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**MSR7003R THESIS (WRITTEN RESEARCH WORK)**

# TITLE: EVALUATING SUSTAINABILITY LITERACY AMONG UNIVERSITY STUDENTS AND ITS INFLUENCE ON FUTURE MANAGERIAL COMPETENCE: A STUDY OF FUTURE BUSINESS LEADERS IN UK UNIVERSITIES.

**BY**

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**SEPTEMBER 2026**

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Finally, I dedicate this work to all stakeholders in sustainability teaching and learning in higher education institutions. May it serve as a springboard for improving sustainability literacy for the future.

# ABSTRACT

This study evaluates sustainability literacy among business and management students in UK Universities and investigates its influence on their perceived future managerial competence. Employing a positivist, deductive, cross-sectional survey design with a stratified sample of 98 students, the research measures sustainability literacy using validated instruments aligned with TASK™ and Sulitest®, alongside scales assessing managerial competence. Findings reveal high overall sustainability literacy, particularly in definitional knowledge, though applied managerial scenarios show relative weakness. Perceived managerial competence is also high, with literacy strongly predicting competence ($R^2 = .796$). Curriculum exposure significantly enhances both literacy and competence, while level of study and work experience do not moderate this relationship. The study highlights the transformative potential of embedding sustainability in business education and recommends increased practical learning and industry engagement to bridge gaps in applied competence. These insights contribute empirical evidence to inform curriculum development aimed at fostering sustainability-literate and competent future business leaders.

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**EVALUATING SUSTAINABILITY LITERACY AMONG UNIVERSITY STUDENTS AND ITS INFLUENCE ON FUTURE MANAGERIAL COMPETENCE: A STUDY OF FUTURE BUSINESS LEADERS IN UK UNIVERSITIES**.

**CHAPTER ONE**

# 1.0 INTRODUCTION

## 1.1 Background

Adopted by all United Nations Member States in 2015, the 2030 Agenda for Sustainable Development sets out a shared framework aimed at advancing peace and prosperity for people and the planet, both now and in the future. The main thrust of this agenda are the 17 Sustainable Development Goals (SDGs), which call on developed and developing countries to take urgent action through global partnership and collaboration. These goals recognize that ending poverty and other forms of deprivation must be pursued alongside efforts to improve health and education, reduce inequality, and promote economic growth (UNDESA, 2025). It becomes clear that these goals are achievable only if every facet of human endeavor is driven by them.




Figure 1.1: United Nations Sustainable Development Goals (Source: United Nations, 2025)

These Goals represent a global action plan to end poverty, protect the planet and ensure that by the 2030 timeline, the people of the world enjoy peace and prosperity. The 17 SDGs are integrated and tethered to one another. They recognize that success in achieving plans and programmes in one goal area will have an effect on the others, and that development must ensure balance of economic, social and environmental sustainability (UNDP, 2026). The short titles of the 17 SDGs are:

1. No poverty
2. Zero hunger
3. Good health and well-being
4. Quality education
5. Gender equality

6. Clean water and sanitation
7. Affordable and clean energy
8. Decent work and economic growth
9. Industry, innovation and infrastructure
10. Reduced inequalities
11. Sustainable cities and communities
12. Responsible consumption and production
13. Climate action
14. Life below water
15. Life on land
16. Peace, justice, and strong institutions
17. Partnerships for the goals

A cursory look at these goals shows that every facet of human endeavor is impacted by some particular goals or an interaction of various goals. This therefore cements the importance of an understanding of the time bound objectives of each goal by Nation states, multinational organisations, educational institutions, small businesses and individuals.

Sustainability is a broad concept that has very varying connotations and is understood in different ways across cultures and disciplines (Kates, Parris and Leiserowitz, (2005)). Sezen and Çankaya (2013) defined sustainability as "the use of resources to meet the needs of the present without compromising the ability of the future generation to meet their own needs". Also, the report "Our Common Future" published by the World Commission on Environment and Development in 1987, defined the concept of sustainable development as

"…development that meets the needs of the present without compromising the ability of future generations to meet their own needs…" (WCED, 1987). Most of the international community assumed the statement as the new paradigm for development.

These definitions encompass the basic principles of sustainability as a model that ensures the protection of the future. The social, economic, and environmental challenges facing humanity are global in scope (Steffen, et al. (2007)), as a result, environmental issues such as Climate change, biodiversity loss, and water scarcity threaten the sustainability and future of both human and natural systems.

To surmount these challenges, society must develop an understanding of these phenomena and how they affect or are impacted by consumer choices. Sustainability Literacy helps in the development of this understanding and the knowledge of the roles to be played by various individuals and organisations within the broader system of social and economic production.

In the world today, the push towards and practice of sustainability has transformed the business environment. This transformation has placed enormous expectations on organisations and consequently on the managers who run these organisations. Contemporary issues such as climate change, social inequality, resource scarcity and various regulatory frameworks have made it mandatory for business leaders and practitioners to build capacity to tackle these issues. Business leaders must therefore, in the face of the changing business landscape, possess not only traditional managerial skills, but also the capacity to incorporate sustainability principles and plans into strategic decision making (Bansal and Song, 2017).

The skills needed for future managers have grown to incorporate systems thinking, ethical reasoning, long-term planning, and stakeholder involvement as companies embrace Environmental, Social, and Governance (ESG) frameworks more frequently (Wiek, Withycombe and Redman, 2011). The information, abilities, and attitudes that empower people to take actions that promote sustainable development are what academics refer to as

sustainability literacy, which serves as the foundation for these competences (Jones, Ludi and Levine, 2010).

Higher Education Institutions (HEIs), play a critical role in cultivating sustainability-literate graduates. This very important mandate of universities is given credence by the launch in 2007 of the United Nations Principles for Responsible Management Education (PRME). This project aims at highlighting principles, which are centered on protecting the environment and serving society, to increase awareness of sustainability in business and management education (UN-PRME, 2007). The goal of PRME is to enhance sustainable development by transforming management education and producing tomorrow's responsible decision-makers. More than 800 universities with a focus on business and management from more than 90 countries are Signatory Members of the initiative. In addition to collaborating with UN Global Compact members to promote the Sustainable Development Goals in academia, PRME Signatory Members link ethical companies with universities to attract individuals with sustainable perspectives, competencies, and abilities (UN Global Compact, 2025).

The United Kingdom is a global leader in business and management education with over 300 Higher Education Institutions offering courses in business and management. This therefore means that most of the future business leaders and managers would have or are presently getting a UK education. In the United Kingdom today Education for Sustainable Development (ESD), has become a significant feature in the Higher Education environment. Universities and other HEIs try to embed sustainability education, knowledge and practices in the development of their curricular. However, Winter and Cotton (2012) notes that, “despite strong political support for the development of sustainability literacy amongst the UK graduates, embedding sustainability in the higher education curriculum has met with widespread indifference, and in some cases, active resistance”. Beyond the formal curriculum, additional opportunities exist to engage students in sustainability learning. This

raises a key question: are UK business and management schools adequately equipping future managers and business leaders with the sustainability literacy needed to address contemporary organisational challenges?

## 1.2 Problem Statement

Over the years, universities and other HEIs have been at the forefront of global innovation, creating and conquering new paradigms and ensuring proper education of future entrepreneurs, professionals and decision makers. However, they have remained too traditional in their delivery of such education. With the growing interest and global concern on issue of sustainability, there remains a gap between the demands placed on organisations by issues of sustainability and the preparedness of future managers to respond effectively and efficiently (Wiek, Withycombe and Redman, 2011).

Business and management graduates occupy roles that shape organisational strategy, resource allocation and control and strategic decision making, therefore, they need to develop the knowledge and skills that they can eventually turn into action. In the UK context, universities increasingly claim commitment to sustainability through initiatives such as the Education for Sustainable Development (ESD) guidance issued by Advance HE (Advance HE/QAA, 2021), However, empirical evidence indicates that the integration of sustainability within Business and Management curricula remains inconsistent, fragmented, or overly theoretical (Ralph and Stubbs, 2014).

Therefore, the problem this study addresses is the lack of systematic understanding of the level of sustainability literacy among Business and Management students in UK universities and how this literacy shapes their readiness to act as competent, sustainability-oriented future managers. Without such evidence, universities may struggle to design effective ESD interventions, and employers may continue to face a skills deficit in sustainability-competent graduates.

## 1.3 Research Aim and Objectives

The Aim of this study is to evaluate sustainability literacy among business and management students in UK universities and examine its impact on their perceived future managerial competence. However, as Sustainability literacy in relation to perceived managerial competence is a broad research area that encompasses different elements, the study will have the following objectives;

a. To measure sustainability literacy levels among undergraduate and postgraduate business and management students.
b. To assess students' perceived managerial competence in sustainability-related decision-making.
c. To analyze the relationship between sustainability literacy and perceived managerial competence.
d. To examine demographic and academic factors influencing sustainability literacy.
e. To provide recommendations for integrating sustainability literacy into business and management curricula.

## 1.4 Research Questions

**RQ1**. What is the current level of sustainability literacy among business students in UK universities?

**RQ2**. How do students perceive their managerial competence in sustainability-related contexts?

**RQ3.** Does sustainability literacy significantly predict perceived managerial competence?

**RQ4**. What demographic or academic factors influence sustainability literacy levels?

**RQ5**. How can business schools enhance sustainability literacy to improve managerial competence?

## 1.5 Significance of the Study

This study is significant because it provides an understanding of the interaction between higher education, sustainability and managerial capability. Practically, the study will help UK universities identify gaps in sustainability education with regards to business and management and support curriculum developers in embedding sustainability competences. Theoretically, it provides empirical evidence linking sustainability literacy to managerial competence and extends relevant theories into sustainability education.

Finally, this study contributes to the societal achievement of global sustainable development goals. It contributes to the development of knowledgeable and skilled future business leaders, while emphasizing education for sustainable development in the United Kingdom.

## 1.6 Scope of the Study

This study focuses on assessing the level of sustainability literacy among **Business and Management students enrolled in UK universities** and examining how this literacy influences their perceived future managerial competence. The scope is deliberately defined to ensure conceptual clarity, methodological feasibility, and alignment with the study's objectives. The research is limited to Undergraduate and Postgraduate students studying business-related programmes (Business administration, international business, management, accounting, marketing, finance, etc.). This is because their graduates are most likely to enter managerial or decision-making roles where sustainability competencies are increasingly essential. The study also limits its analysis to sustainability literacy and perceived managerial competence measured through validated scales.

## 1.7 Thesis Outline

Chapter One provides the background and context of the study, outlines the research problem, and presents the aim, objectives, and research questions. It also explains the significance, scope, and structure of the thesis. The chapter establishes the rationale for investigating sustainability literacy among Business and Management students in UK universities. Chapter Two critically examines existing scholarship on sustainability literacy, Education for Sustainable Development (ESD), and managerial competence. It explores conceptual definitions, theoretical frameworks, and empirical findings relevant to the study. The chapter also identifies gaps in literature and develops the conceptual model that underpins the research. Chapter Three outlines the research design, philosophical assumptions, and methodological choices guiding the study. It describes the population, sampling strategy, data collection instrument, and procedures used to assess sustainability literacy and perceived managerial competence. The chapter also discusses validity, reliability, ethical considerations, and the analytical techniques employed. Chapter Four presents the results of the empirical investigation, using descriptive and inferential analysis to address the research questions. It also discusses the results and analyses what they mean in the wider context of sustainability literacy and considers the extent to which the results are reliable and valid. Finally, Chapter Five summarizes the key findings and their implications. It presents recommendations for universities, policymakers, and future researchers.

CHAPTER TWO

# 2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORKS

## 2.1 Introduction

This chapter critically examines the existing scholarship on sustainability literacy, Education for Sustainable Development (ESD), and managerial competence, situating the study at the intersection of three constructs that are rarely brought into sustained dialogue with one another: higher education and curriculum studies, sustainability science and literacy, and organisational and managerial competence research. Rather than offering a purely descriptive survey of prior work, the chapter adopts a critical orientation throughout, interrogating the conceptual ambiguity that continues to surround the notion of sustainability literacy itself, evaluating the methodological strengths and limitations of the instruments used to assess it, and scrutinizing the theoretical assumptions that underpin claims about its relationship to managerial competence.

The chapter proceeds in five principal movements. It begins by conceptualizing sustainability literacy and mapping its constituent components, noting how definitions offered by different scholars diverge in scope and emphasis. It then situates sustainability literacy within the broader institutional project of Education for Sustainable Development (ESD), before narrowing the focus first to the UK higher education context and then to business and management education specifically, where the literature suggests sustainability continues to occupy a marginal and often siloed curricular position. The chapter subsequently reviews the principal instruments used to assess sustainability literacy empirically, justifying the study's

adoption of the Sulitest®/TASK™ framework while acknowledging its practical limitations. It then turns to the concept of managerial competence, tracing its evolution from generic behavioural models to sustainability-specific competence frameworks, and critically examines the barriers that constrain higher education's capacity to develop sustainability-competent managers. Finally, the chapter develops the theoretical framework underpinning the study, drawing on four complementary but individually contested theories, before synthesizing them into a single conceptual model and deriving the study's three research hypotheses.

A recurring critical thread running through the chapter is the observation that, despite the proliferation of research on sustainability literacy and, separately, on managerial competence, remarkably few studies have sought to empirically connect the two constructs within a single explanatory model, and fewer still have done so among business and management students in the UK specifically. Existing UK-based evidence, while valuable, remains largely descriptive or attitudinal in orientation (Akrivou et al., 2025; SOS-UK, 2024), leaving open the empirical question of whether, and to what extent, sustainability literacy predicts students' perceived managerial competence. It is this gap that the theoretical and conceptual architecture developed in this chapter is designed to address, and which the empirical chapters that follow are designed to test.

## 2.2 Conceptualizing Sustainability Literacy

Sustainability literacy has emerged as a central construct in sustainability education, reflecting the knowledge, skills, and values required to contribute to sustainable development. The term gained prominence following the Brundtland Report (World Commission on Environment and Development, 1987), which defined sustainable development as meeting present needs without compromising future generations. Over the years, various scholars and researchers have continued to engage with this construct. Ling, S. *et al.* (2021) note that "the

definition of sustainability literacy remains nebulous, perhaps because of the breadth of the term 'sustainability'", however sustainability literacy can be defined as possessing the 'skills, attitudes, competences, dispositions and values' required to implement a sustainable world. Parkin et al.'s (2004) narrower view characterizes sustainability literacy as the 'knowledge, skills and understanding required to fashion a more sustainable future'.

Dawe, Jucker and Martin (2005) describe sustainability literacy as the ability to "read the world" through a sustainability lens, integrating ecological, social and economic perspectives, this means that a sustainability literate individual should understand the impact of actions and decisions on the environment, society and economy. Sustainability Literacy also indicates possessing the skills, competences, attitudes, dispositions and values that are necessary for surviving in the deteriorating conditions of the world in ways that impede this deterioration (Stibbe, 2009). Some scholars have also used Sustainability Knowledge in referring to Sustainability literacy, Kuehl, C. *et al.* (2023), defines sustainability knowledge as an understanding of the three core domains of sustainability i.e. environment, society and economy. Sustainability literacy encompasses the ability to recognize, replicate and reward actions and decisions that favour sustainable development (Akeel, Bell and Mitchell, 2019). Sustainability literacy requires an understanding of global issues such as peace, poverty, migration, globalization and climate change, as well as the events and institutions that shape them. Its knowledge base includes social, environmental and economic dimensions of sustainability (Chen, C. *et al.*, 2022). To prepare higher education students for an uncertain future, curricula should incorporate relevant knowledge of sustainability issues, principles and components of sustainable development.

### 2.2.1 Components of Sustainability Literacy

Sustainability literacy has emerged as a key construct for evaluating the preparedness of individuals to engage with sustainability challenges. Most definitions and research into

sustainability and sustainability literacy have consistently held that the major components of sustainability literacy are; Knowledge, skills, values, attitudes and behaviour. The United Nations Scientific and Cultural Organization (UNESCO) in framing its policies for Education for Sustainable development (ESD), also clearly states that education plays a vital role in equipping people with the vital skills, knowledge, values and attitudes that enables them to live in a way that is good for the environment, society and economy. Such education encourages people to make responsible and smart choices that create a better future for the world.

