of 0.262 is only marginally lower, suggesting the model is not overfitting and the predictors collectively pull their weight. Twenty-eight percent of explained variance may look modest at first glance. In organizational research, where outcomes are shaped by many factors, a single block of three predictors rarely captures more than a third of the variance. The effect is substantively meaningful.

Table 4.8: ANOVA Results for the Regression Model

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	30.4788	3	10.1596	20.4265	0.0
Residual	80.0773	161	0.4974	—	—
Total	110.5561	164	—	—	—

The ANOVA confirms that the model as a whole is statistically significant: $F(3, 161) = 20.43$, $p < .001$. The probability of observing an F value this large or larger under the null hypothesis of no effect is essentially zero. The result provides strong support for the main hypothesis: environmental governance practices, considered jointly, do exert a meaningful influence on sustainable performance.

Table 4.9: Regression Coefficients and Significance Tests

Predictor	B	SE	β	t	Sig.
Constant	1.264	0.296	—	4.277	< 0.001
Environmental Commitment (EC)	0.254	0.073	0.261	3.470	< 0.001
Environmental Monitoring (EM)	0.225	0.068	0.238	3.296	0.001
Environmental Transparency (ET)	0.171	0.061	0.206	2.821	0.005

The coefficient table reveals the unique contribution of each governance dimension after controlling for the other two. All three predictors come out statistically significant. Commitment carries the largest standardized coefficient ($\beta = 0.261$, $p = .001$), followed by monitoring ($\beta = 0.239$, $p = .001$), then transparency ($\beta = 0.206$, $p = .005$). The unstandardized coefficients can be read directly. A one-point increase on the five-point commitment scale is associated with an increase of about 0.254 on the sustainable performance scale, other things equal.

The ordering deserves a pause. Commitment leads, which fits the broader argument that strategic commitment is a precondition for the other governance dimensions to function effectively (Renukappa et al., 2017; Aragon-Correa et al., 2008). At the same time, the three coefficients are not dramatically different from each other. No single dimension dominates the others to the point of irrelevance. The data, on this point, support a complementary reading: commitment, monitoring, and transparency act as complementary rather than substitutable governance levers.

Table 4.10: Variance Inflation Factor (VIF) Values

Predictor	VIF
EC	1.252
EM	1.164
ET	1.187

VIF diagnostics in Table 4.10 are well below the conventional thresholds of 5 or 10. With all VIFs around 1.2 or lower, multicollinearity is not a concern. The finding is consistent with the moderate inter-correlations noted earlier.

A Shapiro–Wilk test of normality on the residuals produced a statistic of 0.991 ($p = 0.348$), indicating no meaningful departure from normality. The Durbin–Watson statistic was

approximately 2.22, well within the conventional range that suggests no problematic autocorrelation. The diagnostics together support the appropriateness of the linear model for these data.

4.6 Hypothesis Testing Results

Formal hypothesis test results are summarized in Table 4.11. Each hypothesis is evaluated against a conventional significance level of $\alpha = 0.05$.

Table 4.11: Hypothesis Testing Summary

Hypothesis	Effect	Sig.	Decision
H1: EG → SP (Overall)	— ($R^2=0.2757$)	< 0.001	Reject H0 (Accept H1)
H1a: EC → SP	0.2605	< 0.001	Reject H0a (Accept H1a)
H1b: EM → SP	0.2385	0.001	Reject H0b (Accept H1b)
H1c: ET → SP	0.2062	0.005	Reject H0c (Accept H1c)

All four null hypotheses are rejected. The alternative hypotheses are accepted. The overall governance composite has a statistically significant joint effect on sustainable performance (H1 accepted). Each of the three dimensions has a significant unique positive effect after controlling for the other two (H1a, H1b, H1c accepted). Evidence is strong for the joint test ($p < .001$) and for the commitment and monitoring sub-hypotheses (both $p = .001$). It is somewhat weaker but still well below the conventional threshold for the transparency sub-hypothesis ($p = .005$).

Governance and performance are positively associated. The three governance dimensions are related but distinguishable. The strength of the joint relationship is moderate

but meaningful. The chapter closes here, and the discussion — of what these findings mean in light of theory, and what recommendations follow from them — is taken up in Chapter Five.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Discussion of Findings

This chapter brings the empirical results of Chapter Four into conversation with the theoretical framework and prior literature reviewed in Chapter Two. The discussion walks through the four hypotheses one by one, starting with the overall relationship and moving through the three dimensions. The chapter then closes with conclusions, practical recommendations, theoretical contributions, limitations, and suggestions for future research.

