SUSTAINABLE PROJECT MANAGEMENT THROUGH PM²

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Deliverable 2.2
SPM²: Mapping Competence Gaps and Standardizing Roles in Sustainable Project Management

Industry Survey Report

WP2 – Stakeholder engagement, needs analysis, and SPM² Guide preparation

Co-funded by the European Union

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Description of the Deliverable: (3-5 lines)	This report presents the results of an online survey conducted among industry professionals to assess current and future competence needs related to sustainable project management. The findings inform the development of standardized professional profiles and serve as a foundation for aligning educational interventions with real-world sustainability expectations across sectors.
Key Words:	*Sustainable project management, competence needs, stakeholder survey, professional profiles, skills gap, sustainability standards, industry alignment*

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About the SPM² Initiative

The *Sustainable Project Management Through PM²* - **SPM² initiative** aims to integrate sustainability principles into the PM² project management methodology, addressing critical gaps in sustainable practices across industries and education. By developing comprehensive tools, frameworks, and training programs, the project supports professionals and institutions in aligning with green and digital transitions, fostering long-term impact and sustainability.

Key Objectives

1. **Develop the SPM² Guide and Digital Resource Hub**:
    - A practical guide and online platform providing tools, templates, and educational resources for sustainable project management.
    - **Indicators**: 200+ downloads within the first three months, 500+ user engagements.
2. **Standardize Professional Profiles and Curriculum**:
    - Define essential competencies and align HEI and VET curricula to industry standards.
    - **Indicators**: Adoption by HEIs and VETs, industry validation, and surveys evaluating curriculum relevance.
3. **Establish Micro-Credential Framework**:
    - Design ISO-compliant micro-credentials for SPM² skills with flexible, scalable frameworks.
    - **Indicators**: Development of 4-6 micro-credentials, 300 pilot participants, and partnerships with accreditation bodies.
4. **Secure Endorsement and Certification**:
    - Institutionalize SPM² methodology through widespread adoption by HEIs, VETs, and industry partners.
    - **Indicators**: Endorsements from 3+ European decision-makers and real-world case studies.

Target Groups

- **Primary**: HEIs, VET providers, project managers, and students seeking to embed sustainability in project management practices.
- **Secondary**: NGOs, policymakers, and industry partners advocating for sustainable development.

Expected Outcomes

1. Comprehensive SPM² Guide and resource hub to enable widespread adoption.
2. Industry-aligned professional profiles and curriculum fostering sustainable project management education.
3. Flexible micro-credential framework to support lifelong learning and professional mobility.
4. Institutionalized SPM² methodology through certifications and endorsements.

Executive Summary

The "SPM²: Mapping Competence Gaps and Standardizing Roles in Sustainable Project Management" report presents key findings from an extensive cross-sectoral survey conducted among 986 industry professionals across 15 countries, aiming to identify competence gaps and role expectations in the field of sustainable project management (SPM). The survey gathered input from respondents occupying diverse project-related roles, with varying years of experience, operating across industries such as energy, construction, IT, manufacturing, and education. Through an extensive survey the study gathered insights on essential competencies, current organizational practices, and educational needs for effective SPM. This inquiry engaged a broad spectrum of stakeholders – from project managers and program directors to educators and industry experts – ensuring that the findings reflect multiple perspectives on the evolving role of sustainability in project work. The result is a rich portrayal of the current state of SPM competencies and clear indications of what is required to equip the next generation of project managers for sustainable practice.

The survey reveals a strong **recognition of sustainability's importance** in project management, coupled with noticeable gaps in implementation. **Many organizations have begun embedding environmental and social considerations** into their projects, aligning with global sustainability trends, yet **governance aspects lag behind**. Nearly one-third of responding organizations report taking a *holistic ESG approach* (addressing environmental, social, and governance dimensions in tandem), signalling a comprehensive sustainability strategy in those cases. However, a significant fraction of firms either focus on only one ESG dimension or have **no sustainability initiatives at all** (over 20% of respondents indicated that ESG efforts were *"Not Applicable"* in their context). This indicates that while pockets of best practice exist, **sustainability integration in project management is uneven**, with clear room for broader adoption of governance and ethical management practices.

Crucially, **practitioners across roles consistently rate sustainability-related competencies as highly important but report lower performance levels in these areas within their organizations**. This disparity between perceived importance and current performance was evident across multiple project lifecycle phases, underscoring a **competency gap**. For example, capabilities such as implementing sustainable solutions and delivering project outputs with lasting social/environmental value are widely seen as essential, yet organizations struggle to excel in them. Such gaps – on the order of half a point on a five-point scale in key areas – highlight an urgent need for capacity building. In effect, project managers *want* to drive sustainability in their projects, but often **lack the tools, processes, or organizational support** to do so at the desired level. This finding underlines the importance of targeted interventions (training, methodology development, better governance

frameworks) to bridge the implementation gap between knowing *what* to do and *how* to do it.

The needs analysis also pinpointed **future-facing requirements for education and professional development**. Respondents expressed strong support for integrating SPM competencies into curricula and certification frameworks. There is a clear preference for **practical, flexible learning formats** to build sustainability skills: short, focused courses and employer-led workshops were rated as the most effective ways to address ESG skill gaps, far above traditional long-term programs. This suggests that working professionals favor accessible upskilling opportunities that can be readily applied on the job. Correspondingly, the survey identified **barriers that must be overcome** to mainstream SPM education. The most prominent challenges include a general *lack of awareness* about SPM's importance in some organizations and a *shortage of qualified trainers* or faculty with the dual expertise in sustainability and project management. Additional obstacles such as limited interdisciplinary programs, insufficient employer support for continued education, and difficulties in translating sustainability theory into practice were noted, painting a realistic picture of the hurdles educational institutions and industry trainers face.

Despite these challenges, the overall stakeholder sentiment is very encouraging: **an overwhelming majority agrees that sustainability should be a core priority in project management education and professional standards**. Over 70% of survey participants believe that higher education institutions and training providers must prioritize ESG and SPM topics in project management programs, and only a small minority dissent. Likewise, there is broad consensus that **formal certification in SPM** should be available – most favor it as an *optional* add-on for flexibility, while a substantial group even advocates making it *mandatory* for project professionals. This consensus establishes a strong mandate for change: the project management community is ready and eager for SPM principles to be embedded in how project managers are educated, certified, and developed.

In summary, the survey-driven needs analysis performed in WP2 highlights that **sustainable project management is no longer a niche concern but a strategic imperative** for the profession. It provides evidence that project practitioners are calling for more structured guidance, training, and organizational support to integrate sustainability into their daily work. These insights form the foundation for the SPM² project's next steps in developing a **standardized SPM competency profile and guide**. By clearly identifying what knowledge, skills, and mindsets define a "sustainable project manager," and understanding the gaps and needs from the field, the project can craft targeted educational materials and policy recommendations. The findings ultimately reinforce the urgency of aligning project management practices with global sustainability goals and will directly inform the creation of curriculum content, professional development programs, and stakeholder engagement strategies to make Sustainable Project Management a norm in both academia and industry.

1. Introduction

1.1 BACKGROUND AND RATIONALE FOR THE RESEARCH

In the evolving field of Sustainable Project Management (SPM), there is an increasing need to understand the education and competency requirements of professionals who integrate sustainability principles into their project work. To address this, an online survey was conducted as part of Work Package 2, which is dedicated to stakeholder engagement and needs analysis. The survey aimed to capture detailed insights directly from the project management community regarding the essential competencies, training needs, and professional profiles necessary for effective SPM practices.

1.2 THE ROLE OF SUSTAINABLE PROJECT MANAGEMENT (SPM) IN MODERN PROJECT ENVIRONMENTS

In an era marked by growing environmental concerns, social responsibility, and corporate governance challenges, Sustainable Project Management (SPM) has become a crucial framework for aligning project execution with sustainability principles. Organizations worldwide are increasingly recognizing the need to integrate sustainability into project management methodologies to ensure long-term value creation, regulatory compliance, and positive societal impact.

The Evolution of SPM in Project Management

Traditional project management has primarily focused on meeting the triple constraints of time, cost, and scope. However, modern project environments demand a broader approach that incorporates environmental, social, and economic sustainability considerations into the entire project lifecycle. This paradigm shift is driven by:

- Regulatory frameworks, such as the European Green Deal and the UN Sustainable Development Goals (SDGs), which set clear sustainability targets for industries and projects.
- Market expectations, as organizations are pressured by investors, customers, and stakeholders to demonstrate sustainable practices.
- Industry-specific demands, where sectors like construction, IT, energy, and finance require dedicated sustainability strategies to meet compliance and operational efficiency goals.

Sustainable Project Management (SPM) is thus an integrated approach that ensures projects not only meet business objectives but also contribute to long-term environmental and social well-being.

Key Principles of Sustainable Project Management

SPM is founded on several core principles that guide project managers in embedding sustainability across all project phases:

1. *Lifecycle Thinking* – Projects should consider sustainability from initiation to closure, including the impact of deliverables beyond project completion.
2. *Stakeholder Engagement* – Project success is increasingly measured by stakeholder value, requiring active consultation with diverse groups such as regulators, communities, and investors.
3. *Resource Efficiency* – Effective use of materials, energy, and time is a key component of sustainable projects, ensuring waste reduction and cost savings.
4. *Risk and Opportunity Management* – SPM integrates sustainability-related risks (e.g., climate risks, regulatory changes) into traditional project risk management processes.
5. *Ethical Governance and Transparency* – Sustainable projects must adhere to ethical principles, ensuring compliance with legal requirements and fostering trust among stakeholders.

These principles reflect the broader shift towards responsible and resilient project management practices, ensuring organizations stay competitive in a rapidly evolving landscape.

SPM in Industry-Specific Applications

Sustainable Project Management is being adopted across multiple industries to drive green innovation, efficiency, and responsible business practices. Some key sectoral applications include:

- *Construction & Infrastructure*: Green building standards such as BREEAM and LEED are increasingly integrated into project planning to reduce carbon footprints and improve energy efficiency.
- *Renewable Energy Projects*: Project managers play a pivotal role in deploying solar, wind, and hydropower projects while ensuring compliance with environmental regulations.
- *Information Technology & Digital Transformation*: IT project managers integrate sustainability by optimizing energy use in data centers, reducing e-waste, and adopting cloud-based solutions.
- *Finance & Investment*: Sustainable project finance is growing, with organizations focusing on green bonds, ESG-focused investments, and impact assessments.
- *Manufacturing & Supply Chain*: Circular economy principles are influencing projects, ensuring sustainable production methods and responsible resource consumption.

Each of these industries demonstrates how SPM principles contribute to operational efficiency, regulatory compliance, and long-term value creation.

Challenges and Future Directions for SPM

Despite the growing recognition of SPM's importance, challenges remain in fully integrating sustainability into project management practices:

- *Skills and knowledge gaps:* Many project managers lack specialized training in sustainability-related methodologies.
- *Measurement difficulties:* Quantifying sustainability impact and aligning it with traditional project success metrics remains complex.
- *Regulatory complexity:* Navigating evolving sustainability laws and compliance requirements adds complexity to project execution.
- *Resistance to change:* Some organizations still view sustainability as an additional cost rather than a value-generating opportunity.

Addressing these challenges requires better education, standardized frameworks, and increased stakeholder collaboration. As sustainability continues to shape the future of project management, SPM will be a defining factor in how organizations plan, execute, and evaluate projects in the modern business environment.

1.3 LITERATURE REVIEW

Sustainable Project Management (SPM) represents a paradigm shift in how projects are conceived, planned, and delivered. It extends the traditional project management framework by embedding environmental, social, and economic sustainability considerations throughout the project lifecycle (Martens & Carvalho, 2017). Rather than treating sustainability as an external requirement or a final evaluation criterion, SPM positions it as a core value integrated into all phases—from initiation to closure and beyond.

The literature highlights the growing relevance of SPM in response to global trends, such as climate change, regulatory shifts, and the evolving expectations of stakeholders (Kivilä et al., 2017). This shift is particularly prominent in Europe, where policy initiatives such as the European Green Deal and the UN Sustainable Development Goals (SDGs) have stimulated widespread organizational transformation (European Commission, 2019; UNEP, 2022). The integration of sustainability into project management is also formalized through emerging standards such as the GPM P5 Standard, which explicitly links project outcomes to environmental and social performance metrics.

SPM is characterized by several critical competencies that extend beyond the traditional project manager's skillset. These include systems thinking, life cycle analysis, stakeholder engagement, environmental impact assessment, and change management (Gareis et al., 2013; Martens & Carvalho, 2017). According to recent

studies, these competencies are increasingly in demand across sectors such as renewable energy, infrastructure, construction, IT, and finance (PwC, 2022; Saarinen & Aarikka-Stenroos, 2022).

Notably, the literature underscores a shift from reactive compliance approaches to proactive value creation models. Project managers are not only responsible for meeting deadlines and budgets but also for ensuring that projects contribute to long-term sustainability outcomes, including reduced emissions, social equity, and circular economy practices (GPM Global, 2020; Laurin & Fantazy, 2017).

From a methodological perspective, SPM leverages both traditional (e.g., Waterfall) and adaptive (e.g., Agile, Lean) approaches, often combining them into hybrid frameworks that allow for flexibility and stakeholder responsiveness (Sanchez, Hampson & Mohamed, 2015). Moreover, SPM requires familiarity with digital tools such as sustainability dashboards, carbon footprint calculators, and collaborative platforms for real-time monitoring and reporting.

Despite growing recognition, the literature also highlights several barriers to the adoption of SPM. These include a lack of standardized competency profiles, limited availability of training programs, and organizational resistance to change (Meng & Shaikh, 2023). Nevertheless, the consensus in both academic and industry publications is clear: SPM is no longer optional but essential for project success in the 21st century.