Wiek et al. (2011) in a systematic review of competences in sustainability for academic program development, takes a different dimension by positing that sustainability knowledge can be developed by gaining different competences (skills, knowledge and attitudes that enable task performance and problem solving), viz;

- Systems Thinking competence- The ability to collectively analyze complex systems across different domains (environment, economy, society) and across different scales (global, local) and consider their trickle-down effects in relation to sustainability and sustainability issues.
- Anticipatory competence- Ability to critically analyze future related sustainability issues and craft problem-solving interventions.
- Normative competence- The ability to collectively map, reconcile, apply and negotiate sustainability values, principles, goals and targets.
- Strategic competence- The ability to design and implement interventions, transitions and transformative strategies geared towards sustainability.
- Interpersonal competence- This is the ability to motivate, enable and facilitate collaborative and participatory sustainability problem-solving.

Fanea-Ivanovici and Baber (2022) in a survey of 422 students from different universities in India, determined that exposure to knowledge on environmental sustainability, campus sustainability and the integration of sustainability into academic curricula are factors that shape the attitudes of students towards sustainability. Recent scholarship has expanded the concept further. For example, Akrivou et al. (2025) argue that sustainability literacy must incorporate values-based and experiential dimensions, noting that students' motivation to engage with sustainability is shaped not only by knowledge but by personal meaning, identity, and perceived relevance. Their study of UK Business and Management students found that sustainability literacy is strongly influenced by the extent to which curricula integrate sustainability in authentic, practice-oriented ways.

## 2.3 Education for Sustainable Development (ESD) in Higher education

Internationally, Education for Sustainable Development (ESD) is the main building block for unlocking the United Nations vision towards attaining the United Nations Sustainable Development Goals (UN-SDGs), especially Goal 4 targeting Quality Education (UNESCO, 2020). ESD requires the holistic integration of sustainability into teaching, learning and educational practices within Higher Education Institutions (HEIs). Since sustainability literacy is the possession of skills, knowledge and attitudes that address sustainability issues, ESD provides the framework for the acquisition of those skills and knowledge (Ncube, Yeboah and Pandey, 2025).

ESD is the multidisciplinary approach to education that addresses the integrated social, economic, and environmental aspects of both official and informal curricula. ESD is a teaching and learning strategy that can help staff support graduates who want to follow a job that reflects their values and acquire the information, skills, and experience necessary to contribute to an ethical and environmentally conscious society (Advance HE/QAA, 2021).

Sustainability in Universities encompasses environmental social and economic dimensions often referred to as the Triple Bottom Line. A sustainability policy in any HEI should aim to integrate these paradigms into university's curriculum, operations and community engagement.

Sterling and Scott (2008) in their critical commentary on Higher education and ESD in England, note that there are four thrusts of Education for Sustainable Development (ESD) which are; 'Improving access to quality basic education, reorienting existing education to address sustainability, developing public understanding and awareness, providing training programs for all sectors of private, governmental, and civil society'. Universities are a microcosm of society; therefore, they provide a template for raising sustainability literate individuals who would subsequently mirror such unto society and business. Also, SDGs and HEIs have an impact on one another. HEIs help in nurturing future SDG advocates, incorporate SDGs into operations, governance, and culture, and provide knowledge, ideas, and solutions for SDG implementation. Simultaneously, the SDGs define responsible university practices, encourage cooperation with a variety of partners to achieve the goals, and generate demand for SDG-focused education in HEIs (Ankareddy, *et al.* 2025).

Scherak and Rieckmann (2020) in a study of ESD competences in German Higher Education, noted that, 'there is a clear link between the principles of Sustainable Education and the achievement of the United Nations Decade of Action (2011-2020)'. They stress the importance of young people in the sustainability process. In their overview of ESD, they state that the concept of ESD involves a combination of environmental education, development education, political education and peace education all interwoven into traditional approaches to education, to guide students towards developing certain attitudes and competences geared towards problem solving.

### 2.3.1 Sustainability and Sustainability Literacy in UK Higher Education Context.

According to the Higher Education Statistics Agency (HESA, 2026), more than 2.8 million undergraduate students and over 796,000 postgraduate students were enrolled in higher education in the United Kingdom during the 2024/2025 academic year. These figures indicate strong demand for UK higher education, driven by factors such as flexible modes of delivery, world-class teaching and research, a broad mix of full-time and part-time courses, and a diverse international student population.

The growing number of students in higher education in the UK places the sector as a very important component of the UK economy. Therefore, it is safe to say that HEIs in the UK play a very crucial role in promoting sustainability. They do this through research, innovation, community engagement, climate change advocacy and sustainability programmes and processes on their campuses, all geared towards the achievement of the Sustainable Development Goals (SDGs). In a study of ESD in UK Higher Education Institutions, Fiselier, Longhurst and Gough (2018), noted that the HE sectors in the UK have become increasingly competitive. Therefore, HEIs have continued to focus on maximizing their ability to recruit prospective students and staff by marketing themselves and highlighting characteristic features of which sustainability has become one of these expectations.

Also, a 2024 review of the UK Higher Education Sector by Students Organising for Sustainability (SOS-UK, 2024), sheds light on the current state of experiences of students with regards to teaching and learning on sustainable development. The survey which aimed to access the attitudes of students to sustainable development, student's aspiration towards learning about sustainability and their aspirations for sustainability in employment after their time in education, noted that 88% of students agree that their place of study should incorporate and promote sustainability, 81% would like to see sustainable development

incorporated within their curricula. Also, 65% of the students surveyed believed sustainability and sustainable development is something they would like to learn about. This therefore suggests the need for improved integration of sustainability and sustainable development principles into curriculum, which would in turn ensure that graduates of HEIs in the UK context become more sustainability literate.

### 2.3.2 Sustainability and Sustainability Literacy in Business and Management Education

There has been substantial increase in interest in sustainability in management, business and organisational studies in the last few years. Cullen, J.G. (2017), in a bibliometric review of research needs in relation to educating business students about sustainability, notes that, management and business education practitioners play an important role in "developing globally minded, responsible managers and business leaders". Sustainability in early years was a major concern in areas and courses of study such as sociology, geography, environmental studies and development studies. However, interest recently has been placed in the areas of business, management, leadership and organisational studies, stemming from the plethora of environmental, social and economic crises bedeviling the world (Currie, Knights and Starkey, 2010).

The Principles of Responsible Management Education (PRME) launched in 2007 by the United Nations, brings to the fore the need for the integration of sustainability ethics and social responsibility into management and business education. The PRME as an initiative helps to foster the development and exchange of knowledge within business schools, while developing innovative tools and opportunities that will improve learning and teaching in business and management education. To achieve this laudable objective, the PRME framework tracks and monitors the implementation of the seven (7) principles of PRME viz;

Purpose, Values, Teaching, Research, Partnership, Practice and Sharing within the United Nations and Management-related Higher Education Institutions.

As sustainability shapes the future of business, educational institutions need to rejig their approaches, this is to ensure that students, especially in the field of business and management, need to understand and value the principles of sustainability and their impact on the global economy. Akrivou, K. *et al.* (2025) in a study involving the students of business and management in three (3) UK Universities, notes that by modifying teaching methods to emphasize sustainability, lecturers can furnish students with the practical skills and understanding needed to positively change the global business landscape. Also, teaching methods and pedagogical frameworks should embody systemic thinking across value-chains and cross-cultural management to ensure an all-inclusive learning environment (Janssens, L. *et al.* 2024).

## 2.4 Assessment of Sustainability Literacy

As we have noted in the course of this study, Sustainability literacy connotes an understanding of the connections between economic, social and environmental systems for sustainable development. It is the basic understanding of how human activities impact the society, environment and economy. Sustainability and Sustainability Literacy are broad topics, with researchers focusing on different dimensions. Therefore, it is important to gain an understanding of the various methods, tools and frameworks deployed by researchers to measure or access the level of sustainably literacy as a contemporary concept.

Saama and Laius (2025) in a systematic literature review of sustainability literacy assessment instruments, firstly notes that any tool, test or framework used to assess sustainability literacy must take into cognizance the economic, social and environmental aspects of sustainability, while measuring competences, attitudes and beliefs of the individual which align with the principles of Education for Sustainable Development (ESD). In the study, they reviewed a

total of 28 articles by various authors which defined, measured and categorized the economic, social and environmental components of sustainability literacy.

The study noted that there are various tools that have been deployed in the assessment of sustainability literacy, this is because of the complexity of determining sustainability literacy comprising knowledge, skills, attitudes and values from environmental, social and economic concepts. Some of the studies reviewed use the Sulitest®, which is an already developed and globally popular assessment instrument. Some other recent studies used the Test of Sustainability Knowledge (TASK™) which is a recent version or update of the Sulitest® which is specifically tailored for the measurement or assessment of sustainability knowledge of students in Higher education Institutions. Other studies reviewed developed their own ad-hoc test instruments by way of closed-ended or open-ended questionnaires directed by previous studies or a combination of test frameworks.

### 2.4.1 Sustainability Literacy Test Sulitest® (TASK™)

The Sulitest® is an online multiple-choice test that assesses the minimum level of knowledge in social, economic and environmental responsibility globally. The assessment is developed to be applicable all over the world, in any country, in any type of higher education institution and for students of any level of study (bachelors, Masters, MBA, PHD, etc.). The test was launched in 2016 as an initiative of the United Nations Higher Education Sustainability Initiative (HESI) (UN-DESA, 2026). The Sulitest® is an easy-to-use questionnaire with at least 30 questions displayed randomly from a database (bank) of questions organized into several sustainability subject areas that cover core international modules, plus an additional 20 questions tailored to a specific region or country, and an optional module of 15 questions which are focused on testing the understanding of the 17 SDGs. Over 500 universities located in 57 countries have enlisted to use Sulitest® (Décamps, A. *et al.*, 2017). Sulitest® as an assessment tool is adjudged to be cost effective and allows for flexibility with relation to the

questions, as they can be localized to fit institutions or study populations (Décamps, A. *et al.*, 2017). Presently, over 60 institutions and 80,000 people have been assessed using Sulitest® (Sulitest.org).

The Assessment of Sustainability Knowledge (TASK™) is an updated and advanced version of the Sulitest®. It is an instrument that provides a standardized and research-driven way to measure what students and other learners know about sustainability and how they are prepared for sustainable development. TASK™ was adopted in 2023 as a "psychometrically validated instrument", expanded to cover a larger number of sustainability constructs than the previous Sulitest® and provides a certification on completion of the test (sulitest.org).

A study of 650 students in environmental, engineering and agriculture departments of a Nigerian university, adapted its survey instrument in line with the Sulitest® and TASK™ to test sustainability literacy. The study determined that Nigerian students performed below average on the sustainability literacy tests and recommended targeted education on sustainability issues should be pursued in Nigerian HEIs and periodic assessments should be considered (Aikowe and Mazancova, 2023). Also, Mason, A (2019) in a mixed-method study of 45 students at a Midwestern university in the United States, used the Sulitest® as the basis for the quantitative phase of the study in conjunction with a 14-item scale measuring attitudes and perceptions towards learning and motivation (Mason, A. 2019).

This present study is predicated on the use of the Sulitest® and TASK$^{TM}$ as the basis for the development of study instruments because of its accessibility, cost effectiveness and flexibility (Mason, A. 2019). A potential limitation of the Sulitest® or TASK™ for the purpose of this research is that the complete test consists of 112 questions. This is likely to be an enormous time commitment for anyone who is a participant in the study. However, in addressing this limitation, a customized test instrument in line with the TASK$^{TM}$ and based on previous studies by Aikowe and Mazancova (2023) and Akeel et.al. (2019) is developed.

## 2.5 Managerial Competence in the Context of Sustainability

Managerial competencies are characteristics and attitudes that enable a person to perform his or her job. It is a combination of skills, knowledge and behaviours that enable individuals perform managerial roles effectively (Tyranska, M. 2017). Contemporary research notes that managerial competencies now incorporate leadership, decision making and strategic thinking (MacNeil and Khare, 2025). More recent definitions of managerial competencies in the context of sustainability, increasingly recognize the need for managers to navigate complex, uncertain and ethically complicated environments. This shift in the expectation from present day managers by their organisations is driven by issues such as climate change, regulatory frameworks and pressures, and the need to integrate Economic, Social and Governance (ESG) considerations into the decision-making process.

Redman and Wiek (2021), in a study of competences for advancing sustainability, identify a convergence of eight (8) key competencies in sustainability, which are; futures-thinking, systems-thinking, values-thinking, strategies-thinking, implementation competence, interpersonal competence, intrapersonal competence and integration competence. These competencies enable individual to apply analytical approaches to sustainability issues, forecast and anticipate sustainability problems, access the sustainability of proposed interventions, collaborate with diverse stakeholders and develop workable action plans for implementation (MacNeil and Khare, 2025). These competences clearly align with sustainability frameworks that suggest a convergence between sustainability literacy and managerial capacity development.

### 2.5.1 The Role of Higher Education in Developing Sustainability-Competent Managers

Higher education institutions play a critical role in shaping the competencies, values, and identities of future managers. Business schools have been identified as key sites for cultivating sustainability-oriented managerial capabilities. Historically, business education has been criticized for promoting narrow economic rationalities that prioritize profit maximization, efficiency, and shareholder value (Ghoshal, S. 2005). These paradigms have been linked to managerial behaviours that contribute to environmental degradation, social inequality, and corporate misconduct. In response, scholars have called for a fundamental reorientation of business education towards sustainability, ethics, and social responsibility. Despite these calls, empirical evidence suggests that business schools have been slow to adopt transformative sustainability pedagogies. Akrivou et al. (2025) found that UK Business and Management students often perceive sustainability education as peripheral, theoretical, and insufficiently connected to managerial practice. Students reported that sustainability topics were frequently presented in isolation from core business subjects, limiting their ability to understand sustainability as a strategic and operational imperative.

The literature identifies several barriers to the development of sustainability-competent managers within higher education:

- Epistemological constraints: Business education often privileges quantitative, analytical, and market-oriented knowledge, which may conflict with the holistic, ethical, and systems-based perspectives required for sustainability.
- Curriculum fragmentation: Sustainability content is frequently confined to elective modules or CSR units, rather than embedded across strategy, finance, operations, and leadership curricula.
- Pedagogical limitations: Traditional lecture-based teaching methods may be inadequate for developing complex sustainability competencies, which require experiential, reflective, and interdisciplinary learning.

- Institutional pressures: Business schools face pressures to align curricula with accreditation standards, employer expectations, and market demands, which may prioritize technical skills over sustainability competencies.
- Faculty expertise: Many business academics lack training in sustainability pedagogy, limiting their ability to integrate sustainability meaningfully into their teaching.

Despite these challenges, there is the need for HEIs to pay more attention to Experiential learning approaches such as live sustainability projects, community partnerships, and interdisciplinary collaborations which have been shown to enhance sustainability competencies by fostering critical thinking, collaboration, and real-world application (Brundiers & Wiek, 2017).

Vogel, M. *et al.* (2023) in a recent review of literature on Education for Sustainable Development funded by Advance HE UK, recommends that universities adopt a strategic, whole-institution approach to ESD, moving beyond isolated, bottom-up initiatives. It calls for robust evaluation, competency-based learning outcomes, and transformative pedagogies such as problem-based, interdisciplinary, and experiential learning. It also emphasizes staff development, community partnerships, and clear institutional purpose in embedding sustainability across higher education.

## 2.6 Theoretical Frameworks

### 2.6.1 Introduction

A theoretical framework performs a foundational function in empirical research: it provides the conceptual architecture that shapes the design of a study, it guides the operationalization of variables and supplies the interpretive lens through which findings are understood and contextualized (Saunders, et al, 2019). Without a rigorous theoretical foundation, empirical

findings risk remaining descriptive and disconnected from the broader body of scholarly knowledge within which they should be situated. For this study, which seeks to evaluate the nature and extent of sustainability literacy among business and management students in UK universities, and to examine the relationship between such literacy and students' perceived future managerial competence, a multi-theoretical approach is both methodologically appropriate and intellectually necessary.