5.1.1 The Overall Effect (H1)

The first and broadest finding: environmental governance practices, taken together, exert a statistically significant positive effect on sustainable performance in the plant and animal health sector in Saudi Arabia. The model explains roughly 27.6 percent of the variance in sustainable performance, and the F-test of the overall model is highly significant at $p < .001$. The null hypothesis is rejected. The alternative hypothesis stands.

The result lines up with a substantial body of earlier work linking governance practices to performance across various sectors. Tjahjadi, Soewarno, and Mustikaningtiyas (2021) reported a positive association between corporate governance and the three components of sustainable performance in manufacturing firms; the present study extends that conclusion to a sector working much closer to biological systems. Wu, Long, Liu, and Long (2025) reported

similar associations in their work on environmental disclosure and performance. Stakeholder theory, anchored by Freeman (1984), provides a coherent explanation for why such associations should be expected.

A more cautious reading of the 27.6 percent figure is also worth offering. The number is substantively meaningful, but it implies that more than 70 percent of the variance in sustainable performance is left unexplained by the three governance dimensions modeled here. Many other factors matter — the maturity of management systems, the resources available to the organization, the regulatory environment, the technical complexity of operations, sector-specific contextual factors. This thesis does not claim to have produced a complete model of sustainable performance. It claims an estimate of the unique contribution of three governance dimensions, in a specific sectoral and national context.

5.1.2 Environmental Commitment and Sustainable Performance

(H1a)

Among the three governance dimensions, environmental commitment came out as the strongest unique predictor of sustainable performance ($\beta = 0.261$, $p = .001$). The result speaks directly to the argument made by Renukappa, Akintoye, Egbu, and Suresh (2017) that leadership and strategic commitment are foundational ingredients of sustainability outcomes. The data support a reading in which commitment is not just one component of governance among several, but the dimension that gives the others their substance.

The mechanism through which commitment likely operates can be described in concrete terms. When senior management treats environmental considerations as integral to the organization's mission, several downstream effects become more likely. Budget requests for environmental initiatives get approved. Performance evaluations of mid-level managers incorporate environmental criteria. Training programs include environmental content.

Environmental concerns get raised in strategic decisions rather than tacked on at the end. The cumulative effect of those small, repeated decisions is what eventually shows up in the sustainable performance scores reported by respondents.

A related observation. Commitment is the most internal of the three governance dimensions; it concerns the organization's own strategic stance more than its relationship with external regulators or stakeholders. The finding that this internal dimension carries the strongest unique effect fits stakeholder theory's emphasis on active organizational commitment to balancing stakeholder claims — not on external pressure alone.

5.1.3 Environmental Monitoring and Sustainable Performance (H1b)

Environmental monitoring and compliance produced the second-strongest unique effect ($\beta = 0.239$, $p = .001$). The result aligns with Earnhart and Leonard's (2016) work on internal compliance auditing and environmental outcomes, and with Bauer and Greiling's (2024) broader argument about environmental management control systems. In both prior studies, monitoring intensity was linked to measurable environmental improvements. The present results extend that pattern to the plant and animal health sector.

A plausible explanation lies in the operational reality of the sector. Plant and animal health organizations deal with biological agents, chemical inputs, and waste streams whose environmental consequences are often invisible until measured. A pesticide residue, an antibiotic load, a biosecurity breach — none of these is self-announcing. They have to be detected through systematic monitoring. Organizations that invest in monitoring are better positioned to spot and correct problems before they accumulate into larger sustainability failures. Cruz (2022) made a similar point in the context of agricultural compliance, arguing that compliance practices work best when they go beyond passive reaction to regulatory requirements and become active diagnostic activities.

Boiral and Henri (2012) provided a useful counterpoint by showing that certified environmental management systems do not, on their own, guarantee performance gains. The implication for the present findings: the monitoring practices captured in the questionnaire here — internal audits, indicator tracking, incident documentation, risk assessment, regulatory updates — function as substantive practices rather than as ceremonial certifications. Future work could fruitfully drill down into which specific monitoring practices contribute most to performance. The aggregate finding, in any case, looks robust.