This project builds upon the foundational literature by conducting empirical research to define a standardized professional profile for sustainable project managers. Through stakeholder engagement and survey-based needs assessment, we aim to bridge the gap between theory and practice, ensuring that the SPM² methodology reflects the realities and demands of current and future project landscapes.

1.4 OBJECTIVES OF THE SURVEY

The online survey was designed with the following key objectives:

- *Stakeholder Engagement:* To identify and categorize the diverse range of stakeholders involved in SPM, ensuring that the perspectives of project managers, educators, and industry experts are included.
- *Needs Analysis:* To gather comprehensive feedback on current challenges and opportunities in sustainable project management education. This includes understanding the expectations and requirements for standardized training programs and certification pathways.
- *Curriculum and Resource Development:* To inform the development of a standardized professional profile and curriculum framework by pinpointing the critical skills and competencies demanded by the industry.

- *Digital Learning Support:* To identify the key functionalities required for an effective digital resource hub that will provide accessible educational materials and facilitate knowledge sharing among SPM practitioners.

The findings from the online survey serve as the cornerstone for refining the SPM educational framework. They provide empirical evidence that will support the development of a validated SPM Guide, a standardized competency profile, and the requirements for a digital resource hub. In doing so, the survey directly contributes to aligning educational and professional development initiatives with the practical needs of those engaged in sustainable project management.

By focusing on the responses collected through the online survey, this report highlights the primary concerns, insights, and recommendations offered by practitioners and stakeholders. The resulting data not only underscores the growing importance of sustainability in project management but also offers a clear pathway for designing more effective training and certification programs tailored to the evolving demands of the industry.

2. Methodology

The research design for the SPM survey was built upon a robust methodological framework to ensure the reliability and validity of the findings. The development of the survey instrument was guided by a comprehensive review of Sustainable Project Management (SPM) frameworks, industry best practices, and competency models, and was further enriched by expert insights from business partners and academic specialists in project management education.

The questionnaire was carefully crafted through collaborative discussions among project partners, including a dedicated session during the kick-off meeting held on December 10, 2024, in Novi Sad. This meeting provided a platform for in-depth deliberation, ensuring that each survey question was thoughtfully designed to capture relevant and actionable data aligned with the research objectives. The structured and methodical approach reflected the project team's commitment to high methodological standards, integrating both theoretical foundations and real-world industry insights.

2.1.1 SURVEY DESIGN AND STRUCTURE

The online survey on Sustainable Project Management (SPM) was designed to gather insights into the competencies, organizational practices, and future expectations related to the integration of sustainability principles into project management. The survey was structured into five distinct sections, each focusing on different aspects of SPM to ensure a comprehensive assessment of stakeholder perspectives.

Survey Structure

The survey consists of **five main sections**, progressing from general demographic and organizational information to in-depth assessments of competencies and future expectations.

1. Respondent Background

This section aims to collect **demographic and professional information** from participants to allow segmentation of responses based on experience, seniority, certification status, and functional role. It includes:

- *Demographic information:* Age, education level, country of work.
- *Professional background:* Years of experience, seniority level, and industry sector.
- *Project management role:* Current job title, certification status, and primary work environment.

These questions help contextualize respondents' perspectives based on their industry experience and professional engagement with project management.

2. Organization Background

This section focuses on the characteristics of the organizations in which respondents operate. It includes:

- *Industry classification:* Identification of the respondent's sector (e.g., IT, construction, finance).
- *Company size:* Number of employees and operational years.
- *Sustainability integration:* Assessment of whether the organization has dedicated SPM roles, how long it has been integrating sustainability, and the organization's general approach (proactive, reactive, ad hoc).
- *Sustainability initiatives***:** Open-ended responses about ongoing sustainability efforts and focus areas (environmental, social, governance).

These insights provide an overview of how sustainability is currently being embedded at the organizational level.

3. Competencies for Sustainable Project Management (SPM)

This is the core section of the survey, structured around project lifecycle phases. Respondents are asked to rate the importance and organizational performance of key SPM competencies using a 5-point Likert scale (1 = Not relevant / Very poor; 5 = Essential / Excellent).

The competencies are divided into the following phases:

- *Initiation:* Setting sustainability-focused objectives, assessing sustainability impacts, and integrating sustainability into governance structures.

- *Planning:* Developing resource-efficient plans, embedding sustainability KPIs, green procurement strategies, and circular economy principles.
- *Execution:* Implementing sustainability solutions, engaging stakeholders, and ensuring compliance with sustainability standards.
- *Monitoring & Control:* Tracking sustainability metrics, managing sustainability-related risks, and ensuring compliance with sustainability frameworks.
- *Closing:* Capturing lessons learned, evaluating sustainability achievements, and ensuring long-term sustainability of project deliverables.

This section provides **quantitative data** on perceived importance vs. actual implementation of sustainability-related project management competencies.

4. Future Expectations and Key Challenges

This section explores emerging trends, training needs, and barriers related to the future of SPM, including:

- *Industry demand projection:* Expected growth in demand for SPM competencies over the next five years.
- *Trends shaping SPM adoption:* Regulatory changes, technological advancements, stakeholder pressure, and business strategy alignment.
- *Training and education priorities:* Preferences for training formats (university programs, certifications, employer-led workshops, micro-credentialing).
- *Barriers to SPM education and training:* Lack of awareness, high costs, and gaps in formal education.
- *Certification relevance:* Views on whether SPM-related certifications should be mandatory or optional.

This section provides **strategic insights** into how SPM competencies should be developed in educational and professional training programs.

5. Final Validation and General Feedback

The last section contains closing questions, including:

- Cross-sector collaboration in SPM education.
- Importance of integrating SPM in formal project management curricula.
- Final comments on improving SPM education and industry practices.

These open-ended and Likert-scale questions allow respondents to reflect on the survey topics holistically.

Types of Questions Used in the Survey

The survey uses a mix of question formats to ensure both structured and open-ended data collection:

1. *Multiple-choice questions:* Used for demographic, industry, and organizational classification.
2. *Likert scale ratings (1–5):* Used to assess the **importance and performance** of competencies in SPM.
3. *Open-ended questions:* Used for qualitative insights on sustainability initiatives, training needs, and challenges.
4. *Multiple-answer selection:* Used in sections where respondents can choose more than one option (e.g., industry trends influencing SPM).
5. *Yes/No questions:* Used to determine the presence of SPM-specific roles and initiatives within organizations.

2.1.2 TARGET POPULATION AND RESPONDENT DEMOGRAPHICS

The target population for this survey consisted of professionals actively engaged in Sustainable Project Management (SPM) or related fields, including:

1. *Project Management Professionals* – Practitioners managing projects across industries, with varying levels of experience in integrating sustainability principles into their work.
2. *Industry Leaders and Decision-Makers* – Executives, senior managers, and directors responsible for strategic implementation of sustainability initiatives within organizations.
3. *Educators and Researchers in Project Management* – Academics, trainers, and curriculum developers involved in SPM education, certification, and competency development.

This diverse respondent base was carefully selected to capture a holistic view of how sustainability principles are integrated into project management, identify competency gaps, and explore future needs for education and certification.

Rationale for Selecting These Groups

The inclusion of these three key stakeholder groups was essential to ensure the survey results reflect real-world practices, challenges, and expectations in Sustainable Project Management.

1. PROJECT MANAGEMENT PROFESSIONALS

Project managers and practitioners are at the forefront of SPM implementation within organizations. Their direct experience provides:

- Practical insights into the current integration of sustainability principles into project workflows.
- First-hand knowledge of challenges in balancing sustainability objectives with traditional project constraints (cost, time, scope).
- Competency assessments, helping to determine which skills are essential for sustainable project execution and where gaps exist.

- Industry-specific perspectives, ensuring that findings are relevant across different sectors (IT, construction, finance, healthcare, etc.).

By analyzing responses from this group, the survey helps in understanding how sustainability principles are currently being applied and what additional training may be required.

2. Industry Leaders and Decision-Makers

Senior professionals, including C-level executives, directors, and managers, were targeted to provide insights into organizational-level sustainability strategies and policies. Their role in the survey was to:

- Assess corporate sustainability priorities – Understanding the extent to which organizations prioritize sustainability and whether they have clear SPM guidelines in place.
- Evaluate the strategic alignment of SPM with organizational goals.
- Identify barriers and enablers – Insights into regulatory, financial, and cultural challenges influencing the adoption of sustainability in project management.
- Determine training and certification needs – What skills organizations expect from their project managers regarding sustainability.

Industry leaders provide a top-down perspective, ensuring that survey results align with both operational challenges and strategic sustainability objectives.

3. Educators and Researchers in Project Management

Educational institutions play a crucial role in shaping future project management professionals. This group was included to:

- Examine the current state of SPM education – How sustainability topics are integrated into project management curricula.
- Identify training gaps – Whether existing programs adequately prepare students for real-world sustainability challenges.
- Explore certification and competency standardization – Understanding how training programs and certifications should be structured.
- Strengthen academia-industry collaboration – Ensuring that education providers develop content that aligns with industry expectations.

Engaging educators ensures that findings can be used to inform curriculum development, create standardized learning paths, and enhance professional certifications.

Respondent Demographics

The survey aimed for broad representation across multiple dimensions, including:

1. *Experience Level* – From entry-level project managers to senior executives, ensuring insights across career stages.
2. *Industry Sectors* – Including IT, engineering, finance, construction, manufacturing, healthcare, and public administration, to capture sector-specific sustainability challenges.
3. *Global Reach* – While primarily targeting respondents from Europe, efforts were made to include perspectives from other regions where sustainability regulations and practices vary.
4. *Project Management Certification Status* – To assess whether formal project management certifications (PMI, PRINCE2, PM²) influence SPM adoption.
5. *Functional Roles* – Ensuring participation from professionals working in strategy, finance, operations, and sustainability departments, alongside project management.

SIGNIFICANCE OF A DIVERSE RESPONDENT BASE

A diverse and representative sample was necessary to:

- Understand how SPM competencies vary across industries and roles.
- Assess the impact of organizational size and structure on sustainability adoption.
- Capture regional differences in sustainability policies and regulatory compliance.
- Ensure that future training and certification recommendations are inclusive and widely applicable.

By targeting a broad range of professionals, the survey provides a comprehensive analysis of the current state of SPM and highlights the necessary steps for advancing education, competency frameworks, and industry best practices.

2.1.3 DATA COLLECTION PROCESS AND ETHICAL CONSIDERATIONS

The questionnaire was prepared exclusively in English, with the decision not to translate it into the languages of project partners based on several key considerations:

- Proficiency of SPM Professionals: Specialists in the field of project management and sustainability generally possess a sufficient level of English proficiency to accurately complete the survey.
- Consistency in Data Analysis: Using a single language ensures a more straightforward, consistent, and error-free analysis, eliminating potential discrepancies that may arise from translation variations.
- Terminological Precision: Many SPM-related terms do not have direct equivalents in other languages. Keeping them in English ensures clarity, uniformity, and alignment with established international standards.
- Efficiency in Survey Administration: Managing a single-language questionnaire reduces administrative complexity, streamlines the data collection process, and enhances data integrity.

Following the kick-off meeting, the SPM survey underwent a rigorous Validation and Piloting phase to ensure the quality, clarity, and effectiveness of the questionnaire before its official launch. The data collection process was structured to achieve high response rates and meaningful engagement from the target population, aligning with project objectives.

Survey Validation and Pretesting

Before its launch, the survey underwent a pretesting phase with 5–10 industry professionals to evaluate:

- *Question clarity and wording* – Ensuring that terminology used in the survey was understandable and relevant to project management professionals.
- *Survey length and structure* – Assessing the optimal time required to complete the survey and refining the flow of questions for a logical progression.
- *Relevance to SPM competencies* – Confirming that questions effectively captured insights on SPM skills, industry needs, and future expectations.

Refinements were made based on the feedback received, including adjustments to wording, removal of ambiguities, and streamlining of sections to improve response quality.

Ethical Considerations

To ensure compliance with ethical research standards and data protection regulations, several measures were implemented:

Informed Consent: A consent statement was included at the beginning of the survey, outlining:

- *Voluntary participation* – Respondents could exit the survey at any time.
- *Anonymization of responses* – No personally identifiable information was collected.
- *Purpose of data collection* – Data would only be used for the research project.
- *Compliance with GDPR and international data protection laws*, ensuring responsible handling of data.

The consent statement read: *"Your participation in this survey is voluntary, and your responses will be anonymized and used solely for the Sustainable Project Management (SPM) research initiative. By continuing, you agree to the collection and processing of your data in compliance with applicable EU, international, and national data protection laws (in particular, Regulation 2016/679, Directive 95/46/EC (GDPR))."*

Expert Review and Technical Validation

To ensure methodological rigor and alignment with project objectives, the survey was reviewed by SPM and project management experts from multiple institutions. This review focused on:

- Ensuring relevance to the competency framework for Sustainable Project Management.
- Verifying alignment with current industry practices in project sustainability.
- Ensuring clarity and neutrality in the phrasing of survey items.

Additionally, technical validation was conducted to guarantee smooth implementation:

- *Cross-platform testing:* The survey was tested on various devices (desktop, tablet, mobile) to ensure accessibility.
- *Browser compatibility checks:* Ensured that the questionnaire functioned correctly across different browsers.
- *Accessibility verification:* Ensured compliance with web accessibility standards.

Survey Administration and Data Collection

The SPM survey was implemented using LimeSurvey, an open-source platform known for its secure and flexible data collection capabilities. Key aspects of the data collection strategy included:

- Direct email invitations and follow-up reminders to targeted professionals.
- Engagement through professional networks such as LinkedIn and project management forums.
- Promotion via organizational channels of project partners, ensuring broad outreach across sectors.