The crux and subject matter of this investigation navigate the intersection of three scholarly domains: higher education and curriculum studies, sustainability literacy and science, and organisational and managerial competence. No single theoretical tradition adequately encompasses all three dimensions. Accordingly, this framework draws on four interrelated bodies of theory, each of which illuminates a distinct dimension of the study's conceptual model. Competence-Based Theory (CBT) provides the framework for understanding and measuring managerial competence as a multidimensional, performance-oriented construct. Transformative Learning Theory (TLT) explains the pedagogical and teaching processes through which sustainability education can reshape students' values, professional identities, and capability orientations. Human Capital Theory (HCT) situates sustainability literacy within a socioeconomic framework of educational investment and professional returns. The Triple Bottom Line (TBL) framework defines the content architecture of sustainability itself, establishing the economic, social, and environmental dimensions across which literacy and competence are assessed.

Each theory is examined below in terms of its intellectual origins, core propositions, relationship to the study's variables, and the scholarly critiques that have been advanced against it. The section concludes with a theoretical synthesis that integrates all four frameworks into a coherent conceptual model, from which three overarching, all-encompassing hypotheses are formally derived. These hypotheses are structured to capture the full range of theoretically

significant relationships examined in this study, and each is directly testable using the quantitative data generated by the research instrument.

### 2.6.2 Competence -Based Theory

Competence-Based Theory (CBT) has its intellectual roots in the influential work of McClelland (1973), who challenged the prevailing reliance on intelligence tests as predictors of professional performance, arguing instead that job-relevant competencies — comprising knowledge, skills, motives, and behavioural dispositions — were more accurate and equitable predictors of effective performance. This foundational insight was systematised by Boyatzis (1982), who defined competence as 'an underlying characteristic of a person that results in effective or superior performance in a job', and who developed the first empirically grounded competency model for managerial roles. Spencer and Spencer (1993) subsequently distinguished between threshold competencies — those required for minimally adequate performance — and differentiating competencies that distinguish superior from average performers, a distinction particularly relevant to the study's interest in sustainability-oriented managerial excellence.

CBT is centrally applicable to this study through its conceptualisation of managerial competence as a multidimensional construct encompassing discrete, measurable capabilities. The study operationalizes perceived managerial competence across three theoretically distinct dimensions: decision-making competence, leadership competence, and strategic competence. These dimensions correspond closely to the sustainability competence framework developed by Wiek, Withycombe and Redman (2011), who identified systems thinking, anticipatory, normative, strategic, and interpersonal competences as foundational for addressing sustainability challenges in professional contexts. More recently, Redman and Wiek (2021) expanded this framework to eight convergent competencies, adding futures-thinking, values-

thinking, implementation competence, intrapersonal competence, and integration competence, arguing that these are required to advance meaningful sustainability transitions within organisations. MacNeil and Khare (2025) have further argued that contemporary sustainability leadership demands dynamic, context-sensitive competencies that integrate ethical reasoning, stakeholder sensitivity, and long-term systems thinking — precisely the competence dimensions measured in this study.

Critically for this study, CBT predicts that domain-specific literacy — the acquisition of knowledge, attitudes, and applied skills within a defined domain — constitutes a foundational condition for the development of domain-specific competence. Applied here, this proposition yields the study's first and most central hypothesis: that sustainability literacy, as a composite of knowledge, attitudes, behaviours, and applied competences across economic, social, and environmental dimensions, will be a significant positive predictor of perceived managerial competence in sustainability-oriented roles. CBT also generates expectations about the internal structure of this relationship — specifically, that sustainability literacy should predict each dimension of managerial competence (decision-making, leadership, and strategic competence) independently, a proposition testable through dimension-level regression analysis.

CBT has been criticized on several grounds. Cheetham and Chivers (1996) argued that the framework's emphasis on discrete, observable behaviours is reductionist, failing to capture the holistic, reflective, and adaptive capacities that characterize genuinely effective professional performance. They clearly note that ‘competence is judged squarely on performance within the job role, rather than on academic attainment or on the basis of training inputs received. This critique has force in the sustainability domain, where competencies are frequently contextually contingent, ethically complex, and resistant to standardised measurement (Akrivou et al., 2025). The present study addresses this limitation through its broad, multi-dimensional operationalization of both sustainability literacy and perceived managerial competence,

incorporating attitudinal and behavioural dimensions alongside declarative knowledge. The risk of social desirability bias in self-reported competence measures is also acknowledged, consistent with Tyranska's (2017) caution about the limitations of perceived competence as a proxy for actual managerial capability. Nevertheless, perceived competence remains a well-established and theoretically valid construct, associated with professional self-efficacy and behavioural intention (Redman and Wiek, 2021).

### 2.6.3 Transformative Learning Theory

Transformative Learning Theory (TLT) has its origins from the critical seminal contributions of Mezirow (1978, 1991). It offers a framework for understanding how education produces not merely incremental additions to learners' knowledge base, but qualitative shifts in their frames of reference — the assumptions, beliefs, and meaning structures through which they interpret their experiences and guide their actions. Mezirow (1991) argued that transformative learning occurs when individuals engage in critical reflection on their existing assumptions, encounter disorienting dilemmas that challenge those assumptions, and construct new, more inclusive and integrative meaning perspectives. Cranton (1994) extended this framework by emphasizing the roles of dialogue, relational trust, and social context in facilitating transformative learning experiences, while Taylor (1998) highlighted the affective dimensions of transformation — the role of emotions, intuitions, and personal experience in reshaping worldviews and professional identities.

TLT is indispensable to this study because it theorizes the mechanism through which sustainability education produces the outcomes of interest — enhanced sustainability literacy and greater perceived managerial competence. Sustainability education in its most ambitious form does not merely transmit information about environmental, social, and economic challenges; it seeks to fundamentally reorient students' professional values, ethical

commitments, and capability orientations towards sustainability (Sterling and Scott, 2008). This transformative ambition is captured in the Education for Sustainable Development (ESD) policy framework of Advance HE/QAA (2021), which calls on UK higher education institutions to embed sustainability across curricula in ways that develop not only knowledge but also critical thinking, values, and practical competences.

TLT's direct relevance to this study would be better understood in helping to answer the question, if formal curriculum exposure to sustainability is transformative — if it genuinely challenges students' assumptions and reshapes their professional orientations — then students who have undertaken sustainability-related modules should demonstrate measurably higher levels of sustainability literacy across all its dimensions: knowledge, attitudes, behaviours, and applied competences. Scherak and Rieckmann (2020) found strong empirical support for this proposition in their study of German Higher Education Institutions, where ESD programmes that employed participatory, interdisciplinary, and problem-based approaches produced graduates with significantly stronger sustainability competences than those delivered through conventional lecture-based methods. Akrivou et al. (2025) reported similar findings in the UK context, observing that business and management students who experienced authentically integrated, practice-oriented sustainability curricula demonstrated stronger sustainability identities and greater confidence in applying sustainability principles to managerial practice. Critically, these studies suggest that the transformative impact of sustainability education is not simply a function of content coverage but depends on the pedagogical approach — a nuance acknowledged in the design of this study's second hypothesis.

TLT is not without its critics. Newman (2012) argued that Mezirow's framework is overly individualistic and rationalistic, neglecting the structural, cultural, and institutional constraints that shape learning possibilities. He posits “that we abandon the term transformative learning and just stick to the straightforward term ‘good learning’. In the context of UK business

schools, which serve diverse multinational student populations with varied prior educational experiences and cultural frameworks (Fanea-Ivanovici and Baber, 2022), the transformative potential of sustainability education may be differentially experienced across demographic groups — a possibility examined in this study through the analysis of differences in sustainability literacy across gender, age, and level of study. Furthermore, TLT's emphasis on deep, critical reflection has been critiqued as epistemologically demanding and potentially inaccessible in educational contexts where sustainability is delivered as a peripheral, content-heavy module rather than as an integrated, values-oriented pedagogical commitment (Winter and Cotton, 2012; Ralph and Stubbs, 2014). These critiques do not undermine the relevance of TLT to this study, but they do contextualize the expectation that curriculum exposure alone may not uniformly produce transformative sustainability learning outcomes.

### 2.6.4 Human Capital Theory

Human Capital Theory (HCT) was developed principally by Schultz (1961) and Becker (1964) as an economic framework for understanding education and training as forms of productive investment. Schultz (1961, p. 1) argued that individuals invest in themselves through education, training, and experience, generating stocks of knowledge and capability that function as productive capital in the same way as physical or financial capital. Becker (1964) formalized this proposition, distinguishing between general human capital — knowledge and skills broadly applicable across employers and contexts — and firm-specific human capital, which is valuable primarily within a particular organisational setting. This distinction is theoretically significant for this study: sustainability literacy constitutes a form of specialized general human capital, applicable across a wide range of organisations and managerial roles in the contemporary business environment, where ESG reporting requirements, climate-related disclosure obligations, and stakeholder sustainability expectations are rapidly becoming

institutionalized features of business practice (Bansal and Song, 2017; MacNeil and Khare, 2025; UNDP, 2026).

Asides formal teaching and learning to develop this all-important capital, practical work experience — whether through formal placements, internships, or employment — constitutes a form of on-the-job human capital investment that, according to HCT, reinforces and contextualizes classroom learning, generating additional capability returns that should be reflected in higher perceived managerial competence (Becker, 1964; Schultz, 1961).

HCT also provides the economic logic underpinning students' own perceptions of sustainability literacy as professionally valuable. Evidence from SOS-UK (2024) indicates that around 60% of UK University students wish sustainability to be embedded within their curricula, partly because they perceive sustainability competence as increasingly instrumental to career advancement and professional relevance — a perception entirely consistent with HCT's framing of education as an investment motivated by anticipated professional returns. At the institutional level, the UN Principles for Responsible Management Education (UN-PRME, 2007) operationalize a similar logic, framing sustainability education in business schools as a strategic investment in the human capital of future business leaders.

HCT has attracted significant criticism, particularly from critical management scholars. Ghoshal (2005) argued that business education dominated by economic-rationalist HCT logic has produced managers committed to the narrow pursuit of shareholder value at the expense of social and environmental responsibility. He clearly notes that some ‘bad management theories are destroying good management practice’. If sustainability is treated within business curricula merely as another form of competitive human capital — a tool for career advancement — rather than as an ethical imperative and a systemic necessity, the deep attitudinal and values transformation that effective sustainability management requires may be superficial (Ralph and

Stubbs, 2014). This tension between the instrumental HCT framing and the transformative TLT framing of sustainability education is a productive conceptual one for this study, which measures both the perceived professional utility of sustainability literacy and the attitudinal depth of students' sustainability orientations.

### 2.6.5 Triple Bottom Line Framework

The Triple Bottom Line (TBL) framework, introduced by Elkington (1997), provides the content architecture within which sustainability literacy is understood and operationalized throughout this study. Elkington argued that organisational performance and accountability must be evaluated not solely in financial terms but across three interdependent dimensions: economic (profit), social (people), and environmental (planet). The TBL framework challenged the shareholder-primacy model of business by demonstrating that long-term organisational viability requires simultaneous and balanced management of financial performance, social impacts, and environmental consequences. In doing so, it established the conceptual parameters within which sustainability competence in organisational contexts is now broadly understood: the capacity to analyze, evaluate, and act upon the interrelated economic, social, and environmental dimensions of managerial decisions (Kuehl, Weiss and Huisman, 2023; Dawe, Jucker and Martin, 2005).

The TBL framework is structurally embedded in the research instrument of this study a section of which is adapted from TASK™/Sulitest® knowledge assessment. Items within the instrument assess students' understanding across all three TBL dimensions: environmental sustainability, social responsibility and governance, and integrated sustainable development. This structural alignment between the TBL framework and the research instrument ensures conceptual coherence and supports the content validity of the study's sustainability literacy and managerial competence constructs.

The TBL has been contested on important grounds. Milne and Gray (2013) argued that the TBL 'does not come close to capturing what sustainability actually demands' because it allows organisations to offset poor environmental performance against strong social or economic results without operating within absolute ecological limits. Norman and MacDonald (2004) raised methodological concerns, contending that the TBL's three-pillar structure lacks rigorous and standardised measurement criteria, enabling selective reporting and sustainability 'greenwashing'. These are important critiques, and they are acknowledged in this study, which focuses not on organisational TBL performance but on the extent to which students have developed the knowledge, attitudes, and competences to understand and apply TBL principles in managerial contexts. Despite its limitations, the TBL remains the most widely adopted conceptual framework in sustainability management education and corporate sustainability discourse, and its deployment here is justified by its broad scholarly, policy, and professional legitimacy (Advance HE/QAA, 2021; UNDP, 2026; Vogel, et al., 2023).

### 2.6.6 Theoretical Synthesis and Conceptual Model

The four theoretical frameworks examined above are mutually reinforcing and collectively generate a coherent, internally consistent conceptual model for this study. Each theory addresses a distinct but interrelated dimension of the research problem. The TBL framework defines the content domain of sustainability literacy: the economic, social, and environmental knowledge, attitudes, and competences that business and management students need to acquire. Transformative Learning Theory explains the teaching mechanism through which this literacy is developed in higher education: through critically reflective, values-oriented, and experientially grounded engagement with sustainability content that reshapes professional identities and capability orientations. Competence-Based Theory frames the managerial

outcomes of sustainability literacy: the specific, measurable dimensions of decision-making, leadership, and strategic competence that sustainability-literate graduates are expected to demonstrate in professional roles. Human Capital Theory situates the entire relationship within a socioeconomic framework of investment and returns, explaining both why students invest in sustainability literacy and why that investment is expected to yield enhanced professional capability.

When integrated, these frameworks generate a conceptual model with the following structure: sustainability literacy (comprising knowledge, attitudes, behaviours, and applied competences across TBL dimensions) functions as the primary independent variable, predicting perceived managerial competence (the dependent variable, comprising decision-making, leadership, and strategic dimensions). This core relationship is theorized to be significantly enhanced by formal curriculum exposure to sustainability (the transformative mechanism predicted by TLT) and moderated by level of academic study and professional work experience (the human capital investment variables predicted by HCT). Together, these elements constitute the full explanatory model tested empirically in Chapter Four.

This model makes three overarching theoretical predictions, from which three all-encompassing, testable hypotheses are derived. Each hypothesis is designed to capture a distinct but theoretically grounded layer of the conceptual model: the core literacy–competence relationship ($H_1$), the role of formal sustainability education as the transformative mechanism ($H_2$), and the moderating influence of academic and professional experience on that relationship ($H_3$). Together, these three hypotheses cover the full theoretical scope of the study and are directly testable using the quantitative data generated by the research instrument.

### 2.6.7 Research Hypotheses

Flowing from the theoretical and conceptual frameworks advanced within this study, three hypotheses are advanced below, each derived from the synthesis of theoretical frameworks developed in the preceding sections. Each of the stated hypotheses are grounded in specific theoretical propositions drawn from CBT, TLT, HCT, and the TBL framework. Each hypothesis is all-encompassing in scope, integrating multiple sub-relationships within a single coherent proposition.

**Hypothesis One — Sustainability Literacy as a Predictor of Perceived Managerial Competence**

**$H_1$:** Sustainability literacy (encompassing knowledge, attitudes, behaviours, and applied competences across economic, social, and environmental dimensions) significantly and positively predicts perceived managerial competence (encompassing decision-making, leadership, and strategic competence dimensions) among business and management students in UK universities.

***Theoretical basis:*** *Grounded in Competence-Based Theory (Boyatzis, 1982; Wiek, Withycombe and Redman, 2011; Redman and Wiek, 2021) and Human Capital Theory (Becker, 1964; Schultz, 1961). CBT predicts that domain-specific literacy is an important condition for domain-specific competence; HCT predicts that sustainability literacy constitutes a form of specialized professional capital associated with measurable capability and efficiency returns. This is the study's most central hypothesis.*

**Hypothesis Two — Formal Curriculum Exposure as the Transformative Mechanism**

**$H_2$:** Business and management students who have undertaken formally integrated sustainability-related modules will demonstrate significantly higher sustainability literacy and

perceived managerial competence than those who have not, and curriculum exposure will emerge as a significant independent predictor of both sustainability literacy and perceived managerial competence.