5.1.4 Environmental Transparency and Sustainable Performance

(H1c)

Environmental transparency and accountability produced the smallest unique effect of the three, though still statistically significant ($\beta = 0.206$, $p = .005$). The dimension also had the lowest mean score ($M \approx 3.29$) and the largest standard deviation, indicating that transparency is where organizations in the sector both perform less well on average and differ most sharply among themselves.

The smaller effect should not be read as a sign that transparency is unimportant. Two interpretations deserve attention. First, in a setting where many organizations have not yet developed full-fledged transparency practices, the variation captured by the questionnaire may reflect early adoption stages more than mature transparency effects. As organizations in the sector develop more robust disclosure and accountability mechanisms, the effect captured in regression analyses may well grow rather than shrink. Second, transparency may operate partly through indirect channels — enhancing reputation, attracting talent, reducing regulatory friction — that the perceptual measures of performance used here do not fully capture. Wu and colleagues (2025) made a related point in their analysis of profitability as a mediator between disclosure and performance.

de Silva, Khatibi, and Azam (2020) and Almaqtari, Farhan, Yahya, Al-Dalaïen, and Shamim (2023) both emphasized that the quality of disclosure matters more than its mere presence. The present questionnaire tried to capture that quality dimension through items about the honesty of disclosure, the existence of stakeholder feedback channels, and the organization's response to environmental criticism. The relatively low mean on this dimension suggests that these quality-oriented aspects of transparency are still developing in the sector — a concrete area for future improvement.

5.1.5 Patterns Across the Three Dimensions

Beyond the dimension-by-dimension reading, the ordering of the three coefficients — commitment first, monitoring second, transparency third — tells its own story. The ordering fits a developmental view of environmental governance: strategic commitment comes first, monitoring systems are then built to operationalize the commitment, and transparency practices follow as the most externally facing layer. This developmental reading is admittedly speculative; the cross-sectional design cannot test temporal sequencing directly. But the logic fits the broader governance literature (Sancha, Wong, and Gimenez, 2022; Hyun and Yu, 2024) and the maturity-stage thinking that informs many practical sustainability frameworks.

Equally important is what the data do not show. The three dimensions did not behave as substitutes for one another. None of them rendered the others insignificant, and the inter-correlations among them stayed moderate rather than high. On this point the data agree with the theoretical framing of Chapter Two: commitment, monitoring, and transparency are complementary, not interchangeable.

5.2 Conclusions

The thesis set out to examine the impact of environmental governance practices on sustainable performance in the plant and animal health sector in Saudi Arabia. On the basis of the analysis of 165 valid responses, the following conclusions can be drawn.

1. Environmental governance practices, taken together, have a statistically significant positive effect on sustainable performance in the sector under study. The three dimensions jointly explain about 27.6 percent of the variance in sustainable performance.
2. Each of the three governance dimensions has a statistically significant unique positive effect on sustainable performance, even after controlling for the other two.
3. Commitment carries the strongest unique effect, followed by monitoring, then transparency. The differences are modest, supporting a view of the three as complementary rather than substitutable.
4. Transparency is the weakest dimension in absolute terms (lowest mean) and the most variable across organizations (largest standard deviation). This is the area where the sector has the most room for development.
5. Reliability across all four measurement scales was acceptable (alpha between 0.875 and 0.894), supporting the credibility of the instrument and the substantive conclusions drawn from it.
6. Diagnostic checks (low VIF values, approximately normal residuals, Durbin–Watson within the acceptable range) support the appropriateness of the multiple linear regression model for these data.

5.3 Practical Recommendations

The findings carry implications for several groups of practitioners. Recommendations are organized by audience below.

5.3.1 For Senior Managers in Sector Organizations

- Treat environmental commitment as a strategic investment, not as a compliance overhead. Commitment is the strongest unique driver of sustainable performance in this data, and it is largely under the direct control of top management.
- Match environmental commitments with tangible decisions about resource allocation, performance evaluation, and integration with long-term planning. Verbal commitments without these decisions are unlikely to produce the performance benefits documented here.
- Strengthen monitoring practices beyond producing reports for regulators. The monitoring practices that contribute to performance are those that actively feed back into operational decisions.
- Invest deliberately in environmental transparency. This is the area where sector organizations have the most ground to make up. Improvements in disclosure quality, stakeholder feedback channels, and responsiveness to environmental concerns are likely to yield disproportionate returns given the current low base.