Data Collection Timeline

- Survey launch: December 23, 2024
- Survey closure: February 1, 2025
- Total duration: 6 weeks, allowing ample time for participation while ensuring timely data analysis.

Response Tracking and Monitoring

- The survey platform was configured to prevent duplicate responses through IP tracking and email validation.
- Real-time response monitoring enabled project partners to track engagement levels and identify areas where additional outreach was required.

Survey Response Summary

The SPM survey achieved its data collection objectives, surpassing key participation targets outlined in the project proposal. A total of **986 responses** were collected, comprising:

- **754 fully completed surveys**, demonstrating a high level of engagement and commitment from respondents.
- 232 partial responses, which still contribute valuable insights for specific sections of the analysis.

With a completion rate of approximately **76.47%,** the survey not only exceeded the 70% target response rate but also reinforced the reliability and robustness of the collected data. Despite the length and complexity of the questionnaire, the high engagement levels indicate a strong interest in the topic and validate the relevance of the research. The large and diverse dataset will provide a solid foundation for further analysis, informing recommendations for competency development, training programs, and SPM integration strategies.

2.1.4 ANALYTICAL APPROACH

To ensure a rigorous and methodologically sound analysis of the collected survey data, a combination of statistical and data visualization tools was employed. The analysis was conducted using IBM SPSS Statistics Base 29.0 in conjunction with PS IMAGO PRO 10.0, while advanced visualizations were generated using Python and relevant data analysis libraries. This multi-tool approach provided a comprehensive framework for processing, interpreting, and presenting the survey results.

STATISTICAL ANALYSIS USING IBM SPSS STATISTICS AND PS IMAGO PRO

IBM SPSS Statistics, a widely recognized statistical analysis tool, was selected due to its robust capabilities in handling large datasets, conducting advanced statistical tests, and generating detailed reports. The analysis in SPSS and PS IMAGO PRO 10.0 included:

- *Descriptive Statistics* – Frequency distributions, mean values, standard deviations, and percentages were calculated to summarize key findings.
- *Cross-tabulations and Comparative Analysis* – To explore differences in responses across demographic groups, industries, and professional roles.
- *Reliability and Consistency Checks* – Ensuring internal consistency of competency-related ratings using Cronbach's Alpha where applicable.
- *Inferential Statistical Tests* – Where necessary, tests such as Chi-square, ANOVA, and correlation analysis were applied to determine statistical significance and relationships between key variables.

The PS IMAGO PRO 10.0 platform, an extension of SPSS, provided enhanced data visualization capabilities and automated reporting tools, ensuring that complex statistical results were accessible and easy to interpret.

Data Visualization Using Python

For the graphical representation of findings, Python was used in conjunction with specialized data visualization libraries, including:

- *Matplotlib* – For static and high-quality chart generation.
- *Seaborn* – For advanced statistical visualizations that highlight data patterns.
- *Pandas & NumPy* – For efficient data manipulation and numerical computations.

The decision to use Python for visualizations was based on its ability to:

- Generate dynamic, customizable charts tailored to the research needs.
- Provide advanced statistical visualizations that go beyond traditional SPSS capabilities.
- Ensure consistency with project branding by applying a standardized color scheme to all charts and graphs.

Ensuring Data Integrity and Accuracy

To maintain high data integrity and analytical accuracy, the following steps were taken:

- Data Cleaning and Preprocessing – Handling missing values, filtering invalid responses, and standardizing categorical variables.
- Automated Checks for Anomalies – Identifying outliers and inconsistencies in the dataset to ensure reliable results.
- Replication and Validation – Cross-checking key statistical findings across multiple analysis runs to confirm their robustness.

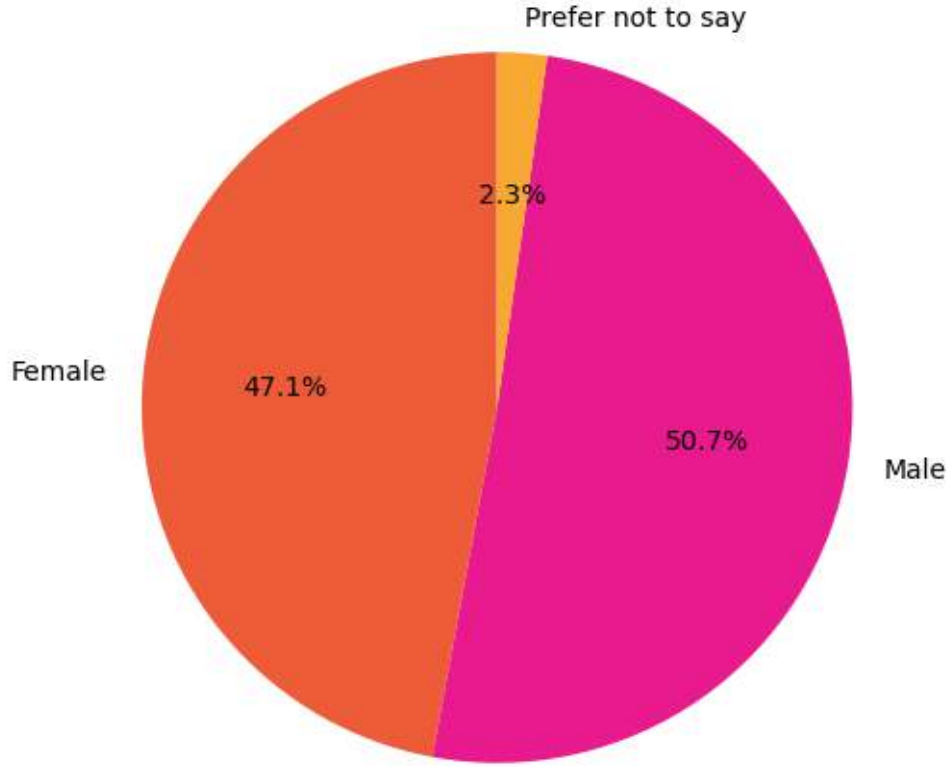
3. Respondent Profile

3.1 GENERAL DEMOGRAPHICS

3.1.1 Gender distribution.

The survey results indicate a nearly balanced gender distribution: Male: 382 respondents (50.7%), Female: 355 respondents (47.1%), Prefer not to say: 17 respondents (2.3%)

Figure 1 Gender Distribution of Respondents



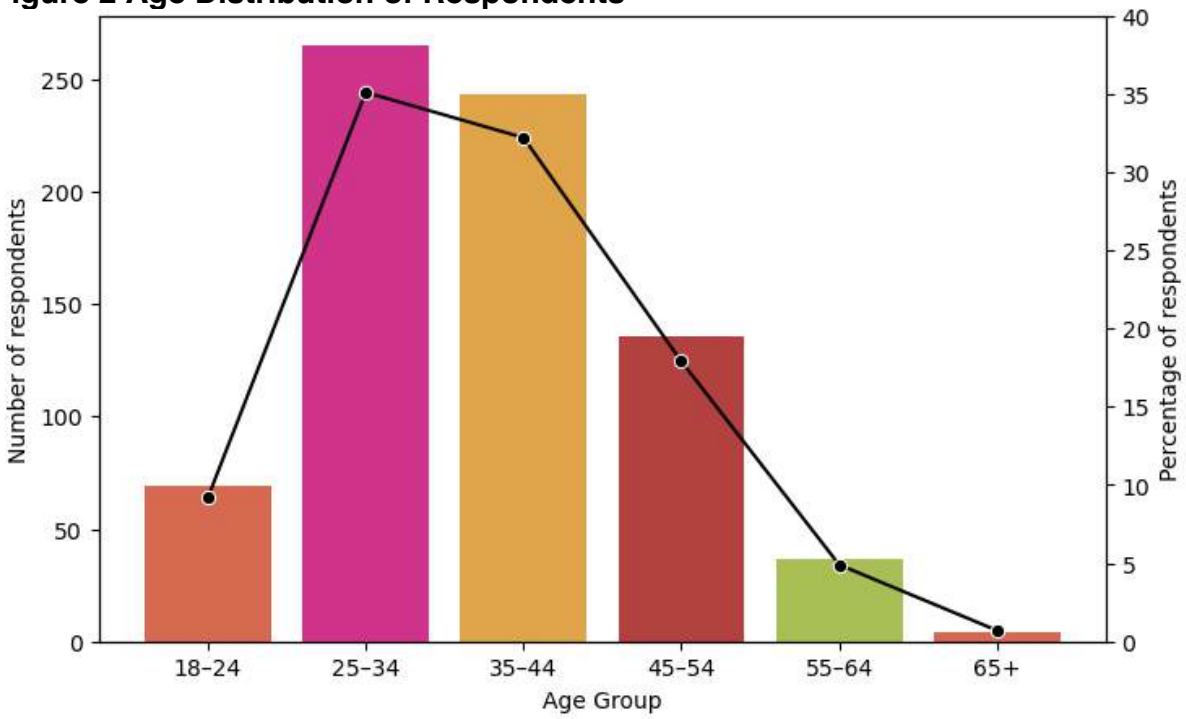
3.1.2 Age groups

The largest group of respondents falls within the 25–44 years range (67.3%), reflecting a strong representation of mid-career professionals actively engaged in project management roles.

Age distribution breakdown:

- 18–24 years: 69 respondents (9.2%)
- 25–34 years: 265 respondents (35.1%)
- 35–44 years: 243 respondents (32.2%)
- 45–54 years: 136 respondents (17.9%)
- 55–64 years: 37 respondents (4.9%)
- 65+ years: 4 respondents (0.7%)

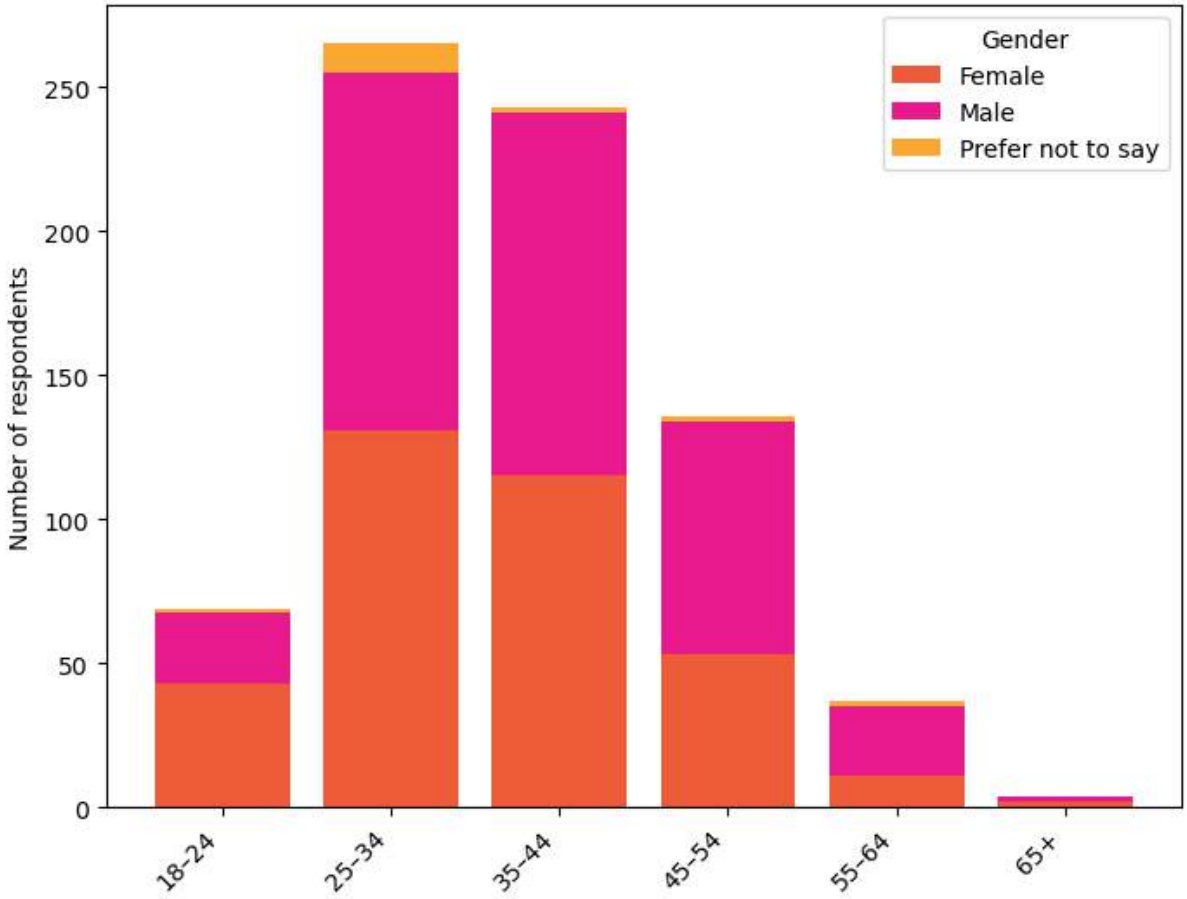
Figure 2 Age Distribution of Respondents



Gender Distribution Across Age Groups

- A balanced representation of male and female respondents is observed in the 25–44 age groups.
- A slight predominance of male respondents in older age categories (45+).