***Theoretical basis:*** *Grounded in Transformative Learning Theory (Mezirow, 1991; Cranton, 1994; Taylor, 1998) and the Education for Sustainable Development (ESD) framework (Sterling and Scott, 2008; Advance HE/QAA, 2021). TLT predicts that structured, curriculum-embedded sustainability education, when delivered through critically reflective and experientially grounded teaching methods, produces qualitative shifts in students' sustainability knowledge, attitudes, and professional capability. ESD scholarship predicts that curriculum integration — as opposed to peripheral sustainability teaching — is the most powerful institutional mechanism for developing sustainability literacy.*

**Hypothesis Three — Academic and Professional Experience as Moderating Variables**

**$H_3$:** Level of academic study (undergraduate versus postgraduate) and professional work experience significantly moderate the sustainability literacy–perceived managerial competence relationship, with postgraduate students and students with work experience demonstrating significantly higher perceived managerial competence than their counterparts, independently of their sustainability literacy scores.

***Theoretical basis:*** *Grounded in Human Capital Theory (Becker, 1964; Schultz, 1961) and supported by the TBL-competence literature (Wiek, Withycombe and Redman, 2011; MacNeil and Khare, 2025). HCT predicts that postgraduate-level study represents a greater cumulative investment in academic human capital than undergraduate study, generating commensurately higher professional capability returns. Similarly, HCT predicts that practical work and placement experience constitutes an additional on-the-job human capital investment that*

*reinforces and contextualizes classroom sustainability learning. Both variables are therefore expected to independently moderate the literacy–competence relationship.*

## 2.7 Gaps in the Literature

Notwithstanding the breadth of scholarship reviewed in the preceding sections, a critical appraisal of the literature reveals several interrelated gaps that collectively justify the present study and shape its design. These gaps are not isolated deficiencies; rather, they converge around the central problem of whether, and through what mechanisms, sustainability literacy translates into managerial competence among business and management students in UK higher education. The principal gaps are identified below.

**Conceptual and measurement inconsistency.** Although there is broad scholarly convergence around the constituent dimensions of sustainability literacy — knowledge, skills, attitudes, values and behaviour (UNESCO, 2020; Wiek, Withycombe and Redman, 2011) — the construct remains, in Ling et al.'s (2021) terms, "nebulous". Definitions diverge markedly in scope, from Parkin et al.'s (2004) narrower emphasis on knowledge and skills to broader accounts that also encompass dispositions and values (Stibbe, 2009; Chen et al., 2022). This definitional plurality is not merely semantic: it carries direct methodological consequences, since the absence of a unified construct undermines the comparability of findings across studies and sustains a proliferation of disparate, ad hoc assessment instruments (Saarna and Laius, 2025). The field, therefore, lacks a consistently operationalized and psychometrically validated measure of sustainability literacy that is simultaneously practicable for large-scale survey administration — a gap this study addresses through its customized, Sulitest®/TASK™-aligned instrument.

**Limited empirical connection between sustainability literacy and managerial competence.** The most consequential gap concerns the empirical relationship between the two constructs at the center of this study. Sustainability literacy and managerial competence have

each been extensively theorized and researched in isolation (Redman and Wiek, 2021; MacNeil and Khare, 2025), yet remarkably few studies have sought to connect them within a single, formally specified explanatory model. Where the two have been brought into dialogue, the evidence has tended to be descriptive or attitudinal rather than hypothesis-driven and inferential (Akrivou et al., 2025; SOS-UK, 2024). Consequently, whether sustainability literacy significantly and positively predicts students' perceived managerial competence remains an open empirical question rather than an established finding — a lacuna that the study's first hypothesis ($H_1$) is designed to address.

**UK business and management education context gap.** A pronounced geographical and disciplinary imbalance characterizes the evidence base. Much of the empirical research cited in support of the literacy–competence relationship originates in non-UK or non-business/management settings, including German higher education (Scherak and Rieckmann, 2020), Indian universities (Fanea-Ivanovici and Baber, 2022), Nigerian institutions (Aikowe and Mazancova, 2023) and the United States (Mason, 2019). UK-specific studies that do exist tend to address sustainability attitudes or curriculum integration rather than the competence outcomes of literacy (Fiselier, Longhurst and Gough, 2018; Akrivou et al., 2025). This is a significant deficiency: UK business schools operate within a distinctive configuration of ESD policy expectations (Advance HE/QAA, 2021), accreditation and employability pressures, and a highly international student population (HESA, 2026), meaning that findings generated elsewhere cannot be assumed to transfer unproblematically. Empirical evidence grounded specifically in UK business and management education is therefore both sparse and urgently needed.

**Curriculum exposure and the transformative mechanism.** The literature is replete with normative arguments that sustainability ought to be embedded across the business curriculum (UN-PRME, 2007; Vogel et al., 2023), yet comparatively little robust empirical evidence

demonstrates that formal, curriculum-integrated sustainability exposure translates into measurably higher sustainability literacy and perceived managerial competence than informal or elective exposure. Although Scherak and Rieckmann (2020) and Akrivou et al. (2025) offer supportive evidence, their findings are largely qualitative or descriptive and do not isolate curriculum exposure as a predictor within a multivariate model. The transformative mechanism posited by Transformative Learning Theory — that structured, critically reflective sustainability pedagogy reshapes professional orientations (Mezirow, 1991; Cranton, 1994) has thus not been adequately tested against the alternative proposition that exposure, in itself, is insufficient where teaching processes remains conventional (Winter and Cotton, 2012; Ralph and Stubbs, 2014). This study addresses the gap through its second hypothesis ($H_2$).

**Moderating role of academic level and professional experience.** Despite the theoretical importance assigned by Human Capital Theory to cumulative educational investment and on-the-job experience (Becker, 1964; Schultz, 1961), the moderating influence of academic level (undergraduate versus postgraduate) and professional work experience on the literacy–competence relationship remains under-examined. Existing studies rarely model these variables as moderators within a single explanatory framework, leaving open the question of whether observed competence differences reflect genuine variations in sustainability literacy or the broader accumulation of human capital (Redman and Wiek, 2021; MacNeil and Khare, 2025). The third hypothesis ($H_3$) is directed at closing this gap.

**Residual methodological limitations and directions for future research.** Finally, certain gaps fall beyond the scope of the present study but warrant acknowledgement as opportunities for future inquiry. The prevalence of cross-sectional designs across the field, including this study, constrains the capacity to draw causal inferences about the developmental trajectory through which sustainability literacy matures into managerial competence over time; longitudinal designs are needed to capture the transformative processes Transformative

Learning Theory posits (Mezirow, 1991; Newman, 2012). Likewise, the field's reliance on self-reported, perceived managerial competence — while theoretically valid and associated with self-efficacy and behavioural intention (Redman and Wiek, 2021) — remains susceptible to social desirability bias (Tyrańska, 2017) and would benefit from triangulation with objective, behavioural or employer-assessed competence measures. These are acknowledged here not as gaps the present study closes, but as productive avenues for subsequent research building upon its findings.

Taken together, these gaps define a coherent research problem: the need to empirically test, within a theoretically integrated and methodologically robust framework, the extent to which sustainability literacy predicts perceived managerial competence among UK business and management students, the mechanisms through which any such relationship operates, and the factors that moderate it. The conceptual model and three hypotheses developed in the preceding sections constitute the study's direct response to this problem.

## 2.8 Chapter Summary

This chapter has undertaken a critical review of the scholarship on sustainability literacy, Education for Sustainable Development, and managerial competence, and has developed the theoretical and conceptual architecture upon which the empirical phases of this study are built. Several key positions emerge from this review. First, sustainability literacy remains a conceptually contested construct: while there is broad scholarly convergence around its constituent dimensions of knowledge, skills, attitudes, values and behaviour (UNESCO, 2020; Wiek, Withycombe and Redman, 2011), definitions diverge markedly in scope, ranging from Parkin et al.'s (2004) narrower emphasis on the knowledge and skills needed to fashion a sustainable future, to broader accounts that also encompass dispositions and values (Ling et al., 2021). This definitional plurality is not merely semantic; it carries direct methodological

consequences, since how sustainability literacy is defined determines how it can subsequently be measured.

Second, the review of the ESD and higher education literature indicates that although UK universities are formally committed to embedding sustainability within curricula, and although students overwhelmingly express a desire for such integration (HESA, 2026; SOS-UK, 2024), implementation within business and management education specifically remains uneven. The evidence reviewed converges on the finding that sustainability content in business schools is frequently peripheral, elective, and disconnected from core managerial subjects (Akrivou et al., 2025; Cullen, 2017), a pattern attributable to epistemological, curricular, pedagogical, institutional and faculty-related constraints identified earlier in the chapter. This is a significant finding for the present study: it suggests that any relationship between sustainability literacy and perceived managerial competence cannot be assumed to follow automatically from curriculum exposure but must instead be empirically tested.

Third, the review of assessment instruments justified the study's adoption of the Sulitest®/TASK™ framework on the grounds of its international validation, cost-effectiveness and flexibility, while candidly acknowledging the practical limitation posed by the length of the full instrument, a constraint addressed through the development of a customized, abbreviated instrument informed by prior studies (Aikowe and Mazancova, 2023; Akeel, Bell and Mitchell, 2019). Fourth, the chapter's engagement with the managerial competence literature established that sustainability increasingly features within contemporary competence frameworks, extending beyond generic decision-making, leadership and strategic dimensions to encompass more specialised sustainability competences such as systems-thinking, anticipatory and normative competence (Wiek, Withycombe and Redman, 2011; Redman and Wiek, 2021).

Fifth, and most consequentially for the design of the empirical study, a multi-theoretical framework integrating Competence-Based Theory, Transformative Learning Theory, Human Capital Theory and the Triple Bottom Line framework was developed. Each of these theories was shown to carry acknowledged limitations: CBT has been criticized as behaviorally reductionist (Cheetham and Chivers, 1996); TLT has been challenged as excessively individualistic and inattentive to structural constraints on learning (Newman, 2012); HCT has been criticized for instrumentalizing sustainability education as a form of competitive career capital rather than an ethical commitment (Ghoshal, 2005); and the TBL has been critiqued as methodologically under-specified and vulnerable to selective reporting or 'greenwashing' (Milne and Gray, 2013; Norman and MacDonald, 2004). None of these critiques were judged sufficient to disqualify the frameworks from use; rather, taken together, they counsel appropriate interpretive caution and justify the study's broad, multidimensional operationalization of both sustainability literacy and perceived managerial competence, rather than reliance on narrow or purely self-reported indicators. The chapter's central theoretical claim is that these four frameworks — operating respectively at the level of content (TBL), pedagogy (TLT), outcome (CBT), and socioeconomic rationale (HCT) are complementary rather than competing, and that their integration yields a conceptual model of genuine explanatory ambition rather than an eclectic assemblage of convenience.

A critical appraisal of this body of scholarship, further identifies a number of interrelated gaps: the limited empirical connection between sustainability literacy and managerial competence within a single explanatory model; the paucity of UK-specific, business-and-management-focused evidence; the under-examined transformative role of formal curriculum exposure; the untested moderating influence of academic level and professional experience; and the prevailing tendency toward single-theory rather than integrated theoretical framing. These gaps do not invalidate the existing literature; rather, they delineate the precise space within which

the present study is located and to which its conceptual model and methodological design are directed.

Taken as a whole, this chapter has shown that although sustainability literacy and managerial competence have each been extensively theorized and researched in isolation, their empirical relationship — particularly among business and management students in UK higher education — remains under-examined and has rarely been tested through a formally specified, hypothesis-driven model.

**CHAPTER THREE**

# 3.0 RESEARCH METHODS AND METHODOLOGY

## 3.1 Introduction

To gain an understanding of how sustainability impacts the perceived future managerial competence of business and management students in UK universities, it is necessary that a robust methodological approach be deployed. This chapter outlines the procedures used to gather and analyze empirical data that support the study's objectives. It discusses the research paradigms and justifies the emphasis on quantitative evidence in order to assess the effect of sustainability literacy.

For quantitative research, a structured survey instrument is very important for data collection. It helps to give insight into the objectivity and replicability of the study. The rationale for the selection of participants, construction of survey instrument and how these align with the conceptual relationships earlier established are explained in this chapter.

Also, this chapter highlights ethical considerations, data validity and quality, data protection and access and informed consent and how they all ensure that the research is compliant with institutional guidelines and academic integrity.

## 3.2 Research Philosophy

Research philosophy refers to the set of beliefs and assumptions that guide the research process and the development of knowledge (Saunders et al., 2019). Positivism is appropriate when a study seeks to measure observable phenomena, test associations between variables and produce findings that can be analyzed statistically. In the present research, sustainability literacy and perceived managerial competence are treated as measurable constructs that can be operationalized through structured survey items and analyzed quantitatively. This approach is consistent with the study's aim of establishing whether sustainability literacy is associated with future managerial competence among business and management students. A positivist orientation also supports transparency and replicability. By using a standardized

questionnaire and a pre-specified analytical strategy, the study seeks to minimize ambiguity in data interpretation and improve the reliability of its findings.

## 3.3 Research Approach

The study adopts a deductive approach. Deduction begins with established theory and literature, from which propositions are derived and tested against empirical data (Bryman, 2016). This is appropriate because the literature suggests that sustainability literacy may influence managerial competence through related capabilities such as systems thinking, strategic awareness, ethical reasoning and stakeholder sensitivity (Wiek, Withycombe and Redman, 2011; MacNeil and Khare, 2025). The deductive logic is also suitable because the study is not attempting to generate an entirely new theoretical model, but rather to examine the extent to which existing relationships are evident in the context of UK business and management students. The approach therefore enables the researcher to move from theory to data in a structured way, while still allowing the findings to challenge or refine current assumptions.

## 3.4 Research design

The research uses a cross-sectional survey design. A cross-sectional design collects data from participants at a single point in time and is well suited to studies seeking to describe current conditions and test associations between variables (Saunders et al, 2019). This is particularly relevant here because the study is interested in the present level of sustainability literacy and its relationship with students' perceived readiness for managerial roles. The survey method is appropriate because it allows responses from a relatively large student population to be collected in a consistent format. It is also efficient in terms of time and cost, while still offering sufficient flexibility to examine demographic differences, curriculum exposure and the relationship between the two main study variables.

## 3.5 Population of study

The target population comprises undergraduate and postgraduate students studying business and management-related programmes in UK universities. This includes students in business administration, management, accounting, finance, marketing, international business and related disciplines. These students are selected because their likely career trajectories include supervisory, managerial or decision-making responsibilities in which sustainability competence is increasingly important. The focus on students is justified by the study aim, which is concerned with future managerial competence rather than current professional performance. Students are at a formative stage of development, and their exposure to sustainability in the curriculum may shape how they understand business responsibilities, organisational priorities and ethical decision-making.

## 3.6 Sampling strategy

Flowing from the study's quantitative design, a probability-based sampling method is adopted to ensure representativeness and also generalizability of the findings of the study across UK Universities. As noted earlier, the sampling population comprises of all Undergraduate and Postgraduate students of business and management related courses in UK universities.

Stratified Random Sampling technique will be employed to ensure representation across different levels of undergraduate (Year 1-4) and Postgraduate (MSc, MBA, MRes, PHD) study. This method improves accuracy and generalizability of the results and ensures coverage of key groups within the population of study (Saunders et al, 2019; Bryman, 2016). It also ensures that findings can be extrapolated, statistically correct, and conclusions can provide frameworks for future policy development.