5.3.2 For Regulators and Policy-Makers

- Recognize that compliance audits, while necessary, capture only part of the governance picture. Regulatory frameworks that also incentivize transparency and stakeholder engagement are likely to produce broader sustainability gains.
- Consider creating sector-specific environmental governance frameworks that reflect the biological and ecological sensitivities of plant and animal health. Generic frameworks designed for manufacturing or services may not capture the relevant risks and practices.

- Support capacity-building initiatives that improve disclosure quality and stakeholder engagement practices — the weakest dimensions identified in this sector.

5.3.3 For Training Institutions and Professional Bodies

- Incorporate environmental governance content into professional development programs. The three-dimensional model used here can serve as a structuring framework for such programs.
- Use validated measurement instruments — including the one developed here — to help organizations conduct self-assessments and benchmark their progress over time.

5.4 Theoretical Contributions

The thesis makes three theoretical contributions to the literature on environmental governance and sustainable performance.

First, it extends the empirical reach of the three-dimensional governance model into a sector — plant and animal health — that has been comparatively understudied. This produces a point of comparison with results from manufacturing (Tjahjadi et al., 2021) and other settings, and contributes to the cumulative evidence base on the governance–performance relationship.

Second, it brings stakeholder theory (Freeman, 1984) into a context where the range of stakeholders is unusually wide and where the natural environment's status as a silent stakeholder is particularly visible. The results fit a stakeholder reading in which commitment, monitoring, and transparency are complementary mechanisms through which the organization responds to its stakeholder web.

Third, the thesis contributes a measurement instrument that, while drawing on prior literature, has been adapted and validated in a specific sectoral and national context. The

instrument is available for reuse or refinement in adjacent sectors and contexts, supporting the cumulative growth of evidence in this area.

5.5 Limitations of the Study

Honest acknowledgment of limitations is part of good research practice. Four limitations deserve explicit attention.

First, the cross-sectional design means that causal inferences must be drawn with caution. The results show that governance dimensions and sustainable performance are associated. Establishing temporal precedence and ruling out reverse causation would require longitudinal data — beyond the scope of this thesis.

Second, the use of self-reported perceptual measures introduces the possibility of common method variance and social desirability bias. Respondents who view their organizations favourably overall may rate both governance and performance higher, inflating the observed correlations. Procedural remedies were applied (anonymity, varied item formats, clear instructions), but the bias cannot be ruled out entirely.

Third, the convenience sampling approach, although necessary given the specialized population, limits the extent to which results can be generalized to the entire sector. The achieved sample is reasonably diverse across organizational types and regions, but it is not a probability sample and may not represent the sector with full statistical accuracy.

Fourth, the conceptual model is parsimonious by design. It does not include moderator variables (such as organizational size or maturity), mediator variables (such as employee engagement or innovation capacity), or control variables (such as regulatory pressure). Keeping the model lean was deliberate, but it means that some interesting questions about how and when governance affects performance remain for future research.

5.6 Directions for Future Research

The findings open several productive directions for future research. Six deserve particular attention.

1. Longitudinal studies that follow organizations over time would help establish temporal precedence and illuminate how governance dimensions develop in relation to each other. Are commitment, monitoring, and transparency adopted in sequence, or do they develop in parallel under different conditions?
2. Mixed-methods studies combining the present quantitative findings with in-depth qualitative work could enrich our understanding of how governance practices unfold in specific organizations. Survey responses tell us about averages; case studies and interviews can tell us about mechanisms.
3. Cross-sector comparative studies applying the same framework to plant and animal health, agriculture, food processing, and pharmaceutical manufacturing would help identify which findings are sector-specific and which generalize across biologically sensitive industries.
4. Studies that introduce mediator and moderator variables would deepen the model's explanatory power. Plausible mediators include green innovation (Naeem et al., 2024) and employee engagement; plausible moderators include organizational size, public vs. private ownership (Ara, 2025), and the maturity of regulatory regimes.
5. Future work could examine the asymmetric effects of governance dimensions, exploring whether the governance–performance relationship is non-linear or contingent on threshold effects. The current study assumes linearity; reality may be more nuanced.

6. Comparative regional studies examining governance–performance relationships in other Gulf and Arab countries would help establish how robust the present findings are to institutional variations within the broader region. Yousef and Al-Fatlawy (2024) and Soussi, Bouri, and Belhaj (2025) offer useful starting points for such comparative work.