Figure 3 Gender Distribution within Age Groups

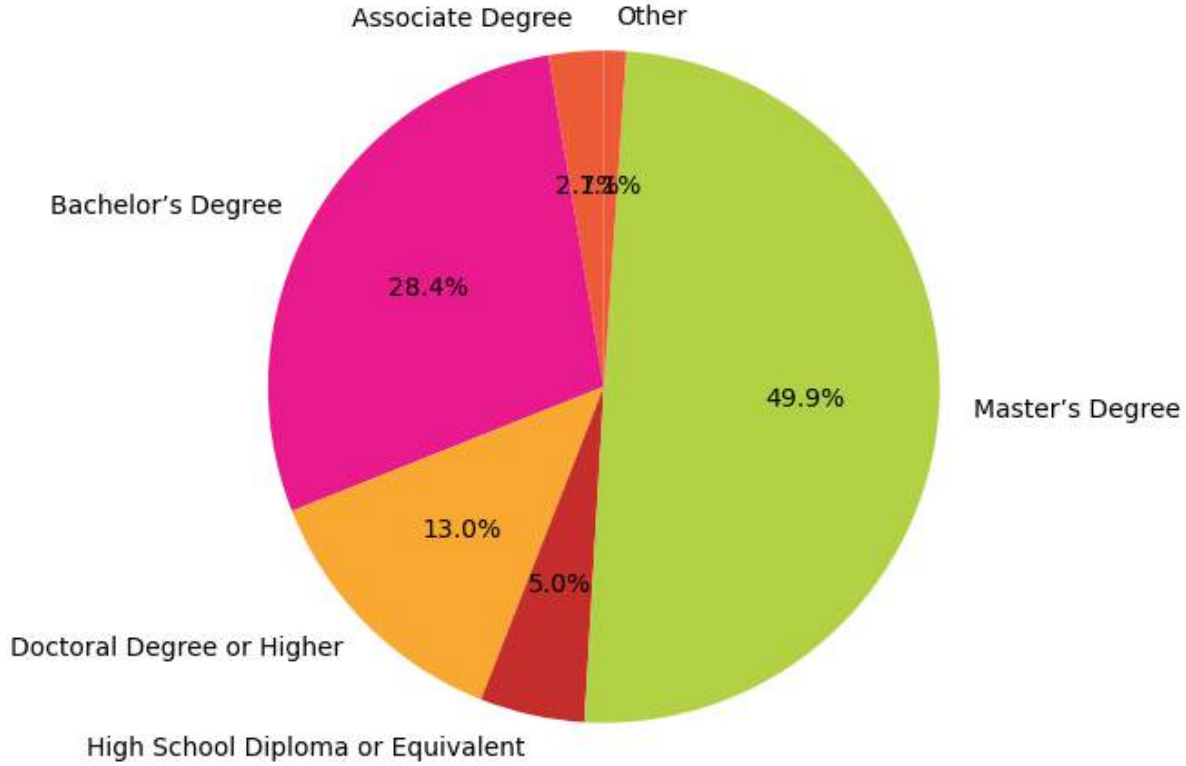


3.1.3 Educational background

Education Level Distribution

- Master's Degree holders form the largest group (49.9%), indicating a strong preference for advanced education among professionals in project management.
- Bachelor's Degree holders account for 28.4%, making it the second most common level of education.
- Doctoral Degree or Higher is held by 13.0% of respondents.
- High School Diploma or Equivalent represents 5.0%, while Associate Degrees account for 2.7%.
- Other educational backgrounds make up 1.1%.

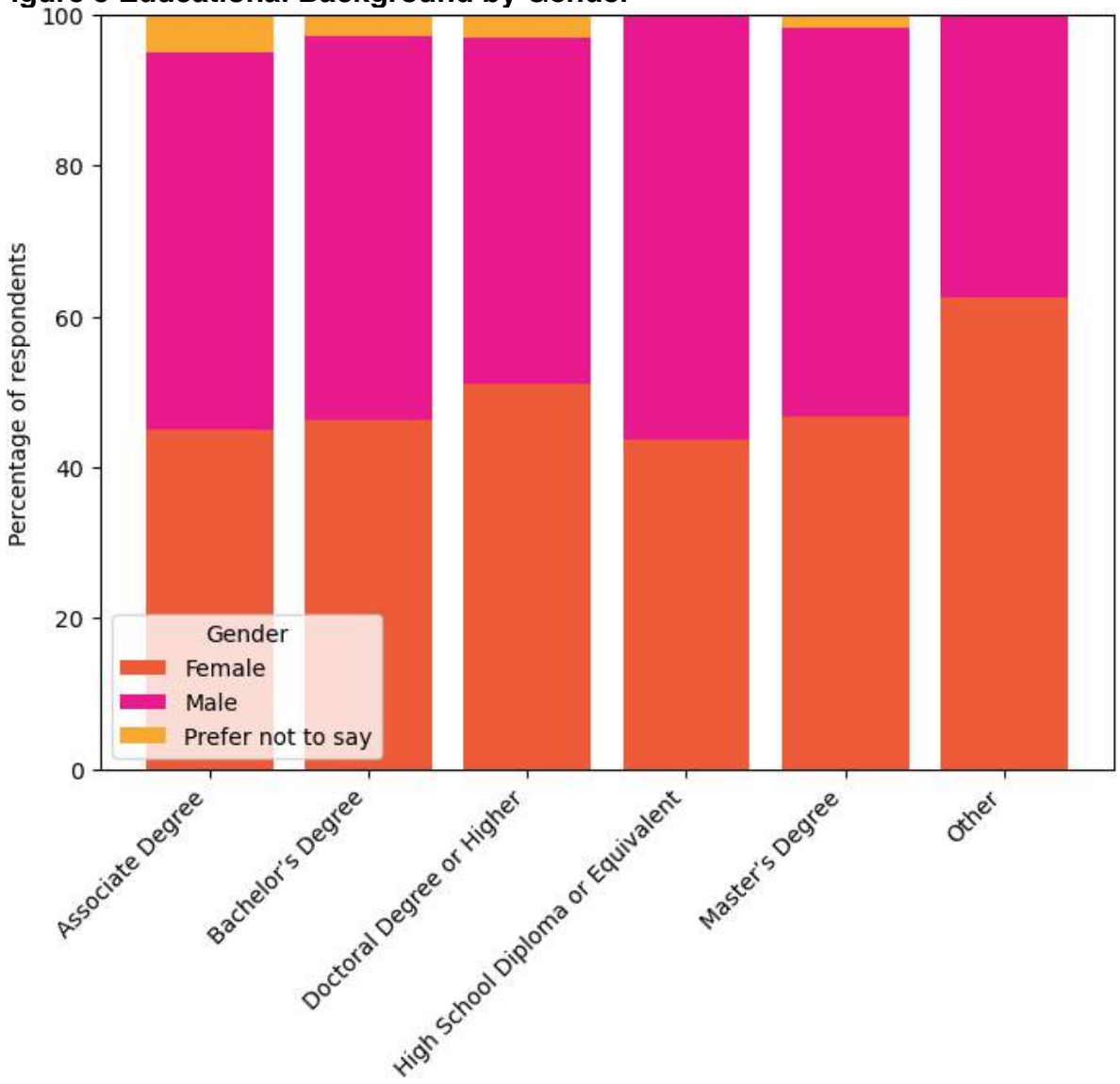
Figure 4 Education Level Distribution of Respondents



The cross-tabulation of education levels and gender reveals the following trends:

- Master's Degree holders are evenly distributed, with 175 females and 193 males.
- Bachelor's Degrees are also balanced, with 99 females and 109 males.
- Among those with a Doctoral Degree or higher, 50 females and 45 males were recorded.
- High School Diploma and Associate Degree holders show a relatively small distribution across genders.
- Respondents who selected "Other" as their highest education level are a minority across all gender groups.

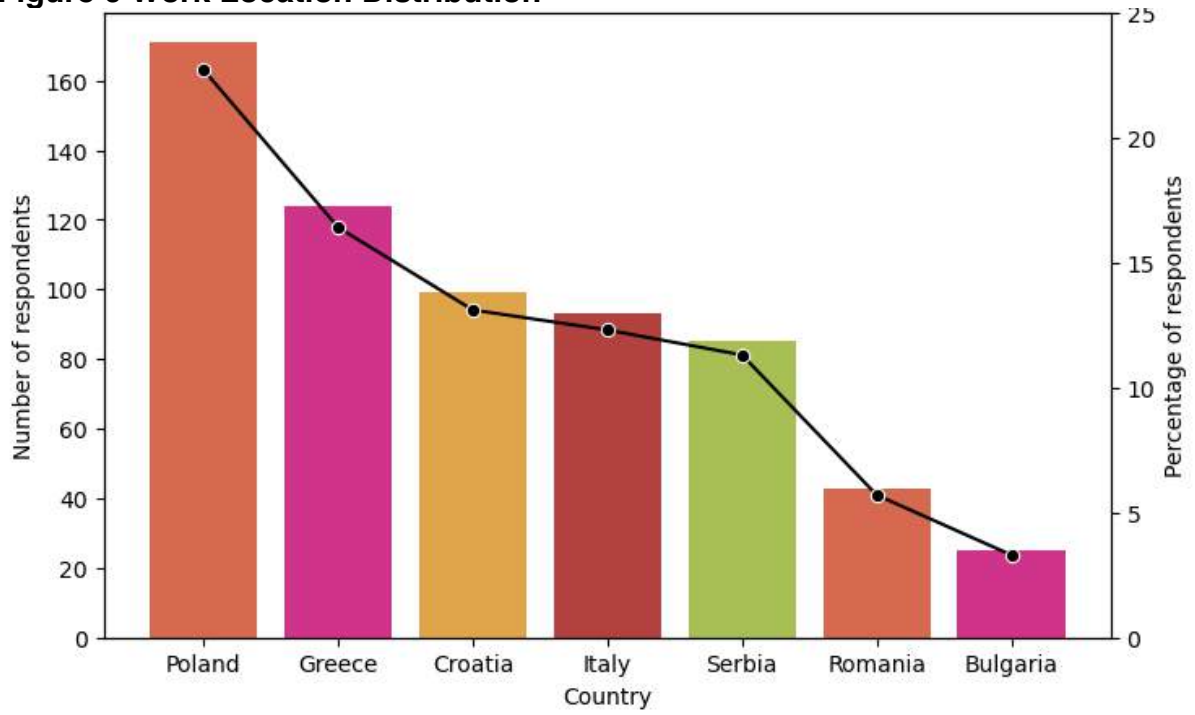
Figure 5 Educational Background by Gender



3.1.4 Geographic distribution (work location)

The survey results reveal the geographical distribution of respondents' work locations across multiple countries.

Figure 6 Work Location Distribution

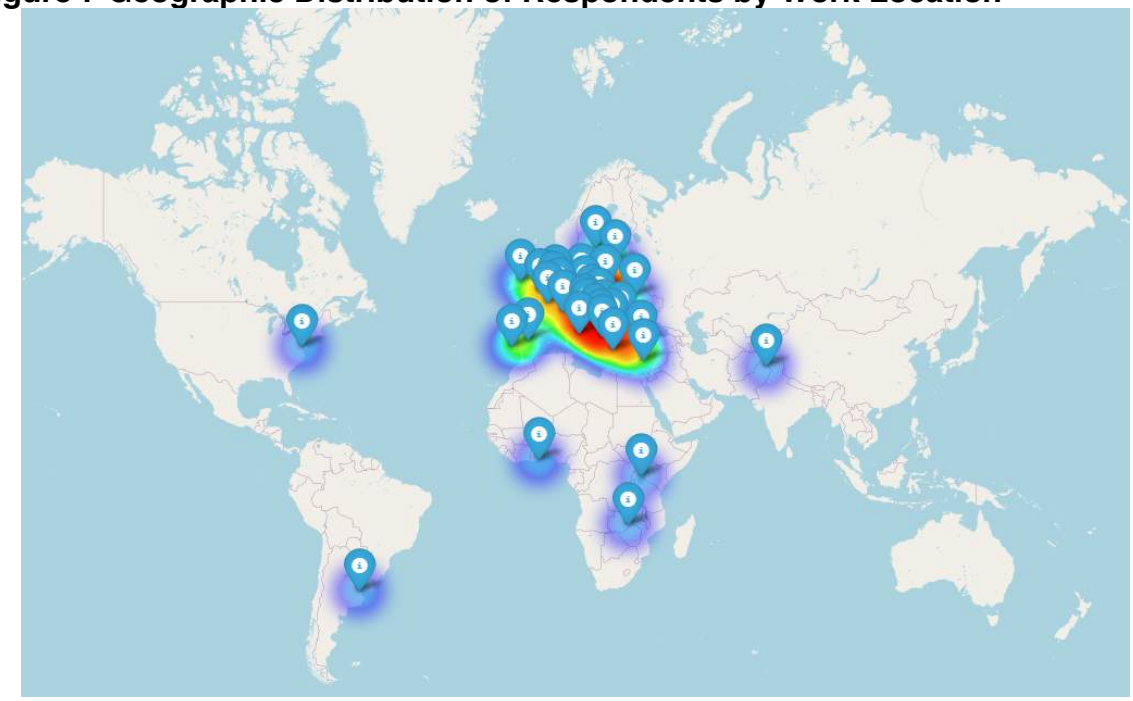


The largest proportion of respondents work in Poland (22.7%), making it the most represented country in the dataset. Greece (16.4%) and Croatia (13.1%) follow as the second and third most common work locations. Other countries with significant representation include:

- Italy (12.3%)
- Serbia (11.3%)
- Romania (5.7%)
- Bulgaria (3.3%)

The remaining respondents (under 3%) are distributed across multiple countries, indicating a diverse workforce.