The study aims to collect responses from a minimum of 100–150 participants. For a large population, achieving a 95% confidence level with a ±5% margin of error would, under Cochran's (1977) formula, require a substantially larger sample (approximately 384); a target of this size is not feasible within the resource and access constraints of the present study. The 100–150 target is instead set against the minimum thresholds recommended for the multivariate techniques the study intends to run, namely multiple regression and, where applicable, factor analysis (Hair et al., 2014). This is a deliberate trade-off, and the resulting margin of error (closer to ±8–10% at 95% confidence) is acknowledged as a limitation of the study. For the purpose of testing $H_3$, level of academic study will be analyzed as the binary undergraduate-versus-postgraduate distinction specified in the hypothesis, even though the stratified sampling frame below uses finer-grained categories to ensure balanced coverage of the population.

## 3.7 Research Instrument

The primary research instrument is a structured questionnaire. The questionnaire is designed to collect data on demographic characteristics, sustainability literacy, perceived managerial competence, exposure to sustainability within the curriculum, and professional work experience. Demographic items will record level of academic study, coded for hypothesis-testing purposes as the undergraduate-versus-postgraduate distinction specified in $H_3$, and professional work experience, operationalized as a categorical measure of whether the respondent has undertaken relevant work placement, internship or paid employment, together with its approximate duration; this allows work experience to be tested as a moderating variable alongside level of study, as Hypothesis Three requires. Exposure to sustainability within the curriculum will similarly be captured as a categorical item recording whether the respondent has undertaken a formally integrated sustainability-related module, consistent with the group comparison specified in Hypothesis Two, together with a supplementary item

recording the number of such modules completed. A structured instrument is suitable because it supports standardized measurement and enables the use of statistical analysis. The sustainability literacy scale should reflect the multidimensional nature of the construct. It includes items covering environmental, social and economic sustainability, as well as awareness of the Sustainable Development Goals, responsible consumption, climate-related issues and the implications of sustainability for organisational decision-making. The item pool is informed by the literature and by established assessment approaches such as Sulitest© and TASK™, which are designed to measure sustainability knowledge in higher education and related settings (Sulitest, 2026; Akeel, Bell and Mitchell, 2019).

The perceived managerial competence scale should measure respondents' confidence in applying sustainability-related understanding to managerial situations and is organized around the three competence dimensions established in Chapter Two's conceptual model: decision-making, leadership, and strategic competence. The decision-making dimension includes items on ethical judgement, problem-solving and systems thinking; the leadership dimension includes items on stakeholder awareness and the ability to influence and mobilize others around sustainability goals; and the strategic competence dimension includes items on long-term planning and strategic thinking (MacNeil and Khare, 2025; Redman and Wiek, 2021; Tyrańska, M, 2017). A five-point Likert scale is used for capturing degrees of agreement with competence-related statements.

## 3.8 Validity and reliability

Validity concerns whether the instrument measures the construct it is intended to measure. Content validity will be supported by anchoring the questionnaire in the literature and ensuring that the items adequately represent the environmental, social and economic dimensions of sustainability literacy as well as the managerial competence domain. Importantly, content validity will be ensured as before deployment, the survey instrument

was reviewed by two academic professionals in business, management and sustainability education. Also, the instrument was tested among 10 students to test clarity, reliability, and how long it takes to complete the questionnaire. Cronbach's alpha will be used to assess internal consistency, and feedback will guide refinements to improve validity (DeVellis, 2016).

## 3.9 Data Collection Procedures

Data collection began only after ethical approval was obtained from YSJ Research ethics committee. Data collection was conducted using an online survey administered through a secure platform- Microsoft Forms. Online surveys are widely used in higher education research due to their efficiency, accessibility, and ability to reach geographically dispersed participants (Bryman, 2016). The questionnaire was distributed electronically to improve reach, reduce logistical burden and facilitate participation. Before completing the survey, each participant received an information sheet explaining the purpose of the study, what participation involves, the voluntary nature of involvement, and the measures in place to protect confidentiality. Informed consent was obtained before access to the questionnaire. The survey remained open long enough to allow reasonable participation, and reminders were issued where permitted.

## 3.10 Recruitment Strategy

Participants were recruited through university mailing lists, Business and management school administrators and academics, Student unions, social media groups for business and management students. An invitation email/message explaining the purpose of the study, eligibility criteria, confidentiality assurances, and the voluntary nature of participation was attached to the link of the online questionnaire.

## 3.11 Ethical Considerations

This study complied fully with York St John University's ethical guidelines. Ethical compliance is very important in research, as it minimizes the adverse effects that may arise during data collection, analysis, and storage (Okorie et al, 2024). Ethical considerations in research involving human participants ensures participant welfare, informed consent, institutional accountability and data protection.

All participants were provided with a detailed Participant Information Sheet at the beginning of the online questionnaire. This outlined the study's purpose, participation requirements, potential risks, and data protection procedures. To protect anonymity and confidentiality, pseudonyms were used, and all data were stored in encrypted, password-protected files. Access to raw data was restricted to the primary researcher and supervisory team, ensuring compliance with GDPR and the UK Data Protection Act (ICO, 2021).

## 3.12 Data analysis

The data accumulated from questionnaire responses was analyzed using Statistical Package for Social Sciences (SPSS) using both descriptive and inferential statistical techniques. Descriptive statistics will be used to summarize TASK$^{TM}$ scores (mean, median, SD), managerial competence scores, demographic characteristics. These statistics provide an overview of sustainability literacy levels among participants.

Inferential analysis will then be used to test each hypothesis in turn. For $H_1$, Pearson correlation analysis will be used to test whether sustainability literacy is associated with perceived managerial competence, and multiple regression analysis will be used to determine whether sustainability literacy significantly and positively predicts perceived managerial competence while controlling for selected demographic and academic variables. For $H_2$, independent-samples t-tests will be used to compare sustainability literacy and perceived

managerial competence scores between students who have and have not undertaken a formally integrated sustainability-related module, and curriculum exposure will additionally be entered as a predictor in the regression model to assess whether it independently strengthens the literacy–competence relationship. For $H_3$, moderated multiple regression will be used, entering level of study (undergraduate versus postgraduate) and work experience as interaction terms with sustainability literacy; this is the appropriate technique for testing moderation, since it evaluates whether the strength of the literacy–competence relationship differs significantly across groups, rather than simply testing for differences in group means. Where a more general group comparison is also useful for descriptive purposes, one-way ANOVA will be applied depending on the number of categories involved.

## 3.13 Methodological Limitations

Every methodological choice involves trade-offs, and it is important to acknowledge the limitations inherent in this study's design (Saunders et al, 2019). These limitations do not undermine the value of the research but provide transparency and context for interpreting the findings. This present study has the following methodological limitations;

Firstly, the study employs a cross-sectional design, which captures data at a single point in time. While this design is efficient and appropriate for assessing relationships between variables, it limits the ability to infer causal relationships, track changes in sustainability literacy over time and assess the long-term development of managerial competence. Longitudinal studies provide deeper insights into how sustainability literacy evolves throughout students' academic journeys.

Secondly, the use of self-reported measures of assessing managerial competence makes the research instrument susceptible to social desirability bias, over- or underestimation of competence and differences in self-awareness. However, perceived competence is still valuable because it influences behavioral intentions (Tyrańska, M. 2017).

Thirdly, sampling constraints exist. Despite using stratified sampling, several limitations remain, notable among which are, participation is voluntary, which may introduce self-selection bias, students with an interest in sustainability may be more likely to participate, some institutions, course of study and levels of study may be over- or under-represented.

Also, the Assessment of Sustainability Knowledge (TASK™) by Sulitest® which is the main source of testing sustainability literacy in this study was originally developed in the US context. Although it is widely applicable, cultural and institutional differences may influence students' familiarity with sustainability scenarios, interpretation of certain items and relevance to UK business and management education. To mitigate this, items will be reviewed for contextual appropriateness.

Finally, online data collection offers convenience but also poses challenges as participants may rush through the survey and face distractions while completing the survey. Also, technical and network issues may lead to incomplete responses. Nevertheless, online administration is the most practical method for reaching a large, geographically dispersed sample.

CHAPTER FOUR

# 4.0 DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

## 4.1 Introduction

This chapter presents the results of the quantitative analysis of primary data collected from Business and Management students across UK higher education institutions, in fulfilment of the research aim and objectives and to test the hypotheses developed in preceding chapters. Data was analyzed using IBM SPSS Statistics, consistent with the analytical approach specified in Section 3.12. This chapter describes the data cleaning process and the derivation of the final analytic sample, presents the demographic and academic profile of respondents and reports the reliability checks and tests of the research instrument. It also presents descriptive statistics for the study variables, reports the correlations among variables and presents the results of hypothesis testing for the different hypotheses. This chapter also discusses the findings from the data analysis in relation to the literature and the gaps identified.

## 4.2 Data Cleaning and Derivation of the Analytic Sample.

The survey instrument was administered online and generated 109 responses. Following the data screening , three (3) respondents did not proceed past the consent question (they responded NO) and were removed from the dataset as non-participants. A further eight (8) respondents indicated, at the screening question, that they were not currently enrolled on a Business or Management-related programme at a UK university and were therefore excluded as ineligible, consistent with the population and scope of the study. This produced a final analytic sample of 98 respondents (N = 98), summarized in Table 4.1.

**Table 4.1: Derivation of the Analytic Sample**

| Stage | n |
|---|---|
| Total survey responses received | 109 |
| Less: did not provide consent / incomplete screening | 3 |
| Less: ineligible (not enrolled on a Business/Management programme at a UK university) | 8 |
| Final analytic sample (N) | 98 |

A final sample of 98 falls marginally below the indicative target range of 100–150 set out in Section 3.6 but remains adequate for the planned analyses. However, this low number of responses is treated as a limitation rather than a threat to the validity of the analysis.

## 4.3 Demographic and Academic Profile of Respondents

Figures 4.1 to 4.3 present the age, gender and level-of-study profile of the 98 respondents comprising the analytic sample, followed by a summary of remaining background characteristics in Table 4.2.

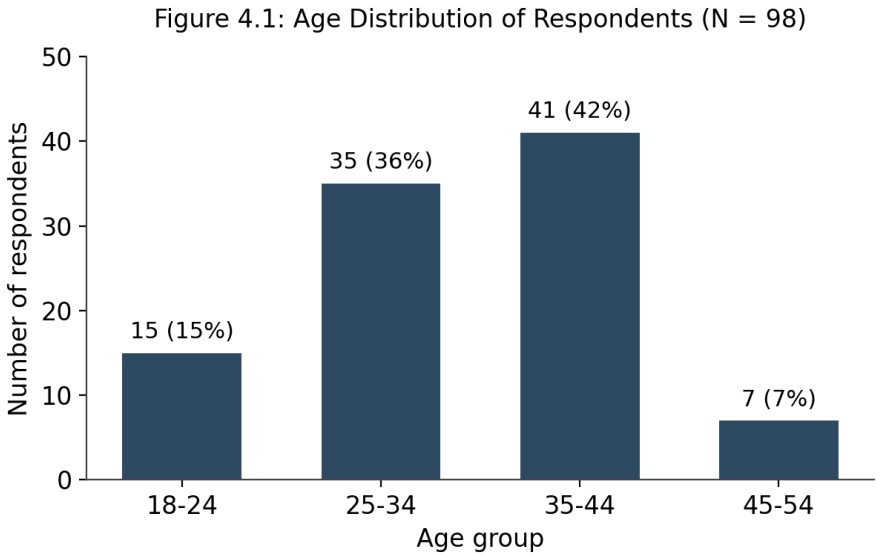



*Figure 4.1: Respondents were predominantly aged 25 and above (77.5%), with the largest single band (41.8%) aged 35–44.*

Figure 4.2: Gender Distribution of Respondents (N = 98)

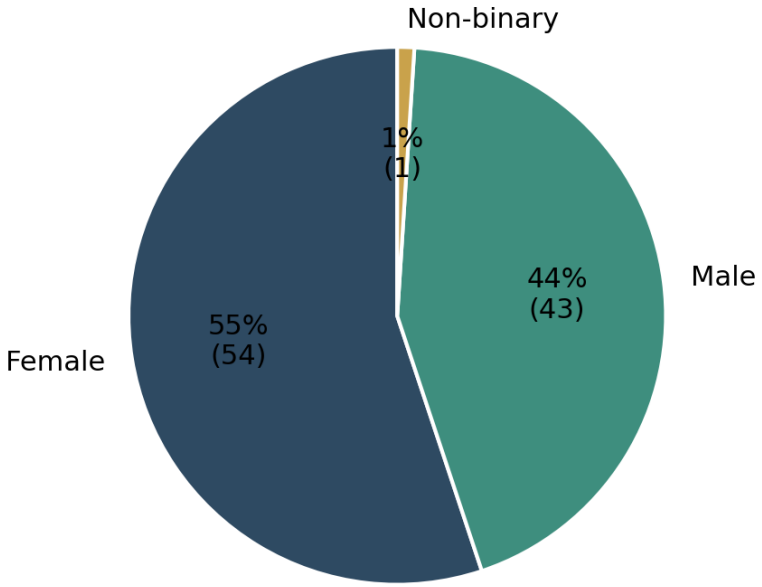



*Figure 4.2: Over half of respondents identified as female (55.1%), 43.9% as male, and 1.0% as non-binary.*

Figure 4.3: Level of Study Distribution of Respondents (N = 98)

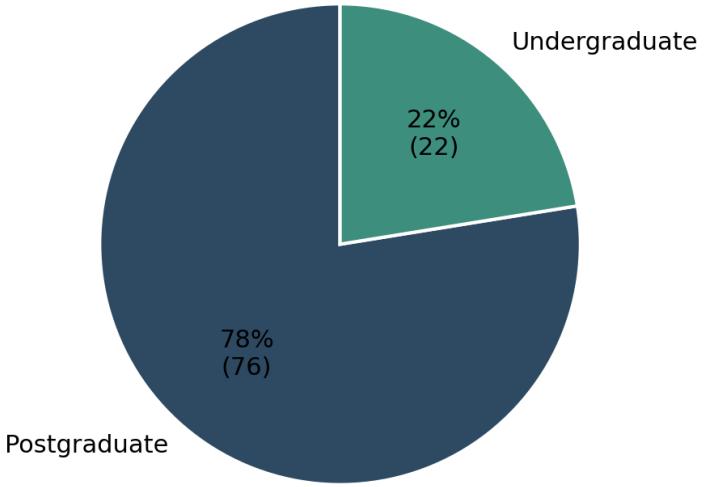



*Figure 4.3: The sample was predominantly postgraduate (77.6%), with the remainder studying at undergraduate level (22.4%).*

Table 4.2 summarizes the remaining background characteristics of the sample: year of study, prior exposure to sustainability-related curriculum content, participation in sustainability-

related extracurricular activity, and relevant work experience. Most respondents (77.6%) reported having undertaken a formal sustainability-related module as part of their programme, 66.3% reported participation in sustainability-related extracurricular activity, and 74.5% reported having relevant work placement, internship or managerial experience.

**Table 4.2: Additional Background Characteristics of Respondents (N = 98)**

| Characteristic | Category | n | % |
|---|---|---|---|
| Year of study | 1st year | 9 | 9.2 |
| | 2nd year | 6 | 6.1 |
| | 3rd year | 6 | 6.1 |
| | Final year (UG) | 9 | 9.2 |
| | Postgraduate | 68 | 69.4 |
| Undertaken a sustainability-related module | Yes | 76 | 77.6 |
| | No | 16 | 16.3 |
| | Not sure | 6 | 6.1 |
| Sustainability-related extracurricular activity | Yes | 65 | 66.3 |
| | No | 28 | 28.6 |
| | Not sure | 5 | 5.1 |
| Work placement / internship / managerial experience | Yes | 73 | 74.5 |
| | No | 25 | 25.5 |

## 4.4 Reliability of the Research Instrument

Internal consistency reliability was assessed using Cronbach's alpha (α). However, reliability for the ten (10) dichotomously-scored sustainability knowledge questions in Section B of the research instrument was tested using the equivalent Kuder-Richardson-20 (KR-20) formulation — mathematically identical to Cronbach's alpha for binary items. As shown in Table 4.3, all scales met or substantially exceeded the conventional acceptability threshold of $\alpha = 0.70$ (Hair et al., 2014), with the knowledge subscale ($\alpha = .750$) at the lower end and the composite managerial competence scale ($\alpha = .960$) at the upper end. These results indicate that the instrument produced internally consistent, reliable measurements across the sample.