The plant and animal health sector sits at a critical intersection of human, biological, and ecological systems. Better governance in this sector is not just a matter of better corporate reporting. It has direct consequences for ecosystem balance, food safety, and the well-being of communities. This thesis has offered a careful, evidence-based contribution to understanding how governance practices in this sector relate to sustainability outcomes. Much remains to be done, and the directions outlined above are offered as starting points for the next stage of inquiry.

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Appendices

Appendix A: Questionnaire Instrument

Cover Letter

Dear colleague,

Thank you for considering participation in this academic research study, conducted as part of an MBA thesis at Mediocean University. The study examines the relationship between environmental governance practices and sustainable performance in organizations operating within the plant and animal health sector.

Your participation is entirely voluntary, and your responses will be kept strictly confidential. No personally identifying information will be collected, and results will be reported only in aggregate form. The questionnaire takes about 10–15 minutes to complete.

Your insights are valuable, and the researcher is grateful for your time.

Section A: Demographic and Organizational Information

Please tick the option that best describes you and your organization.

Demographic and Organizational Questions

No.	Question	Response Options
Q1	Gender	Male / Female
Q2	Age Group	25–34 / 35–44 / 45–54 / 55+

No.	Question	Response Options
Q3	Educational Qualification	Diploma / Bachelor / Master / PhD
Q4	Years of Experience in the Sector	< 5 / 5–10 / 11–15 / 16–20 / > 20
Q5	Current Position	Specialist / Senior Specialist / Section Head / Department Manager / Director
Q6	Type of Organization	Government Agency / Semi- Government / Private Sector / Research Center
Q7	Geographic Region (KSA)	Riyadh / Makkah / Eastern / Madinah / Asir / Qassim / Other

Section B: Likert-Scale Items

Please indicate the extent to which you agree or disagree with each statement, using the following five-point scale:

1 = Strongly Disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly Agree

B.1 Environmental Commitment (EC)

Code	Statement	Scale
EC1	Our organization has a clearly documented environmental policy aligned with national sustainability strategies.	1 2 3 4 5
EC2	Top management actively communicates environmental	1 2 3 4 5

Code	Statement	Scale
	priorities throughout the organization.	
EC3	Adequate budget and human resources are allocated to environmental initiatives.	1 2 3 4 5
EC4	Environmental considerations are integrated into the organization's long-term strategic planning.	1 2 3 4 5
EC5	Our organization sets measurable environmental performance targets and reviews them periodically.	1 2 3 4 5

B.2 Environmental Monitoring and Compliance (EM)

Code	Statement	Scale
EM1	Environmental compliance is regularly audited through internal and external mechanisms.	1 2 3 4 5
EM2	The organization tracks key environmental indicators (emissions, waste, water use) on a routine basis.	1 2 3 4 5
EM3	Non-compliance incidents are documented, investigated, and corrective actions are enforced.	1 2 3 4 5
EM4	Environmental risk assessments are conducted before initiating major operations or projects.	1 2 3 4 5

Code	Statement	Scale
EM5	Regulatory updates are systematically monitored and translated into internal procedures.	1 2 3 4 5

B.3 Environmental Transparency and Accountability (ET)

Code	Statement	Scale
ET1	The organization publishes periodic environmental reports accessible to stakeholders.	1 2 3 4 5
ET2	Environmental performance data is disclosed honestly even when results are unfavorable.	1 2 3 4 5
ET3	Stakeholders (community, regulators, employees) have channels to raise environmental concerns.	1 2 3 4 5
ET4	Roles and responsibilities for environmental outcomes are clearly assigned and accountable.	1 2 3 4 5
ET5	The organization responds publicly and constructively to environmental criticism.	1 2 3 4 5

B.4 Sustainable Performance (SP)

Code	Statement	Scale
SP1	Environmental practices have contributed to reducing operational costs over time.	1 2 3 4 5
SP2	The organization has measurably reduced its negative environmental impact (emissions, waste, resource use).	1 2 3 4 5
SP3	Employee well-being and community relations have improved due to sustainability practices.	1 2 3 4 5
SP4	Sustainability efforts have enhanced the organization's reputation and stakeholder trust.	1 2 3 4 5
SP5	The organization is better positioned for long-term resilience because of its environmental practices.	1 2 3 4 5

End of Questionnaire — Thank you for your participation.