Figure 7 Geographic Distribution of Respondents by Work Location

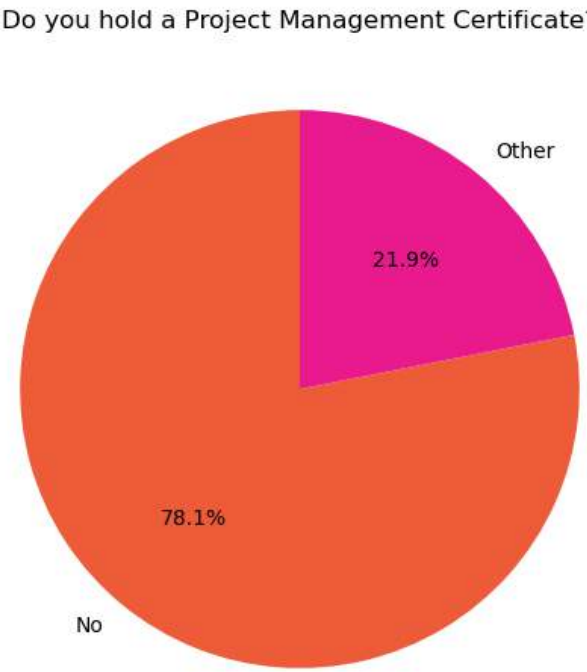


3.2 PROFESSIONAL BACKGROUND

3.2.1 Project management certification status

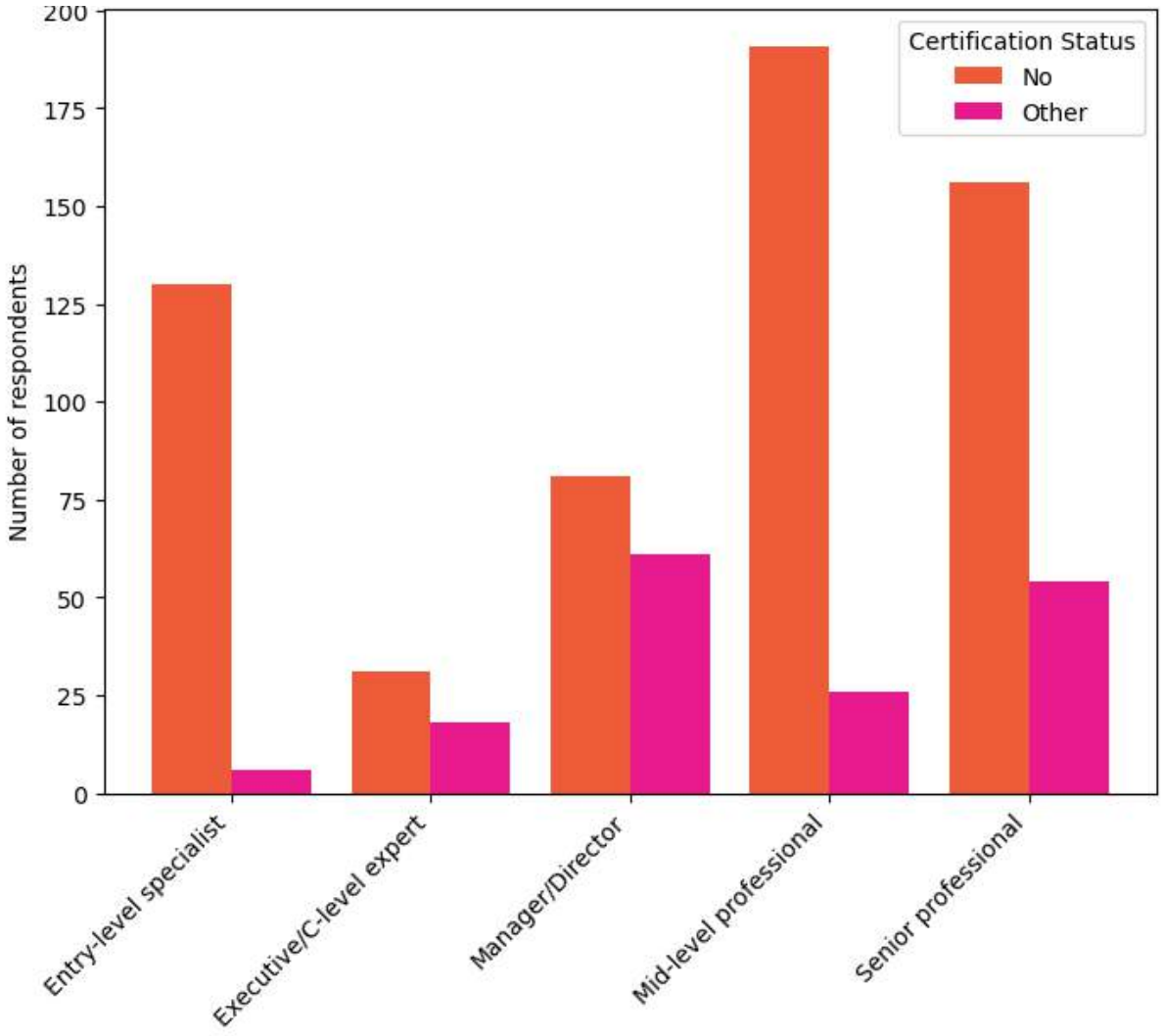
78.1% of respondents do not hold a project management certification, while 21.9% hold other qualifications.

Figure 8 Project Management Certification ownership



The highest certification rate is among Managers/Directors (37%) and Senior professionals (32.7%). The lowest certification rate is among entry-level specialists (3.6%).

Figure 9 Project Management Certification by Seniority Level



he survey responses indicate that a significant number of participants hold project management certifications, reflecting the importance of formal qualifications in the field. The responses reveal a diverse range of certifications, with some being widely recognized across industries and others tailored to specific methodologies and frameworks.

Most Common Certifications:

- The most frequently mentioned certifications include **PMP (Project Management Professional), PRINCE2, and IPMA** (International Project Management Association) certifications.
- Agile-related certifications such as **Scrum Master, PMI-ACP, and SAFe** also appear frequently, reflecting the growing adoption of Agile methodologies in project management.
- The **PM²** methodology, developed by the European Commission, is also widely referenced among respondents, suggesting its increasing relevance in the sector.

Diversity of Certifications:

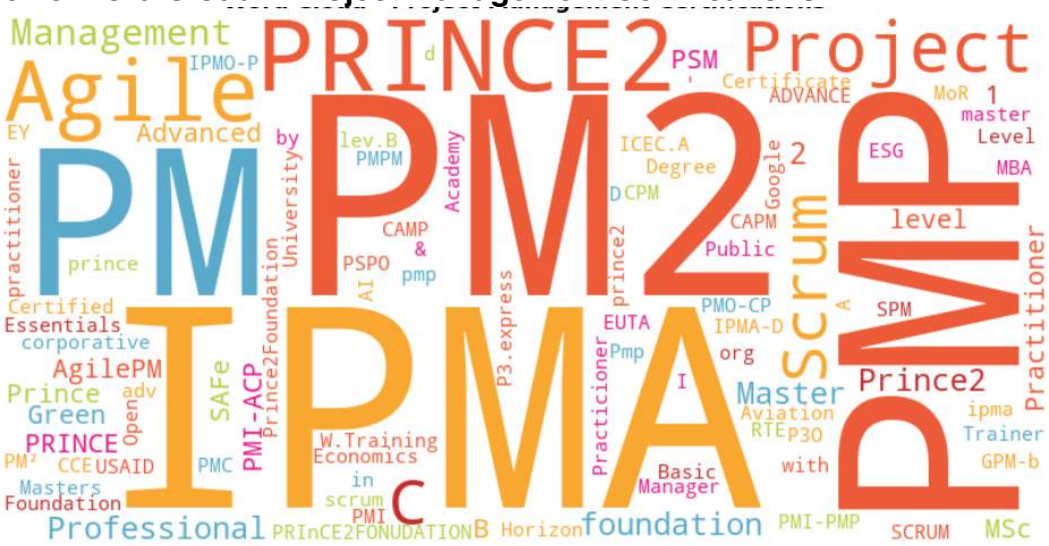
- Respondents have obtained certifications from multiple accreditation bodies, including PMI, AXELOS (PRINCE2), IPMA, and Scrum.org.
- Some respondents mentioned specialized certifications such as **Green Project Management (GPM-b), P3.express Practitioner, and PMO-CP**, highlighting the growing interest in sustainability and strategic project management.
- A subset of respondents has obtained project management education as part of their **MSc or MBA programs**, integrating formal education with professional certifications.

Emerging Trends:

- The presence of **ESG PM (Environmental, Social, and Governance Project Management)** certifications suggests an increasing focus on sustainability in project management.
- The **PM² Advanced** certification indicates a growing interest in European Commission-endorsed frameworks, particularly among professionals managing EU-funded projects.
- Several respondents noted participation in project management training programs rather than specific certifications, highlighting the role of continuous learning.

A **word cloud** illustrates the most frequently mentioned project management certifications, with larger words indicating higher frequency.

Figure 10 Word Cloud – Project Management Certifications



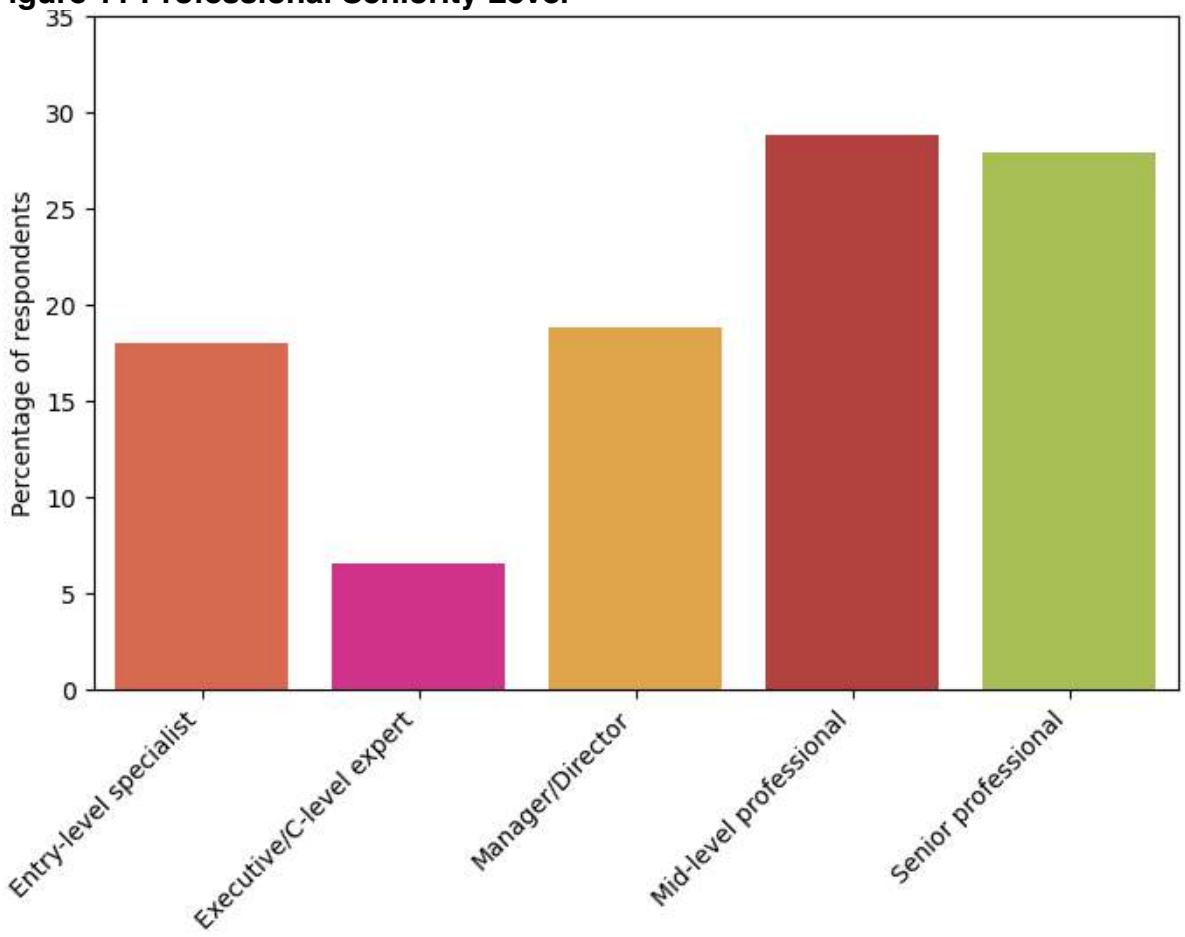
The data suggests that **formal project management certification is a key credential** for professionals in the field. The prevalence of **PMP, PRINCE2, and IPMA** indicates that globally recognized certifications continue to be valuable. Additionally, the prominence of **Agile methodologies and sustainability-focused certifications** points to evolving trends in project management, requiring professionals to continuously update their skills and qualifications.

3.2.2 Seniority level and years of experience in project-oriented environments

PROFESSIONAL SENIORITY LEVEL

The largest group of respondents consists of mid-level professionals (28.8%) and senior professionals (27.9%). Entry-level specialists make up 18%, while Managers/Directors account for 18.8%. C-level executives represent the smallest group, at 6.5%.