**Table 4.3: Reliability Statistics (Cronbach's Alpha)**

| Scale | N of Items | Cronbach's Alpha |
|---|---|---|
| Sustainability Knowledge (B1–B10) ( Using KR-20) | 10 | .750 |
| Sustainability Attitudes (C1–C6) | 6 | .912 |
| Sustainability Behaviour (C7–C10) | 4 | .869 |
| Applied Sustainability Competence (C11–C15) | 5 | .927 |
| Full self-report Sustainability Literacy scale (C1–C15) | 15 | .958 |
| Decision-Making Competence (D1–D3) | 3 | .889 |
| Leadership Competence (D4–D6) | 3 | .853 |
| Strategic Competence (D7–D9) | 3 | .909 |
| Full Perceived Managerial Competence scale (D1–D9) | 9 | .960 |
| Perceived Impact of Sustainability Literacy (E1–E4) | 4 | .928 |

## 4.5 Sustainability Knowledge: Item-Level Analysis

Prior to aggregating the ten knowledge and scenario items into a composite score, item-level performance was examined to establish the pattern of difficulty across the instrument. Figure 4.4 reports the proportion of respondents who answered each item correctly.

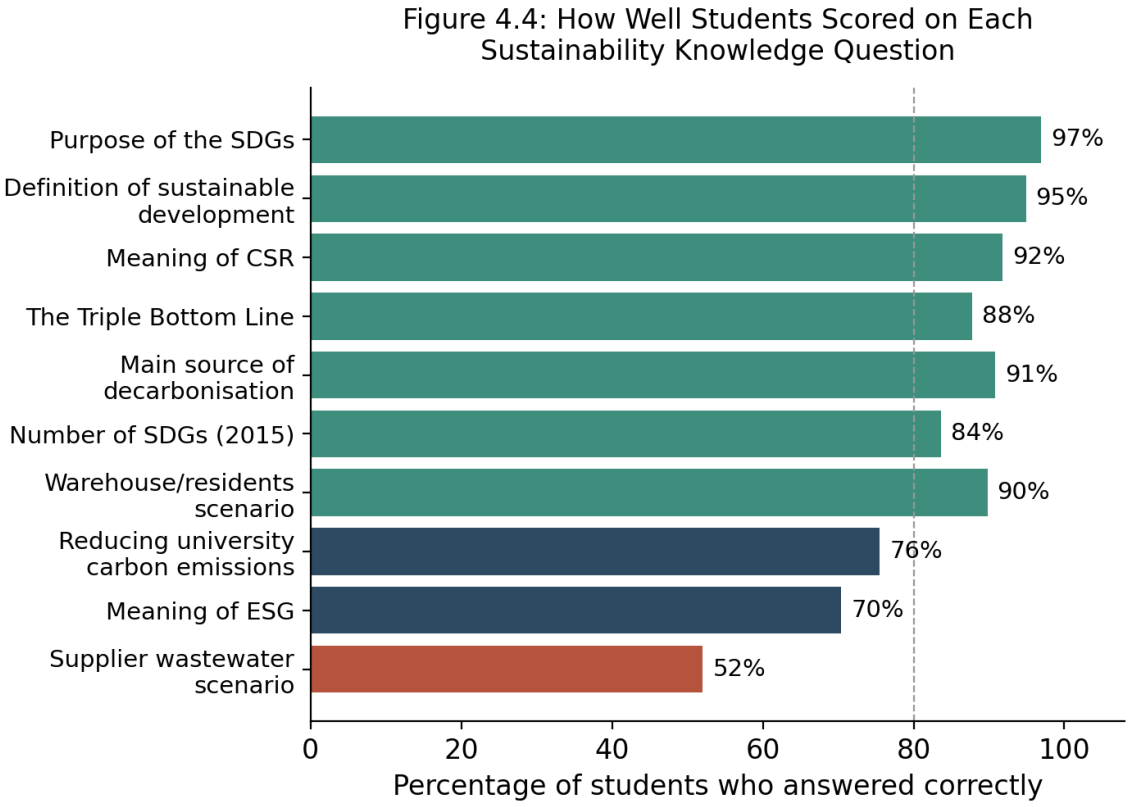



*Figure 4.4: Performance was strongest on declarative/definitional items (green, ≥80% correct) and weakest on the applied managerial scenario items, particularly the supplier wastewater scenario (orange, 52.0% correct).*

Performance was strongest on the purpose of the Sustainable Development Goals (B6, 96.9% correct) and the Brundtland definition of sustainable development (B1, 94.9% correct), and weakest on the ESG terminology item (B7, 70.4% correct) and the applied managerial scenario requiring respondents to select the most responsible course of action when a supplier's wastewater practices raise environmental concerns (B8, 52.0% correct). This pattern, in which respondents perform markedly better on declarative/definitional knowledge than on applied managerial judgement, recurs throughout the results reported later in this chapter and is returned to in Section 4.11.

## 4.6 Descriptive Statistics for Study Variables

To operationalize sustainability literacy as the multidimensional construct defined in Section 2.2 (knowledge, attitudes, behaviour and applied competence), the knowledge subscale was rescaled to a common 1–5 metric equivalent to the Likert-scored subscales, and a composite Sustainability Literacy Index was computed as the mean of the four subscales. Perceived Managerial Competence was computed as the mean of the Decision-Making, Leadership and Strategic Competence subscales, consistent with the instrument described in Section 3.7. Table 4.4 presents descriptive statistics for all study variables. Respondents reported comparatively high mean scores across all subscales (all subscale means exceeded the scale midpoint of 3.00), with the Sustainability Literacy Index ($M = 4.11$, $SD = 0.63$) and Perceived Managerial Competence ($M = 4.05$, $SD = 0.75$) both concentrated toward the upper end of the 1–5 range.

**Table 4.4: Descriptive Statistics for Study Variables (N = 98)**

| Variable | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|
| Knowledge Score (raw, /10) | 1.00 | 10.00 | 8.34 | 1.94 |
| Knowledge (rescaled, 1–5) | 1.40 | 5.00 | 4.34 | 0.78 |
| Sustainability Attitudes | 1.17 | 5.00 | 4.30 | 0.70 |
| Sustainability Behaviour | 1.00 | 5.00 | 3.94 | 0.79 |
| Applied Sustainability Competence | 1.00 | 5.00 | 3.87 | 0.81 |
| Sustainability Literacy Index (composite) | 1.44 | 4.88 | 4.11 | 0.63 |

| | | | | |
|---|---|---|---|---|
| Decision-Making Competence | 1.00 | 5.00 | 4.03 | 0.79 |
| Leadership Competence | 1.00 | 5.00 | 4.01 | 0.75 |
| Strategic Competence | 1.00 | 5.00 | 4.10 | 0.79 |
| Perceived Managerial Competence (composite) | 1.00 | 5.00 | 4.05 | 0.75 |
| Perceived Impact of Sustainability Literacy | 1.00 | 5.00 | 4.22 | 0.80 |

## 4.7 Correlation Among Study Variables

Table 4.5 presents Pearson product-moment correlation coefficients among the sustainability literacy subscales, the composite Sustainability Literacy Index, and Perceived Managerial Competence. All correlations were positive and statistically significant at $p < .05$. The Sustainability Literacy Index was very strongly correlated with Perceived Managerial Competence ($r = .892$, $p < .001$). Notably, the strength of this association was not uniform across subscales: the self-report Attitudes ($r = .822$), Behaviour ($r = .831$) and Applied Competence ($r = .913$) subscales were all very strongly correlated with competence, whereas the independently scored Knowledge subscale showed a comparatively modest, though still significant, correlation ($r = .374$, $p < .001$).

**Table 4.5: Pearson Correlations Among Sustainability Literacy Subscales and Perceived Managerial Competence (N = 98)**

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Knowledge (1–5) | — | | | | | |
| 2. Attitudes | .515** | — | | | | |
| 3. Behaviour | .222* | .758** | — | | | |
| 4. Applied Competence | .318** | .801** | .840** | — | | |
| 5. Sustainability Literacy Index | .620** | .926** | .857** | .899** | — | |
| 6. Managerial Competence | .374** | .822** | .831** | .913** | .892** | — |

*** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

## 4.8 Hypotheses Testing

This section presents the results of the tests of the three research hypotheses developed in chapter 2: multiple regression for H1, an independent samples t-test for H2, and moderated multiple regression for H3.

### 4.8.1 Hypothesis One (H1): Sustainability Literacy and Perceived Managerial Competence

$H_1$ proposed that sustainability literacy is a statistically significant positive predictor of perceived managerial competence among Business and Management students. This was tested using hierarchical multiple regression, with Perceived Managerial Competence regressed on the Sustainability Literacy Index in Model 1:

$$PMC=\beta_0+\beta_1(SLI)+\varepsilon$$

Where PMC= Perceived Managerial Competence
SLI= Sustainability Literacy Index
$\beta_0$ = Intercept (Predicted PMC when all predictors are = 0)
$\beta_1$ = Unstandardized regression coefficient (unit changes per change in PMC)
$\varepsilon$ = Error term (unexplained variation)
and on the Sustainability Literacy Index together with Level of Study, Work Experience and Curriculum Exposure as covariates in Model 2.

$$PMC=\beta_0+\beta_1(SLI)+\beta_2(Level)+\beta_3(WorkExp)+\beta_4(CurricExp)+\varepsilon$$

Variance inflation factors for all predictors in Model 2 ranged from 1.07 to 1.49, well below conventional thresholds of concern (VIF < 5), indicating no problematic multicollinearity.

**Table 4.6: Model Summary — Sustainability Literacy Predicting Perceived Managerial Competence**

| Model | R | $R^2$ | Adjusted $R^2$ | Std. Error of Estimate | $R^2$ Change | F Change | Sig. F Change |
|---|---|---|---|---|---|---|---|
| 1 | .892 | .796 | .793 | .341 | .796 | 373.533 | .000 |
| 2 | .897 | .805 | .797 | .338 | .010 | 1.583 | .199 |

*Model 1 predictors: (Constant), Sustainability Literacy Index. Model 2 predictors: (Constant), Sustainability Literacy Index, Level of Study (0 = Undergraduate, 1 = Postgraduate), Work Experience (0 = No, 1 = Yes), Curriculum Exposure (0 = No, 1 = Yes).*

**Table 4.7: ANOVA — Sustainability Literacy Predicting Perceived Managerial Competence**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 43.508 | 1 | 43.508 | 373.533 | .000 |
| | Residual | 11.182 | 96 | .116 | | |
| | Total | 54.689 | 97 | | | |
| 2 | Regression | 44.051 | 4 | 11.013 | 96.271 | .000 |
| | Residual | 10.639 | 93 | .114 | | |
| | Total | 54.689 | 97 | | | |

**Table 4.8: Regression Coefficients — Sustainability Literacy Predicting Perceived Managerial Competence**

| Model | Predictor | B | Std. Error | Beta | t | Sig. |
|---|---|---|---|---|---|---|
| 1 | (Constant) | −.308 | .228 | | −1.351 | .180 |
| | Sustainability Literacy Index | 1.059 | .055 | .892 | 19.327 | .000 |
| 2 | (Constant) | −.353 | .250 | | −1.414 | .161 |
| | Sustainability Literacy Index | 1.058 | .066 | .891 | 15.944 | .000 |
| | Level of Study (PG = 1) | .053 | .085 | .030 | .631 | .530 |
| | Work Experience (Yes = 1) | .135 | .090 | .079 | 1.504 | .136 |
| | Curriculum Exposure (Yes = 1) | −.118 | .093 | −.066 | −1.268 | .208 |

*Dependent Variable: Perceived Managerial Competence. B = unstandardized coefficient; Beta = standardised coefficient.*

Sustainability literacy was a highly significant, positive predictor of perceived managerial competence in both models. In the simple model, sustainability literacy alone explained 79.6% of the variance in perceived managerial competence ($R^2 = .796$, $F(1, 96) = 373.53$, $p < .001$; $\beta = .892$, $t = 19.33$, $p < .001$). Adding Level of Study, Work Experience and Curriculum Exposure as covariates in Model 2 increased explained variance only marginally, by 1.0 percentage point ($\Delta R^2 = .010$, F change $(3, 93) = 1.58$, $p = .199$, ns), and none of the three covariates reached statistical significance individually. Sustainability literacy remained a strong, virtually unchanged predictor in Model 2 ($\beta = .891$, $t = 15.94$, $p < .001$). On this evidence, $H_1$ is supported: sustainability literacy is a robust, statistically significant positive predictor of

perceived managerial competence, and this relationship is not an artefact of the demographic and academic variables examined alongside it.

### 4.8.2 Hypothesis Two ($H_2$): Curriculum Exposure

$H_2$ proposed that Business and Management students who have undertaken a formal sustainability-related module or curriculum component demonstrate significantly higher sustainability literacy and perceived managerial competence than those who have not. This was tested using independent-samples t-tests comparing respondents who reported having undertaken a sustainability-related module (n = 76) with those who reported not having done so (n = 16); the six respondents who answered 'not sure' were excluded from this comparison.

**Table 4.9: Group Statistics — Curriculum Exposure**

| Variable | Curriculum Exposure | n | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Sustainability Literacy Index | Yes | 76 | 4.268 | .514 | .059 |
| | No | 16 | 3.490 | .777 | .194 |
| Knowledge (1–5) | Yes | 76 | 4.432 | .677 | .078 |
| | No | 16 | 3.975 | 1.022 | .256 |
| Attitudes | Yes | 76 | 4.483 | .478 | .055 |
| | No | 16 | 3.552 | 1.047 | .262 |
| Behaviour | Yes | 76 | 4.099 | .689 | .079 |
| | No | 16 | 3.281 | .948 | .237 |
| Applied Competence | Yes | 76 | 4.061 | .702 | .081 |
| | No | 16 | 3.150 | .937 | .234 |
| Managerial Competence | Yes | 76 | 4.193 | .648 | .074 |
| | No | 16 | 3.410 | .894 | .224 |

**Table 4.10: Independent Samples Test — Curriculum Exposure**

| Variable | Levene's F | Levene's Sig. | t | df | Sig. (2-tailed) | Mean Diff. | Cohen's d |
|---|---|---|---|---|---|---|---|
| Sustainability Literacy Index | 5.342 | .023 | 3.837 | 17.86 | .001 | .779 | 1.376 |
| Knowledge (1–5) | 10.652 | .002 | 1.710 | 17.86 | .105 | .457 | 0.613 |
| Attitudes | 17.980 | .000 | 3.480 | 16.34 | .003 | .930 | 1.523 |
| Behaviour | 1.036 | .312 | 3.271 | 18.48 | .004 | .817 | 1.106 |
| Applied Competence | 2.371 | .127 | 3.677 | 18.71 | .002 | .911 | 1.220 |
| Managerial Competence | 1.455 | .231 | 3.325 | 18.46 | .004 | .783 | 1.127 |

Students who had undertaken a formal sustainability-related module scored significantly higher on the Sustainability Literacy Index (M = 4.27, SD = 0.51) than those who had not (M = 3.49, SD = 0.78), t(17.86) = 3.84, p = .001, a very large effect (d = 1.38). The same pattern is held for Attitudes (p = .003, d = 1.52), Behaviour (p = .004, d = 1.11), Applied Competence (p = .002, d = 1.22) and, critically, for Perceived Managerial Competence itself (M = 4.19 vs 3.41, t(18.46) = 3.33, p = .004, d = 1.13). The Knowledge subscale alone did not reach significance (p = .105), although the difference was in the expected direction with a moderate effect size (d = 0.61); this is very plausibly a power issue given the small 'No' group (n = 16) rather than evidence of no true difference. Taken together, $H_2$ is substantially supported. This sequential pattern aligns closely with Transformative Learning Theory, which conceptualizes curriculum exposure as the trigger for a critical reflection that transforms learners' frames of reference (and hence their literacy).

### 4.8.3 Hypothesis Three ($H_3$): Moderating Role of Level of Study and Work Experience

$H_3$ proposed that level of academic study and prior professional work experience significantly moderate the relationship between sustainability literacy and perceived managerial competence. This was tested using moderated (hierarchical) multiple regression, with the Sustainability Literacy Index mean-centered and multiplied by each moderator in turn to form the interaction terms.

**Table 4.11: Moderated Regression Coefficients — Level of Study and Work Experience**

| Model | Predictor | B | Std. Error | Beta | t | Sig. |
|---|---|---|---|---|---|---|
| 3a | (Constant) | 4.030 | .079 | | 50.860 | .000 |
| | Sustainability Literacy Index (centred) | 1.024 | .114 | .862 | 9.005 | .000 |
| | Level of Study (PG = 1) | .084 | .109 | .047 | .767 | .445 |
| | Literacy × Level of Study | .140 | .135 | .070 | 1.040 | .301 |
| 3b | (Constant) | 4.036 | .083 | | 48.442 | .000 |
| | Sustainability Literacy Index (centred) | 1.019 | .113 | .858 | 9.058 | .000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Work Experience (Yes = 1) | .111 | .098 | .061 | 1.132 | .260 |
| | Literacy × Work Experience | .087 | .123 | .045 | .710 | .480 |

*Dependent Variable: Perceived Managerial Competence. Model 3a tests the Level of Study interaction; Model 3b tests the Work Experience interaction; each interaction was tested in a separate model to preserve statistical power, consistent with Section 3.12. B = unstandardized coefficient; Beta = standardised coefficient.*

Neither interaction term was statistically significant: Literacy × Level of Study (B = .140, β = .070, t = 1.04, p = .301) and Literacy × Work Experience (B = .087, β = .045, t = .71, p = .480). On the moderation test as specified, $H_3$ is therefore not supported: the strength of the relationship between sustainability literacy and perceived managerial competence did not differ significantly by level of study or by work experience — the relationship was consistently strong across both undergraduate and postgraduate respondents, and across respondents with and without prior work experience.

A supplementary descriptive comparison was conducted to examine whether Level of Study and Work Experience were associated with sustainability literacy and competence as simple main effects, independent of any moderating role. As shown in Table 4.12, Level of Study was not significantly associated with either variable. Work Experience, by contrast, showed a significant main-effect association with both: respondents with prior work, placement or managerial experience reported significantly higher sustainability literacy (M = 4.27 vs 3.65, t(33.85) = −3.72, p = .001, d = 1.07) and significantly higher perceived managerial competence (M = 4.24 vs 3.48, t(33.30) = −3.91, p = .001, d = 1.14) than those without.

**Table 4.12: Group Comparisons — Level of Study and Work Experience (Main Effects)**

| Grouping Variable | Group | n | Mean Literacy | Mean Competence | t (Lit.) | Sig. | t (Comp.) | Sig. |
|---|---|---|---|---|---|---|---|---|
| Level of Study | Undergraduate | 22 | 4.19 | 4.06 | 0.78 | .438 | 0.12 | .909 |
| | Postgraduate | 76 | 4.09 | 4.04 | | | | |
| Work Experience | No | 25 | 3.65 | 3.48 | −3.72 | .001 | −3.91 | .001 |
| | Yes | 73 | 4.27 | 4.24 | | | | |

*Lit. = Sustainability Literacy Index; Comp. = Perceived Managerial Competence. t and Sig. values shown once per grouping variable.*

The distinction between main effects and moderation is theoretically significant. Human Capital Theory (HCT) suggests that work experience constitutes an additional investment in human capital and, as the findings indicate, may enhance both sustainability literacy and managerial competence. However, this does not mean that work experience necessarily changes the strength of the relationship between these two constructs. The non-significant interaction effects should therefore be interpreted cautiously, as detecting interaction effects generally requires much larger samples than detecting main effects of similar magnitude (McClelland and Judd, 1993). This caution is especially relevant to the Level of Study comparison, where the sample was unevenly distributed between undergraduates (n = 22) and postgraduates (n = 76).

## 4.9 Supplementary Analysis: Demographic and Academic Factors

In addition to the variables specified in $H_3$, the research objective (d) and RQ4 (Section 1.4) called for an examination of the demographic and academic factors associated with sustainability literacy more broadly. One-way ANOVA and independent-samples t-tests were used, as appropriate to the number of categories involved, to test Age, Year of Study, Sex and Extracurricular Activity.

**Table 4.13: Supplementary Tests of Demographic and Academic Factors on Sustainability Literacy**

| Factor | Test | Statistic | df | Sig. | Outcome |
|---|---|---|---|---|---|
| Age (4 groups) | One-way ANOVA | F = 0.596 | 3, 94 | .619 | Not significant |
| Year of Study (5 groups, exploratory) | One-way ANOVA | F = 2.708 | 4, 93 | .035 | Significant |
| Sex (Female vs Male) | Independent t-test | t = −0.076 | 92.9 | .940 | Not significant |
| Extracurricular Activity (Yes vs No) | Independent t-test | t = −2.310 | 46.9 | .025 | Significant |

Age and sex were not significantly associated with sustainability literacy, suggesting that literacy in this sample was not simply a function of maturity or gender. Year of study showed a significant, if modest, association ($F(4, 93) = 2.71$, $p = .035$); postgraduate respondents and

final-year undergraduates recorded the highest mean literacy, while first- and second-year undergraduates recorded the lowest, broadly consistent with a cumulative, curriculum-linked pattern of literacy development. Participation in sustainability-related extracurricular activity was significantly associated with higher literacy ($M = 4.24$ for participants vs 3.83 for non-participants, $t(46.9) = -2.31$, $p = .025$) and, separately, with higher perceived managerial competence ($t(43.9) = -2.63$, $p = .011$), indicating that engagement beyond the formal curriculum makes an additional, measurable contribution.

## 4.10 Insights from the Open-Ended Responses

The questionnaire concluded with two open-ended questions inviting respondents to reflect, in their own words, on how sustainability education had influenced their career readiness, and what changes they would recommend to how sustainability is taught. Ninety-two (92) respondents answered each question. Responses were read and grouped inductively into recurring themes; indicative counts are reported to convey relative emphasis rather than as a formal quantitative content analysis.

On career readiness, the dominant response was that sustainability education had positively shaped respondents' confidence and strategic outlook, with many respondents describing a sharper appreciation of the commercial and regulatory relevance of sustainability to managerial decision-making. A substantial minority, however, explicitly qualified this positive assessment by noting that their confidence remained principally theoretical, and that they felt under-prepared to apply sustainability concepts in real workplace situations.

On improvements suggested, three themes recurred across most responses:

- More practical, applied and experiential learning: the most frequently mentioned theme by a wide margin. Respondents called for case studies based on real

organisations, live projects with employers, simulations, and site visits, rather than lecture-based delivery of theoretical content alone.

- Better integration across the curriculum: a substantial number of respondents felt that sustainability was taught as an isolated, optional module rather than embedded across core business and management subjects, and recommended that sustainability content be threaded through strategy, finance, operations and marketing modules rather than confined to a single elective.
- Greater engagement with industry and practitioners: respondents wanted more direct contact with working managers and sustainability professionals, through guest lectures, mentoring or employer-led projects, to connect classroom content to workplace practice.

These qualitative themes triangulate closely with the quantitative findings reported above. The gap between strong performance on declarative knowledge items (Figure 4.4) and comparatively weak performance on the applied managerial scenario item (B8, 52.0% correct) mirrors respondents' own diagnosis that classroom learning has out-paced applied, practical exposure. The call for curriculum integration, rather than a standalone module, directly echoes one of the gaps identified in chapter two which notes that curriculum exposure and integration can serve as a transformative mechanism.

## 4.11 Discussion of Findings in Relation to the Literature

Table 4.14 summarizes the outcome of hypotheses testing before the findings are discussed in relation to the theoretical framework and the gaps in literature identified.

**Table 4.14: Summary of Hypothesis Testing Outcomes**

| Hypothesis | Statement (abbreviated) | Key statistic | Outcome |
|---|---|---|---|
| $H_1$ | Sustainability literacy positively predicts perceived managerial competence | $R^2 = .796$, $\beta = .892$, $p < .001$ | Supported |

| | | | |
|---|---|---|---|
| $H_2$ | Curriculum-exposed students show higher literacy and competence | t(18.46) = 3.33, p = .004, d = 1.13 | Substantially supported (mediated pathway) |
| $H_3$ | Level of study and work experience moderate the literacy–competence link | Literacy × Level: p = .301; Literacy × WorkExp: p = .480 | Not supported (moderation); work experience shows a significant main effect |

The very strong support obtained for $H_1$ directly addresses the principal empirical gap identified : that sustainability literacy and managerial competence, although each extensively theorized, had rarely been tested together within a single, hypothesis-driven quantitative model, particularly among UK business and management students. The magnitude of the association ($R^2 = .796$) is large by the standard of most social-science research and provides clear empirical evidence that literacy and perceived competence move closely together in this population, consistent with Competence-Based Theory's claim that literacy functions as an underlying capability from which observable competence is enacted, and with Human Capital Theory's framing of sustainability knowledge and skill as a form of investment that yields returns in perceived managerial capability. At the same time, the marked divergence between the strong self-report correlations and the more modest objectively-scored knowledge correlation nuances this conclusion: it suggests that the dispositional and applied components of literacy (attitudes, behaviour, applied competence) may be doing more of the explanatory work than factual knowledge alone, a distinction the existing literature, framed predominantly around knowledge-centred assessment instruments.

The findings for $H_2$ extend the ESD and curriculum-exposure literature reviewed by clarifying mechanism rather than simply confirming association. Where the UK evidence reviewed in SOS-UK, 2024 and Akrivou et al., 2025 established that students value and desire sustainability content, the mediation-consistent pattern observed here — curriculum exposure predicting literacy strongly, with its direct effect on competence disappearing once literacy is controlled — offers a more precise, testable account of how curriculum exposure translates into perceived

competence. This is well explained by Transformative Learning Theory (Section 2.6.3): formal sustainability teaching appears to operate by transforming students' frames of reference (i.e., by building literacy), which then carries through to perceived managerial capability, rather than by directly shaping managerial self-perception through some separate channel.

The non-significant moderation results for $H_3$ depart from the directional prediction advanced while drawing from Human Capital Theory to argue that postgraduate study and work experience should strengthen the literacy–competence relationship. Two readings are offered. First, this may be a genuine finding: the relationship between sustainability literacy and perceived managerial competence may simply be uniformly strong across academic levels and experience profiles in this population, rather than conditional on them. Second, and consistent with the gaps identified in Section 2.7 regarding under-tested moderating variables, the null interaction results may reflect the well-documented statistical reality that interaction effects require substantially greater statistical power to detect than main effects of comparable magnitude (McClelland and Judd, 1993), particularly with the unbalanced Level of Study split observed in this sample (22 vs 76). The significant main effect of work experience — clearly present in the data even though it does not moderate the literacy–competence link — still lends some support to Human Capital Theory's broader claim that experiential investment builds human capital, even if it does not specifically amplify the return on sustainability literacy in the way $H_3$ anticipated.

Finally, the supplementary and qualitative findings jointly address Objective (d) and RQ4. The significant effect of extracurricular engagement, and the absence of significant age or sex effects, indicate that sustainability literacy in this sample was shaped more by what students actively did — formal study and voluntary engagement alike — than by who they were demographically. The strong, convergent qualitative call for practical, integrated and

practitioner-connected sustainability teaching provides a rich, student-grounded elaboration of the curriculum-integration gap identified.

## 4.12 Chapter Summary

This chapter presented and analyzed data from 98 Business and Management students studying at UK universities. The research instrument demonstrated good-to-excellent internal consistency across all scales. Sustainability literacy was found to be a very strong, statistically significant predictor of perceived managerial competence, providing robust support for $H_1$. Students who had undertaken formal sustainability-related curriculum content reported significantly higher literacy and competence than those who had not, substantially supporting $H_2$, with the data pattern suggesting that this effect operates through literacy rather than as an independent, parallel pathway. Level of study and work experience did not significantly moderate the literacy–competence relationship, and $H_3$ was therefore not supported on the moderation test, although work experience showed a significant positive main effect on both literacy and competence. Supplementary analysis showed that extracurricular engagement, but not age or sex, was significantly associated with sustainability literacy, and open-ended responses converged on a strong student desire for more practical, integrated and practitioner-connected sustainability teaching.

CHAPTER FIVE

# 5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.1 Introduction

This final chapter draws together the thesis. Firstly, it summarizes the study and its methodological approach, answering each research question in turn based on the findings presented in Chapter Four. It also sets out the study's conclusions and its contribution to knowledge, while offering recommendations for practice, policy and future research. It finally discusses the limitations of the study, while providing the researcher's concluding remarks.

## 5.2 Summary of the Study

This study sets out to evaluate sustainability literacy among Business and Management students in UK universities and to examine its relationship with their perceived future managerial competence. Chapter One established the rationale for the study against the backdrop of the escalating global sustainability agenda and the growing expectation that business graduates enter the workforce equipped to manage sustainability-related challenges. Chapter Two critically reviewed the literature on sustainability literacy, Education for Sustainable Development, and managerial competence; identified a set of interconnected gaps in this literature and developed an integrated theoretical framework, drawing on Competence-Based Theory, Transformative Learning Theory, Human Capital Theory and the Triple Bottom

Line, from which three hypotheses were derived. Chapter Three set out a quantitative, cross-sectional research design, using a self-administered online questionnaire combining a knowledge- and scenario-based sustainability literacy test with validated self-report scales, distributed to Business and Management students across UK universities. Chapter Four presented and analyzed the resulting data from 98 eligible respondents, testing the reliability of the instrument, the three research hypotheses, and a range of supplementary demographic and qualitative findings.

## 5.3 Summary of Key Findings: Answering the Research Questions

**RQ1: What is the current level of sustainability literacy among business students in UK universities?**

Sustainability literacy among the sampled UK Business and Management students was, on average, high. The composite Sustainability Literacy Index averaged 4.11 out of 5 (SD = 0.63), and mean knowledge test performance was 8.34 out of 10 (83.4%). Performance was strongest on declarative/definitional knowledge (e.g., the purpose of the SDGs, 96.9% correct; the definition of sustainable development, 94.9% correct) and weakest on applied managerial judgement (the supplier wastewater scenario, 52.0% correct), and on the specific terminology item on ESG (70.4% correct). This indicates a student population that is broadly sustainability-literate at the level of concepts and definitions, but less consistently able to apply that knowledge to ambiguous, realistic managerial scenarios — addressing Objective (a).

**RQ2: How do students perceive their managerial competence in sustainability-related contexts?**

Perceived managerial competence was also high, averaging 4.05 out of 5 (SD = 0.75) across the Decision-Making, Leadership and Strategic Competence subscales, which themselves produced very similar mean scores (4.03, 4.01 and 4.10 respectively), indicating a broadly even

self-assessed profile across the three competence dimensions defined in Section 3.7 rather than a marked strength or weakness in any one domain. Students additionally reported a strongly positive perceived impact of their sustainability education on their own career readiness (M = 4.22), addressing Objective (b), although open-ended responses suggest this confidence is perceived by students themselves as more theoretical than practically tested.

**RQ3: Does sustainability literacy significantly predict perceived managerial competence?**

Yes. Sustainability literacy was a very strong, statistically significant, positive predictor of perceived managerial competence, explaining 79.6% of the variance in competence on its own ($R^2 = .796$, $p < .001$) and remaining a robust predictor after controlling for level of study, work experience and curriculum exposure. This directly addresses Objective (c) and provides empirical support for $H_1$. Students who had undertaken formal sustainability curriculum content also showed significantly higher literacy and competence than those who had not ($H_2$, substantially supported), although level of study and work experience did not significantly moderate the strength of the literacy–competence relationship itself ($H_3$, not supported on the moderation test, though work experience showed a significant main effect on both variables).