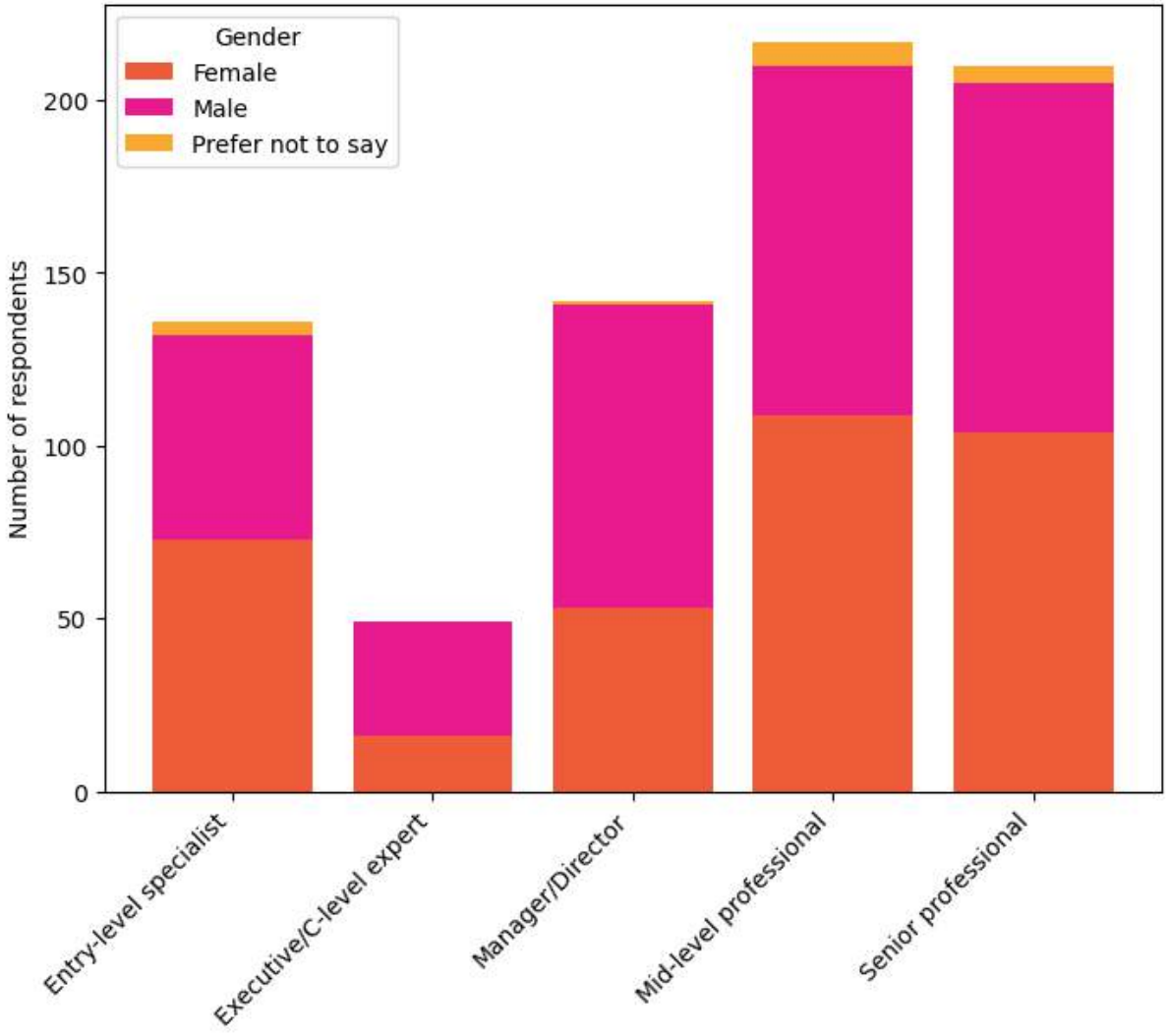
Figure 11 Professional Seniority Level



Professional Seniority Level by Gender Assigned at Birth

Women dominate the entry-level specialist group (53.7%), but Manager/Directors (62%) and C-level experts (67.3%) are mostly men. Mid-level and senior professionals are more evenly distributed across genders.

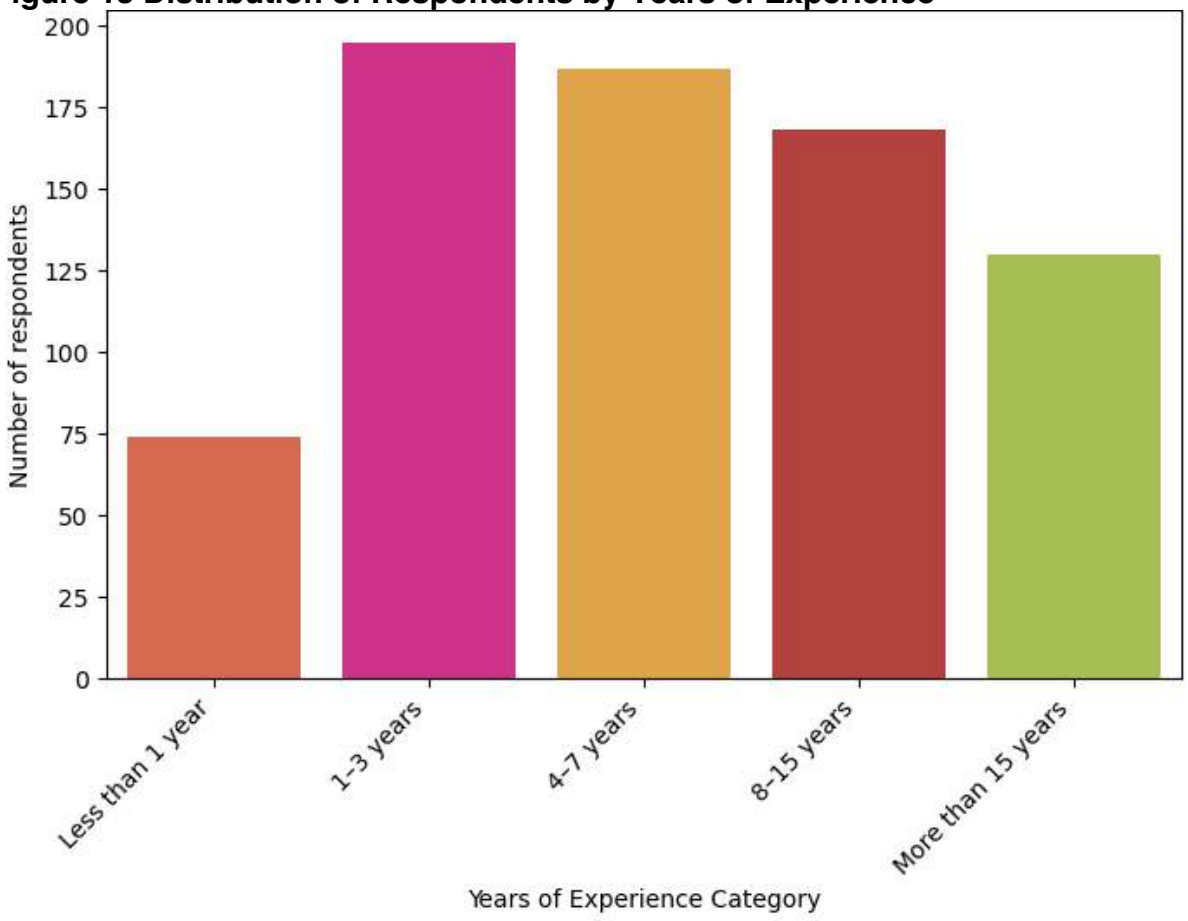
Figure 12 Gender distribution within Seniority Levels



YEARS OF EXPERIENCE IN PROJECT-ORIENTED ENVIRONMENTS

The majority of respondents have 1-3 years (25.9%) or 4-7 years (24.8%) of experience. 22.3% have 8-15 years, while 17.2% have more than 15 years. The least experienced group (less than 1 year) accounts for 9.8% of respondents.

Figure 13 Distribution of Respondents by Years of Experience



3.2.3 Current role in the organization (project, program, portfolio level)

The distribution of respondents' current roles within their organizations provides insight into the structure of project management practices in sustainable project management. The survey results indicate that the majority of participants (56.0%) occupy project-level roles, followed by program-level roles (22.0%), portfolio-level roles (11.3%), and other roles (10.7%).

Key Findings

- **Dominance of Project-Level Roles**: More than half of respondents (56.0%) work at the project level, which includes positions such as Project Manager, Team Leader, or Project Team Member. This reflects the operational focus of sustainable project management implementation within organizations.

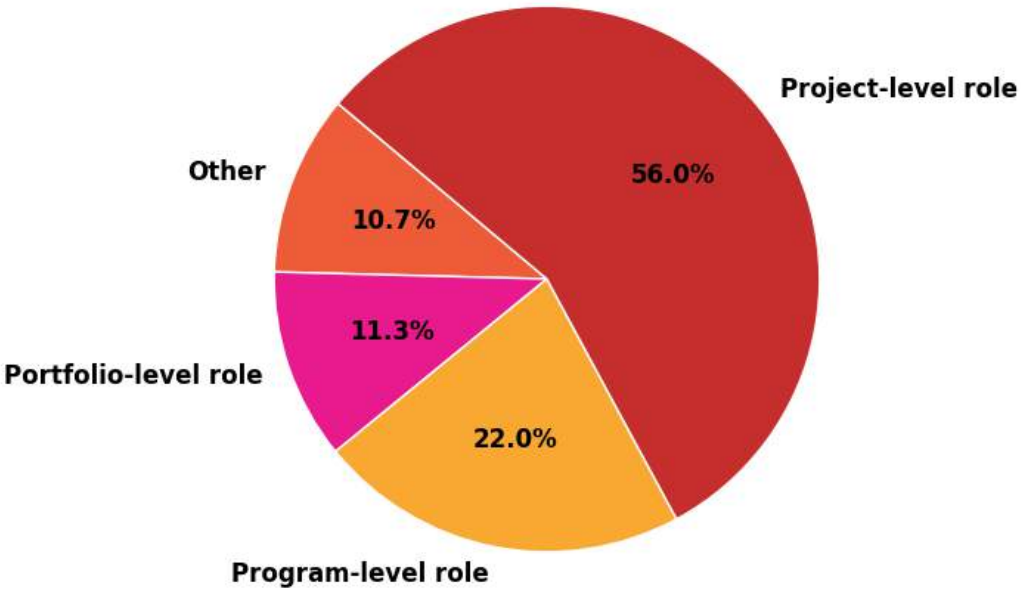
- **Program and Portfolio-Level Roles**: A significant portion of respondents holds program-level (22.0%) and portfolio-level (11.3%) roles, indicating a notable level of strategic project coordination and oversight.
- **Other Roles**: About 10.7% of respondents reported roles outside the traditional project, program, and portfolio management categories, suggesting involvement in support functions or hybrid positions related to sustainability.

Relationship Between Role and Project Management Certification An analysis of the cross-tabulation between project management certification status and organizational role reveals a significant association:

- **Certification Rate by Role**:
  - Among project-level professionals, 44.8% hold a project management certification.
  - The highest certification rates are observed among portfolio-level professionals (18.8%) and program-level professionals (27.9%).
  - The lowest certification rate is in the 'Other' category (8.5%).
- **Chi-Square Test Results**:
  - The Pearson Chi-Square test ($X^2 = 19.547$, $p < .001$) confirms a statistically significant association between an individual's role and their likelihood of holding a project management certification.
  - These results suggest that professionals in higher-level strategic roles (program and portfolio management) are more likely to hold certifications than those in operational project-level roles.

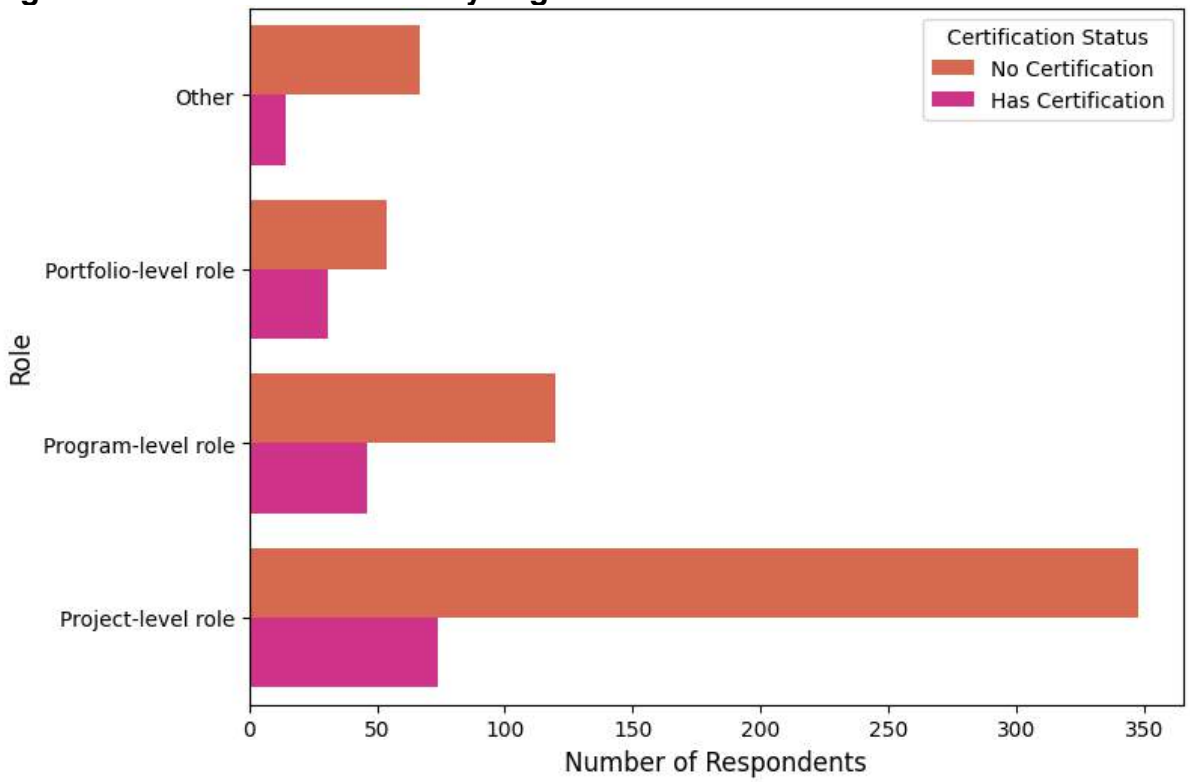
A **pie chart** presents the percentage distribution of roles in the organization.