**RQ4: What demographic or academic factors influence sustainability literacy levels?**

Age and sex were not significantly associated with sustainability literacy in this sample. Year of study showed a significant, modest association, with literacy tending to be higher among postgraduate and final-year undergraduate respondents than among first- and second-year undergraduates. Work experience and, separately, participation in sustainability-related extracurricular activity were both significantly associated with higher literacy and higher perceived competence. This addresses Objective (d) and indicates that literacy in this population is shaped more by academic progression and active engagement, curricular and extracurricular alike, than by demographic characteristics such as age or sex.

**RQ5: How can business schools enhance sustainability literacy to improve managerial competence?**

The quantitative finding that curriculum exposure operates on competence largely indirectly, through literacy, together with the qualitative finding that students overwhelmingly want more practical, integrated and practitioner-connected sustainability teaching (Section 4.10), together point toward specific, actionable curriculum design implications.

## 5.4 Conclusion

This study has achieved its stated aim and each of its five objectives. It has measured sustainability literacy among undergraduate and postgraduate Business and Management students at UK universities (Objective a); assessed their perceived managerial competence in sustainability-related decision-making (Objective b); empirically established and quantified a strong positive relationship between the two constructs (Objective c); identified the demographic and academic factors associated with literacy (Objective d); and, in Section 5.5 below, translated these findings into concrete recommendations for curriculum design (Objective e).

In doing so, the study directly addresses the gaps identified in literature reviewed. It provides UK-specific, business-education-specific, quantitative, hypothesis-tested evidence of the empirical relationship between sustainability literacy and managerial competence, an association that the literature had, until now, more often asserted conceptually than tested formally. It integrates Competence-Based Theory, Transformative Learning Theory, Human Capital Theory and the Triple Bottom Line within a single explanatory model, rather than treating them within separate disciplinary silos. It provides evidence, through the mediation-consistent pattern observed for $H_2$, of the mechanism by which curriculum exposure translates into perceived competence, moving the literature beyond simple assertions of institutional

commitment toward a testable account of individual-level curricular effect. And it extends the evidence base for the moderating role of academic level and work experience, even where, in this dataset, moderation itself was not confirmed.

The central contribution of the study is therefore both empirical and theoretical: it demonstrates, with UK business-education-specific data, that sustainability literacy is not merely a desirable complement to managerial education but a substantial and statistically robust predictor of how competent future managers perceive themselves to be, and it offers a theoretically grounded, multi-framework account of why and how that relationship arises.

## 5.5 Recommendations

### 5.5.1 Recommendations for Business Schools and Curriculum Designers

- Embed sustainability across the core curriculum rather than confining it to a single elective module. The finding that curriculum exposure operates on competence primarily through building literacy, together with students' own explicit call for cross-modular integration , suggests that sustainability content should be threaded through strategy, finance, operations and marketing modules, consistent with the Advance HE/QAA (2021) guidance discussed , rather than delivered as a standalone, elective topic.s
- Increase the proportion of applied, scenario-based and practice-oriented learning relative to declarative content delivery. The gap between strong performance on definitional knowledge items and weak performance on the applied managerial scenario item (Figure 4.4) indicates that students are well versed in sustainability concepts but less confident translating them into managerial judgement; case studies,

live employer projects and simulations were the most frequently requested improvement by respondents themselves.

- Strengthen links with employers and sustainability practitioners, through guest teaching, mentoring or employer-led assessed projects, to connect classroom learning to workplace practice and directly address the practitioner-engagement theme identified in the open-ended responses.
- Actively promote and resource sustainability-related extracurricular activity (societies, challenges, volunteering), given the significant, independent association found between such engagement and both literacy and perceived competence; this represents a complementary, lower-cost lever alongside formal curriculum reform.
- Target curriculum reinforcement at earlier stages of undergraduate study, given the significant association between year of study and literacy (Table 4.13), to bring first- and second-year undergraduates' literacy levels closer to those observed among final-year and postgraduate students.

### 5.5.2 Recommendations for Policy Makers and Sector Bodies

- Sector bodies such as Advance HE and the QAA should consider extending existing ESD guidance (Advance HE/QAA, 2021) with business-education-specific implementation guidance, given that this study found the general commitment to embedding sustainability documented in the wider UK ESD literature does not, on its own, guarantee integration in practice.
- Accreditation bodies for business and management programmes (for example, in the context of AACSB, EQUIS or PRME-aligned provision) should consider requiring evidence of applied, assessed sustainability content, rather than evidence of module

availability alone, in recognition of the applied-versus-declarative gap identified in this study.

- Funders and sector bodies should consider supporting the development of a shorter, UK business-education-validated sustainability literacy instrument, building on the Sulitest®/TASK™ approach used in this study, to make routine institutional benchmarking of sustainability literacy more practicable.

### 5.5.3 Recommendations for Future Research

- Future studies should replicate this design with a larger, more balanced sample across undergraduate and postgraduate levels, to provide adequate statistical power to test the moderating role of level of study and work experience more conclusively than was possible here.
- Future research should employ a longitudinal or quasi-experimental design, tracking students before and after curriculum exposure, to test the mediation pattern identified more directly than the cross-sectional design used in this study permits.
- Future studies should consider incorporating an independently assessed or supervisor-rated measure of managerial competence alongside student self-report, to address the common-method-variance concern discussed and to test whether the very strong self-report correlations observed here hold when competence is assessed independently of the respondent.
- Future research should extend this line of enquiry beyond Business and Management students to other disciplines with significant managerial career pathways, and beyond the UK, to test the generalizability of the findings reported here.

## 5.6 Limitations of the Study

This study is subject to several limitations. First, the final analytic sample (N = 98) fell marginally short of the indicative target of 100–150 and was unevenly distributed across some subgroups, in particular level of study (22 undergraduate versus 76 postgraduate); this most plausibly limited statistical power to detect the moderation effects tested under $H_3$, and findings of non-significant moderation should be interpreted with this in mind rather than as definitive evidence of no effect. Second, both sustainability literacy (with the exception of the objectively-scored knowledge subscale) and perceived managerial competence were measured through self-report administered within the same questionnaire; the very high correlations observed between the self-report subscales and the competence measure are consequently likely to be inflated to some degree by common method variance, a concern partially, but not fully, mitigated by the weaker, more conservative correlation observed for the independently-scored knowledge subscale. Thirdly, the cross-sectional design captures relationships at a single point in time and cannot establish causal direction; the mediation-consistent pattern reported for $H_2$ is therefore best read as suggestive rather than confirmatory of a causal curriculum-to-literacy-to-competence pathway. Finally, as a self-selecting online sample of Business and Management students at a subset of UK universities, the findings may not generalize fully to the wider UK business student population or to other disciplines.

## 5.7 Concluding Remarks

This study set out to establish whether, and how, sustainability literacy relates to the perceived managerial competence of the UK's future business leaders. The evidence gathered provides a clear, statistically robust answer: sustainability literacy is very strongly and positively associated with how competent Business and Management students perceive themselves to be as future managers, an association that formal curriculum exposure appears to build largely by

strengthening literacy itself. As UK business schools continue to respond to the imperative of embedding sustainability within managerial education, the findings and recommendations presented in this thesis offer an evidence-based starting point: not simply to teach sustainability, but to teach it in ways — integrated across the curriculum, applied rather than purely declarative, and connected to practice — that translate literacy into the managerial competence that tomorrow's sustainability challenges will demand.

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# APPENDIX

## PARTICIPANT INFORMATION SHEET

**Evaluating Sustainability Literacy Among University Students and Its Influence on Future Managerial Competence: A Study Of Future Business Leaders In UK Universities**.

**Participant Information Sheet and Consent Form**

I am **Emmanuel C. Ukachukwu**, a Postgraduate student at **York St. John University, London Campus**, currently enrolled in MRes Management Studies Programme. I am conducting this research as part of my thesis under the supervision of Dr. Adebowale Samuel Adeshipo (Senior Lecturer in Business Management and Health Studies: Management Studies Programme Director: Deputy Module Director Thesis in Management Studies).

You are invited to take part in a research study titled:

**Evaluating Sustainability Literacy Among University Students And Its Influence On Future Managerial Competence: A Study Of Future Business Leaders In UK Universities**.

Before you decide whether or not to take part in this research, it is important to provide information as to why the research is being conducted and what it will involve. Please read the following information carefully, and if anything is unclear or you would like further information, please contact me using the details at the end of this document.

**Purpose of Study.**

This study seeks to evaluate sustainability literacy among business and management students in UK universities and examine its impact on their perceived future managerial competence. It specifically seeks to investigate the level of sustainability literacy among students, while assessing how this knowledge shapes perceived future managerial competence in sustainability-related decision-making.

**What is required of you**

If you consent to take part, you will be asked to read the Participant Information Sheet and provide consent before completing an online questionnaire hosted on Google Forms.
The questionnaire includes:

- Screening and Demographic information.
- Multiple Choice questions to assess Sustainability Literacy.
- Structured questions about sustainability attitudes, behaviour and competence.
- Structured questions on perceived managerial competences.
- A few open-ended questions to capture personal thoughts.

The survey will take approximately 10-15 minutes to complete. Participation is entirely online. No gratification or compensation will be provided for taking part in this survey. Participation is entirely voluntary. If you choose to participate;

- You may skip any questions you do not want to answer
- You may withdraw at any time without penalty.

**Why have you been invited to take part?**

You have been invited because you are:

- An adult (18 years or older)
- Currently a student (undergraduate or postgraduate)
- Currently enrolled in any Business or Management related course in a UK University.

No Specialist knowledge is required.

**What happens to the information in the project?**

- All responses are fully anonymous; no identifying information will be collected
- Data will be stored securely on a password-protected Google Drive
- Access will be limited to the researcher and the academic supervisor
- Data will be retained for 1 year and then securely deleted
- The data will be used strictly for academic purposes, including the dissertation and possible academic publication
- All findings will be reported in a way that ensures participants cannot be identified.

**What happens next?**

If you are happy to take part, you will be asked to confirm your consent by selecting an agreement option before proceeding to the questionnaire.
If you choose not to participate, you may exit the survey at this stage.

This study has received ethical approval from the:
MRes Management Studies Ethics Team, York St John University (London Campus).

**Researcher Contact Details**

**Emmanuel C. Ukachukwu**
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**Dr Adebowale Samuel Adeshipo**
York St John University, London Campus
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**Independent Ethics Contact**

If you have any concerns or wish to speak to an independent party, please contact:

**MRes Management Studies Ethics Team**
York St John University, London Campus

Email: mreslondonethics@yorksj.ac.uk

# QUESTIONNAIRE

SECTION A: SCREENING AND DEMOGRAPHIC INFORMATION
Please tick (√) the most appropriate box for each item
A1. Are you currently enrolled in a business or management programme in a UK university?
Yes
No
A2. Level of study
Undergraduate
Postgraduate taught
Postgraduate research
Other

A3. Year of study
1st year
2nd year
3rd year
Final year
Postgraduate

A4. Age Range
18-24
25-34
35-44
45-54
55-64
65 or above

A5. Gender
Female
Male
Non-binary
Prefer not to say
Other

A6. University name
Open response

A7. Subject area
Business
Management
Accounting and Finance
Marketing
Economics
Other

A8. Have you taken any sustainability-related module or course?
Yes
No
Not sure

A9. Have you participated in any sustainability-related extracurricular activity?
Yes
No
Not sure

A10. Have you had any work placement, internship, or managerial work experience?
Yes
No

SECTION B: SUSTAINABILITY LITERACY/APPLIED KNOWLEDGE TEST
Please tick (√) the most appropriate box for each item. (Adapted from TASK™ by Sulitest©)
B1. The main goal of Sustainable Development is:
A. Meeting present needs without compromising the ability of future generations to meet their own needs
B. Maximizing profit in the short term

C. Increasing consumption
D. Reducing regulation
B2. Which is most closely associated with corporate responsibility toward society?
A. CSR
B. GDP
C. ROI
D. CPI
B3. How many Sustainable Development Goals (SDGs) were adopted by the UN in 2015 as part of the 2030 Agenda?
A. 17
B. 19
C. 15
D. 24
B4. Which of the following best represents the triple bottom line?
A. People, Planet, Profit
B. Sales, Costs, Tax
C. Growth, Revenue, Market Share
D. Supply, Demand, Price
B5. Which type of energy source is considered central to decarbonizing the global economy?
A. Kinetic Energy.
B. Renewable Energy.
C. Electrical Energy.
D. Potential Energy.
B6. The SDGs are primarily intended to support:
A. Global sustainable development
B. Short-term industrial growth only
C. National tax reform
D. Private company profits only
B7. ESG stands for:
A. Environmental, Social, Governance
B. Energy, Sustainability, Growth
C. Ethical, Social, Green
D. Environmental, Strategic, Global

Scenario 1:
A UK-based clothing company discovers that one of its overseas suppliers has been discharging untreated wastewater into a local river. The supplier offers a 20% discount if the company agrees not to terminate the contract.

B8. What is the most sustainable managerial response?
A. Accept the discount to protect profit margins
B. Terminate the contract and publicly report the violation
C. Work with the supplier to improve wastewater treatment practices
D. Ignore the issue because it is outside the UK

Scenario 2:

A university aims to reduce its carbon emissions by 40% by 2030.
B9. Which option provides the most effective long-term impact?
A. Switching to LED lighting
B. Purchasing carbon offsets
C. Investing in renewable energy infrastructure
D. Encouraging students to recycle more

Scenario 3:
A company plans to build a new warehouse near a residential area. Local residents express concerns about noise and traffic.

B10. What is the most responsible managerial action?
A. Proceed without consultation.
B. Hold stakeholder meetings and adjust plans accordingly.
C. Offer financial compensation only.
D. Relocate residents to another area.

SECTION C: SUSTAINABILITY ATTITUDES, BEHAVIOUR AND COMPETENCES
Please indicate your level of agreement with the following statements (1=Strongly Disagree, 2=Disagree, 3=Neither agree/disagree, 4= Agree, 5= Strongly agree)
Sustainability Attitudes
C1. Businesses should balance profit with social and environmental responsibility.
C2. Managers have an ethical duty to support sustainable practices.
C3. Sustainability should be embedded in business strategy.
C4. Long-term value creation is more important than short-term profit.
C5. Environmental and social issues should influence managerial decisions.

C6. Sustainability education is important for future business leaders.

Sustainability Behaviour
Response scale for C7–C10:
1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always

C7. I consider environmental impacts when making personal purchasing decisions.
C8. I reduce waste through recycling or reuse where possible.
C9. I seek information about sustainability in business.
C10. I participate in sustainability-related university activities.
Applied Sustainability Competence
Response scale for C11–C15:
1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree
C11. I can analyse business problems from economic, social, and environmental perspectives.
C12. I can identify trade-offs involved in sustainable decision-making.
C13. I can evaluate whether a business strategy is sustainable.

C14. I can propose practical solutions to sustainability challenges.
C15. I feel confident discussing sustainability in a management context.

SECTION D: PERCIEVED MANAGERIAL COMPETENCE
Please indicate how strongly you agree or disagree with each statement.
Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree
Decision Making competence
D1. I can make decisions that balance economic, social and environmental factors.
D2. I consider long-term impacts when making decisions.
D3. I am confident in addressing sustainability challenges in business.
Leadership competence
D4. I can lead teams towards sustainable goals.
D5. I can influence others to adopt sustainable practices.
D6. I value ethical leadership in business.
Strategic competence
D7. I can integrate sustainability into business strategy
D8. I understand how sustainability can create competitive advantage.
D9. I can identify sustainability risks and opportunities.

SECTION E: PERCIEVED IMPACT OF SUSTAINABILITY LITERACY
Please indicate how strongly you agree or disagree with each statement.
Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree
E1. A clear understanding of sustainability prepares me for future managerial roles
E2. My sustainability knowledge enhances my managerial decision making.
E3. Sustainability Education improves leadership abilities.
E4. Sustainability literacy is essential for contemporary managers.

SECTION F: OPEN ENDED QUESTIONS
F1. How do you think sustainability education influences your career readiness.
F2. What improvements would you suggest for sustainability teaching in your course of study.