Figure 14 Project Role Distribution Among Respondents



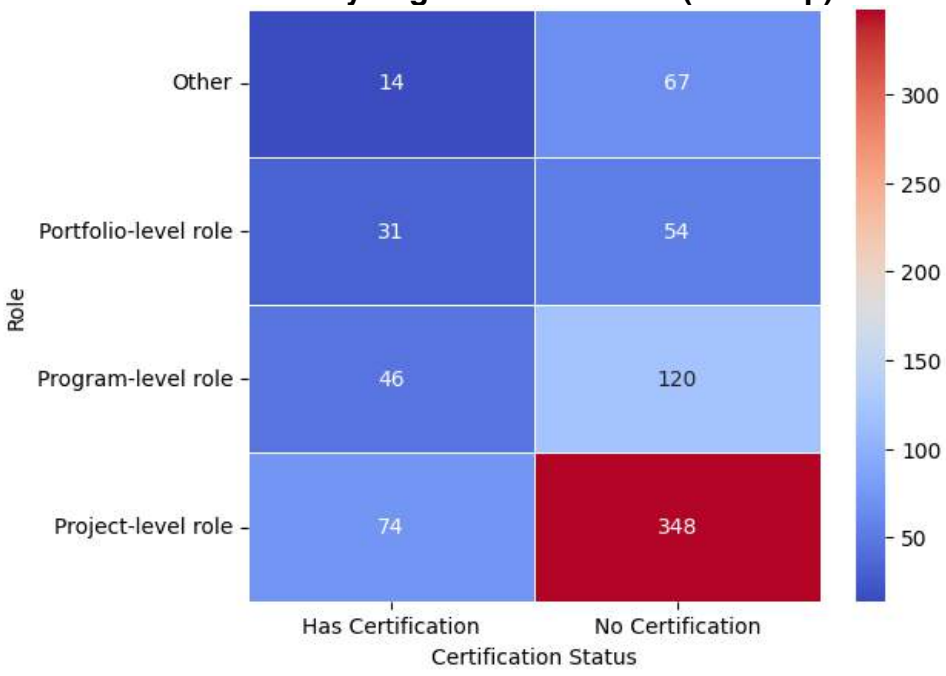
A **stacked bar chart** compares certification status across different roles.

Figure 15 Certification Status by Organizational Role



A **heatmap** visualizes the correlation between certification status and role, highlighting the concentration of certified professionals at the program and portfolio levels.

Figure 16 Certification Status by Organizational Role (heatmap)



The findings indicate that project-level roles dominate sustainable project management environments, while program and portfolio-level roles play a crucial strategic role. Certification rates increase at higher levels of management, suggesting that professional credentials are more relevant for individuals in leadership and coordination roles within the organization. The statistical significance of the relationship between role and certification highlights the structured approach to professional development within sustainable project management.

3.2.4 Functional area

The survey respondents represent a broad range of functional roles within their organizations, highlighting the diverse nature of project management in sustainable project management practices. The most frequently mentioned functional areas include **Operations, Finance, Strategy, IT, Research, Development, Marketing, and Education.**

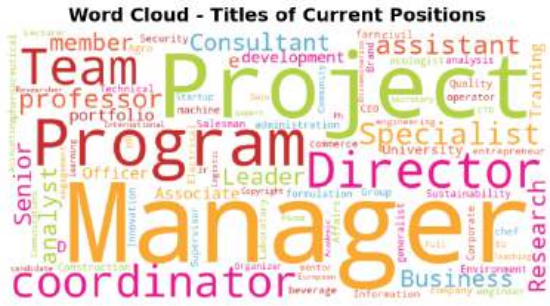
Key Findings

- **Operations as the Dominant Functional Role**: A significant proportion of respondents identify operations as their primary functional area, emphasizing the execution and coordination of projects as a key responsibility.
- **Strategic and Financial Roles**: Strategy and Finance are among the most cited functions, indicating that sustainable project management is highly relevant in decision-making and financial planning.
- **IT and Research Significance**: IT-related roles and research functions also appear prominently, demonstrating the integration of technology and knowledge development in project management practices.
- **Education and Training**: Many respondents are engaged in education and training, suggesting the importance of academic and professional development in fostering sustainability-driven project management.
- **Marketing, Administration, and Compliance**: Other essential functional roles include marketing, administration, compliance, and governance, reflecting the multidisciplinary nature of project management across various industries.

A word cloud illustrates the most frequently mentioned functional areas, providing a visual representation of key trends.

Larger words in the word cloud indicate the most common functional roles, while smaller words represent less frequently mentioned areas.

Figure 17 Functional Areas Represented by Respondents



3.2.5 Work environment

The distribution of work environments among respondents provides valuable insights into workplace trends and the impact of remote and hybrid work models in project management. The survey results indicate that the **hybrid model (mix of office and remote work) is the most prevalent**, followed by the traditional office setting and fully remote work.

1. **Dominance of Hybrid Work**:
    - Over **half of the respondents (52.7%)** work in a hybrid setting, suggesting a strong preference for flexible work arrangements.
    - This trend aligns with the global shift toward hybrid work structures, particularly in industries where collaboration and digital transformation play a key role.
2. **Traditional Office Setting Still Relevant**:
    - **31.4%** of respondents work in a **traditional office setting**, indicating that some industries and roles still require in-person presence.
    - Sectors such as **finance, healthcare, and government-related industries** show higher engagement in traditional office work.
3. **Remote and On-Site Work Trends**:
    - **Fully remote work** accounts for **7.6%** of respondents, reflecting the ongoing adaptation of digital and remote-first operations in certain sectors.
    - **On-site fieldwork** (e.g., construction, site visits) remains a niche category, representing **3.7%** of the workforce, mainly in engineering, manufacturing, and construction industries.
    - **Client-based (1.5%) and co-working space (1.7%)** work settings are the least common among respondents, indicating a preference for structured organizational environments.

Relationship Between Work Environment and Seniority Level

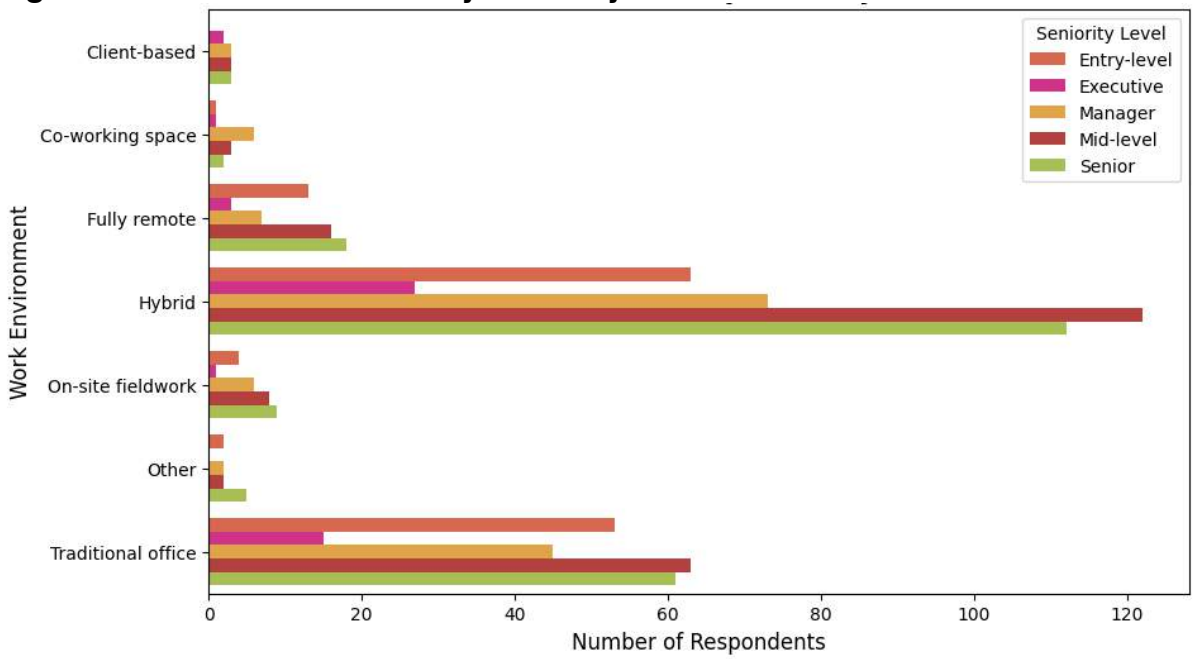
- **Hybrid work is most common** across all seniority levels, with the highest proportion among **mid-level professionals (30.7%) and senior professionals (28.2%)**.

- **Fully remote work** is more frequent among **senior professionals (31.6%)**, suggesting that experienced professionals are more likely to engage in remote-based roles.
- **Traditional office settings** are more common for **entry-level specialists (22.4%)** and **managers (19.0%)**, likely due to structured onboarding and leadership responsibilities.
- The **Chi-Square test results (p = 0.570)** indicate no significant statistical association between work environment and seniority level, implying that work arrangements are distributed relatively evenly across job levels.

Relationship Between Work Environment and Industry

- Hybrid work is **most common across multiple industries**, particularly in IT (17.1%), education (18.4%), and financial services (5.3%).
- Traditional office settings remain **important in finance (7.2%), healthcare (5.9%), and public sector (5.1%)**.
- Fully remote work is **most prevalent in IT-related roles (26.3%)**, highlighting the industry's adaptability to remote-first operations.
- On-site fieldwork is concentrated in **construction (21.4%) and engineering (3.6%)**, where in-person work is essential.

Figure 18 Work Environment by Seniority Level



The findings indicate that hybrid work has become the **dominant model** in project management environments, balancing flexibility with in-person collaboration. While **traditional office settings remain relevant**, especially for structured roles, remote work continues to gain traction among senior professionals. The industry-based breakdown suggests that **IT and digital industries are leading the shift toward remote and hybrid models**, whereas fieldwork-heavy sectors maintain **on-site**

operations. These insights are crucial for organizations optimizing their work policies in the evolving landscape of project management.

4. Organizational Background

4.1 INDUSTRY REPRESENTATION

The survey results provide a comprehensive understanding of the distribution of industries in which respondents' organizations operate. The highest concentration of respondents is in the education sector (21.1%), followed by information technology (13.7%), financial services (7.4%), and engineering services (6.2%). Other industries represent a more balanced distribution, indicating a diverse set of fields engaged in sustainable project management.

Key Findings

- **Education Sector as the Largest Group**: With 21.1% of respondents working in the education sector, this indicates a strong presence of academic and training institutions engaged in project management activities.
- **Significant Presence in IT and Financial Services**: IT services (13.7%) and financial services (7.4%) suggest that project management plays a crucial role in technology-driven and finance-related industries.
- **Engineering and Professional Services**: Engineering services (6.2%) and professional consulting services (5.0%) also form a notable portion of the industry distribution, emphasizing project management's relevance in technical and advisory fields.
- **Diversity Across Sectors**: The distribution across multiple industries such as healthcare (4.5%), manufacturing (5.2%), and non-profit/NGO (4.9%) illustrates that sustainable project management principles are applied across a wide range of organizational contexts.

Relationship Between Industry and Gender Distribution

- The gender distribution varies significantly by industry. Education has the highest proportion of female respondents (65.4%), while industries like construction (70.8%) and manufacturing (53.8%) are predominantly male-dominated.
- The chi-square test ($X^2 = 70.629$, $p = .004$) confirms a statistically significant association between gender and industry, indicating potential trends in gender representation across different sectors.

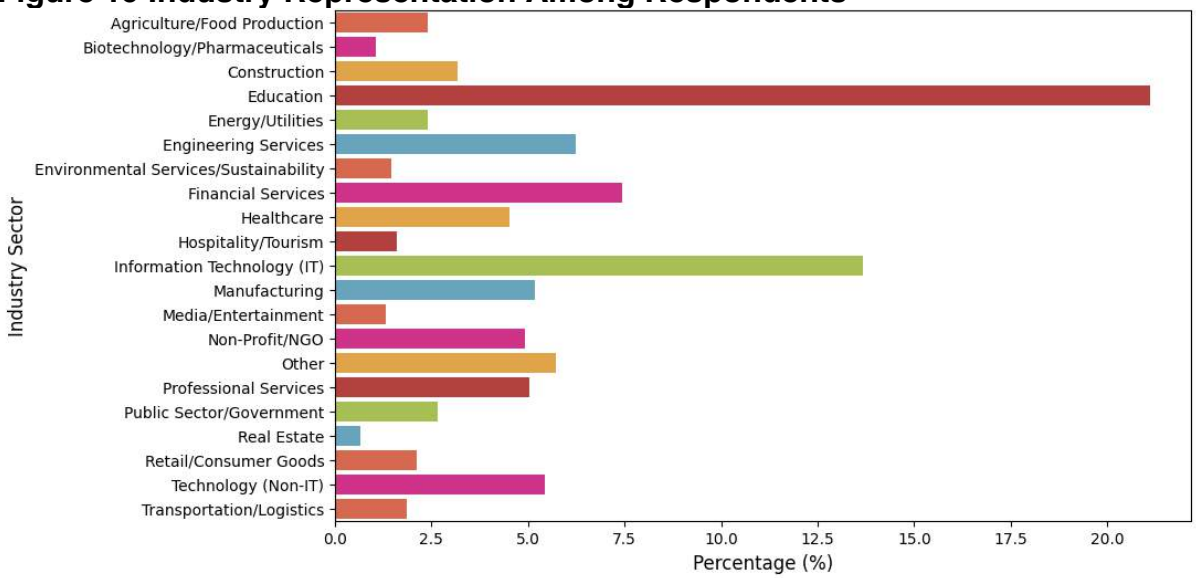
Relationship Between Industry and Certification Status

- The survey also examined the proportion of respondents holding project management certifications across industries.

- The highest certification rates were observed in engineering services (29.8%), public sector/government (35.0%), and professional services (31.6%), suggesting that certification is more common in structured and regulated industries.
- The chi-square test ($X^2 = 29.458$, $p = .103$) did not indicate a statistically significant relationship between industry and certification, implying that certification distribution is relatively independent of industry type.

A **bar chart** illustrates the distribution of industries by percentage of respondents.

Figure 19 Industry Representation Among Respondents



The results suggest that sustainable project management is relevant across multiple industries, with a particularly strong presence in education, IT, and financial services. Gender distribution patterns highlight disparities in certain sectors, while certification rates appear to be influenced more by industry norms than by sector-specific requirements.

4.1.1 Breakdown of industries

1. **Industry Distribution**
   - The **education sector (21%)** has the highest representation among respondents, followed by **information technology (IT) (13.7%)** and **financial services (7.4%)**.
   - Other significant industries include **engineering (6.2%), construction (3.2%), and healthcare (4.5%)**.
   - Sectors such as **media/entertainment (1.3%), real estate (0.7%), and hospitality/tourism (1.6%)** have the lowest representation, suggesting a smaller demand for project management professionals in these fields.
2. **Certification Status by Industry**
   - Industries with the **highest proportion of certified project managers** include:
     - **IT (27.2%)** – A sector where structured methodologies and certifications are highly valued.
     - **Engineering (29.8%)** – Reflecting the industry's reliance on standardized project management frameworks.

        - **Professional services (31.6%)** – Suggesting that consulting firms and legal service providers prioritize certification for credibility.
    - Conversely, industries such as **education, NGOs, and manufacturing** show **lower levels of certification**, possibly due to different professional development structures or alternative training models.
3. **Gender Distribution by Industry**
    - **Female-dominated industries**:
        - **Education (65.4%)** – A strong female presence, aligning with global trends in academic and teaching professions.
        - **Non-profit/NGO sector (56.8%)** – Indicates a higher representation of women in social impact-driven work.
        - **Healthcare (58.8%)** – A traditionally female-dominated field, particularly in nursing and patient care management.
    - **Male-dominated industries**:
        - **Construction (70.8%)** – Reflecting the traditionally male-driven workforce in the industry.
        - **Technology (63.4%)** – Despite efforts to increase diversity, IT remains a male-dominated sector.
        - **Finance (51.8%)** – Shows a relatively balanced distribution but still leans toward a male-majority workforce.
    - **Balanced representation**: Sectors such as **engineering, manufacturing, and professional services** show a more even gender distribution.
4. **Statistical Correlations**
    - A **Chi-Square test** ($p = 0.103$) for **industry and certification status** suggests **no strong statistical relationship**, indicating that certification levels do not significantly vary across industries.

The findings emphasize that **education, IT, and finance** are the most common industries for project management professionals. **Certification is more prevalent in IT, engineering, and professional services**, where formal methodologies play a critical role. The **gender distribution varies significantly**, with some industries remaining male- or female-dominated despite ongoing diversity efforts. These insights are crucial for understanding workforce composition and industry-specific project management trends.

4.1.2 Company size and years of operation.

Company Size

The distribution of organizational size among respondents indicates a relatively even split between large and small companies, with medium-sized organizations representing a smaller proportion:

- **Large organizations (251+ employees)** constitute **32.2%** of the respondents, highlighting significant representation from well-established corporations.
- **Small organizations (1–50 employees)** make up **31.3%**, showing strong participation from startups and smaller enterprises.
- **Medium-sized companies (51–250 employees)** account for **21.9%**, indicating a diverse mix of organizational scales.
- **Micro-enterprises (1–10 employees)** comprise **14.6%**, reflecting the role of small-scale businesses and consultancies in the project management space.

The data suggests that while larger organizations dominate, smaller companies still play a crucial role, particularly in innovation-driven and entrepreneurial environments.

Years of Operation

The longevity of organizations in the survey sample highlights a mix of established companies and newer ventures:

- **43.0%** of companies have been operating for **more than 20 years**, showcasing strong market presence and industry experience.
- **25.6%** have been in business for **11–20 years**, reflecting stability and growth.
- **22.5%** have been active for **5–10 years**, indicating recent expansion and consolidation.
- **8.9%** of companies are **less than 5 years old**, representing emerging businesses and startups.

These results demonstrate that a significant proportion of survey respondents belong to long-standing organizations, yet newer companies continue to emerge, contributing to industry dynamism and innovation.

Figure 20 Company Size Distribution

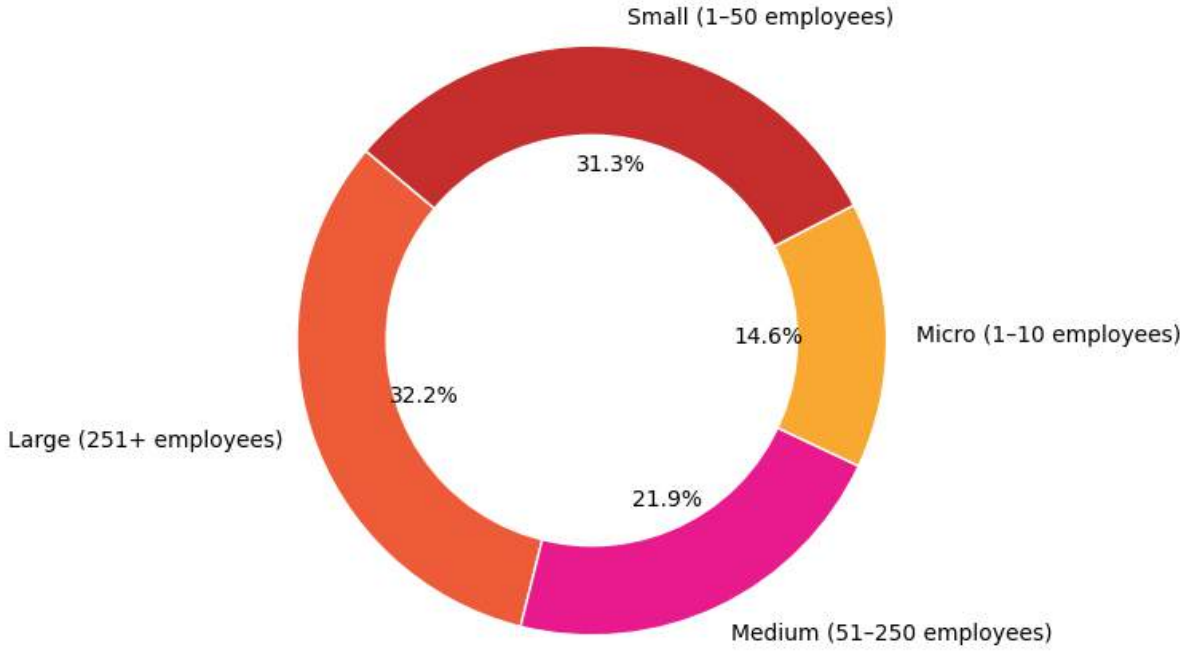
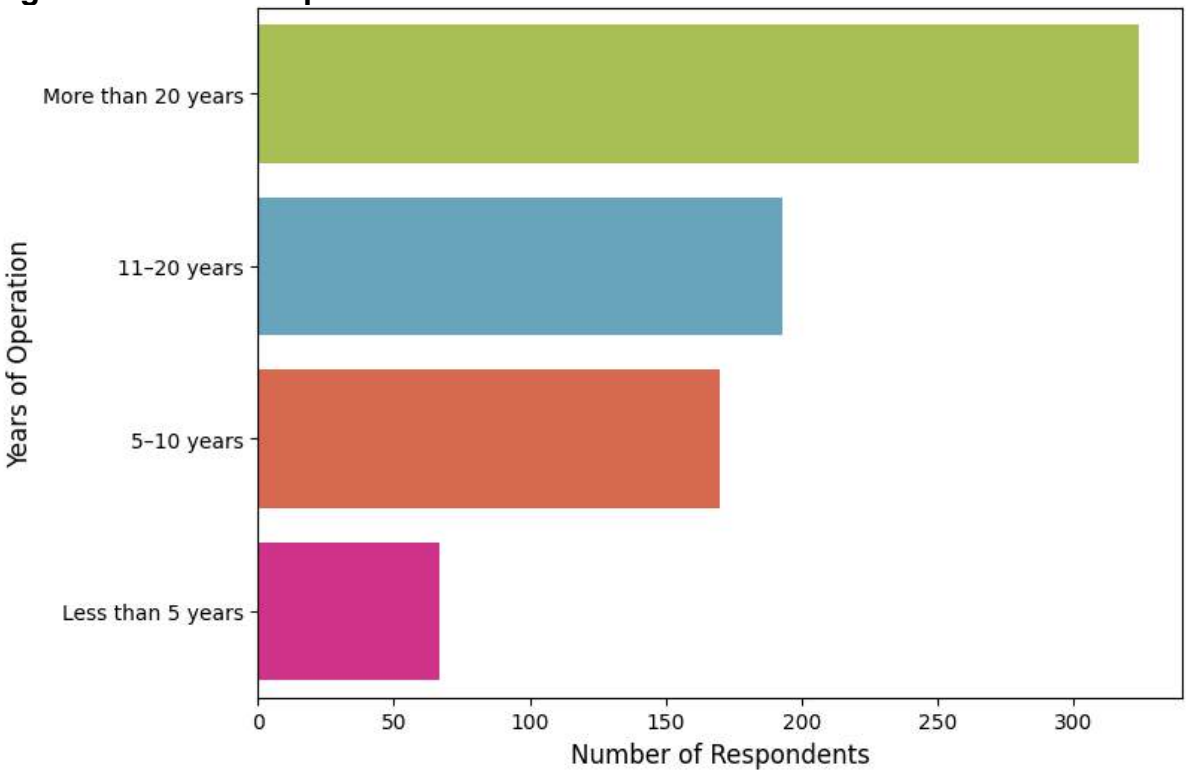


Figure 21 Years of Operation Distribution



4.2 SPM INTEGRATION IN ORGANIZATIONS

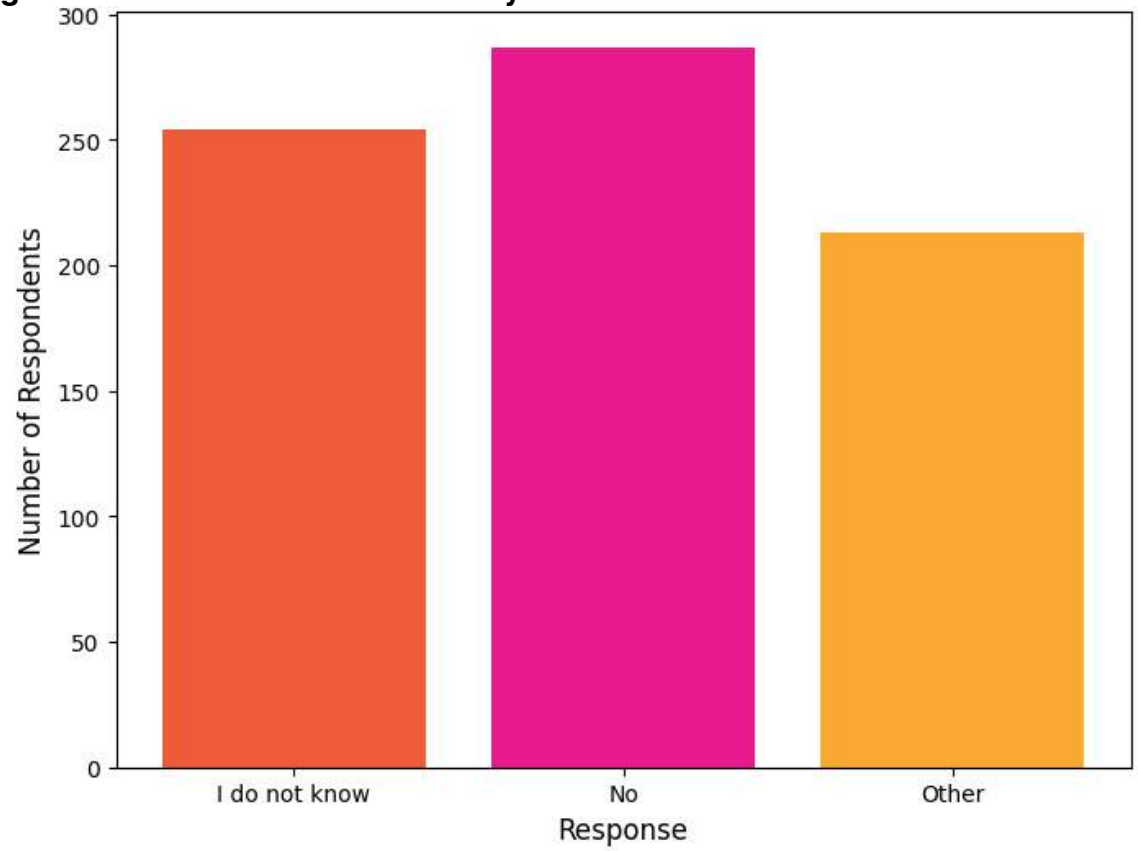
4.2.1 Presence of SPM-specific roles

The presence of Sustainability/ESG-specific roles in organizations reflects the growing emphasis on sustainable project management (SPM). The survey results highlight **a lack of clarity or formal adoption of Sustainability/ESG-specific roles in many organizations**, as a significant proportion of respondents either do not know whether such roles exist or report that their organizations do not have them.

Limited Presence of Sustainability/ESG-Specific Roles

- **38.1% of respondents stated that their organizations do not have Sustainability/ESG roles**, suggesting a lack of dedicated ESG governance in many workplaces.
- **33.7% of respondents indicated they do not know**, which highlights **a potential gap in awareness or communication regarding Sustainability/ESG-specific initiatives** within organizations.
- **28.2% of respondents selected "Other,"** indicating some level of Sustainability/ESG-specific responsibility, though potentially not in a formalized role.

Figure 22 Presence of Sustainability/ESG Roles



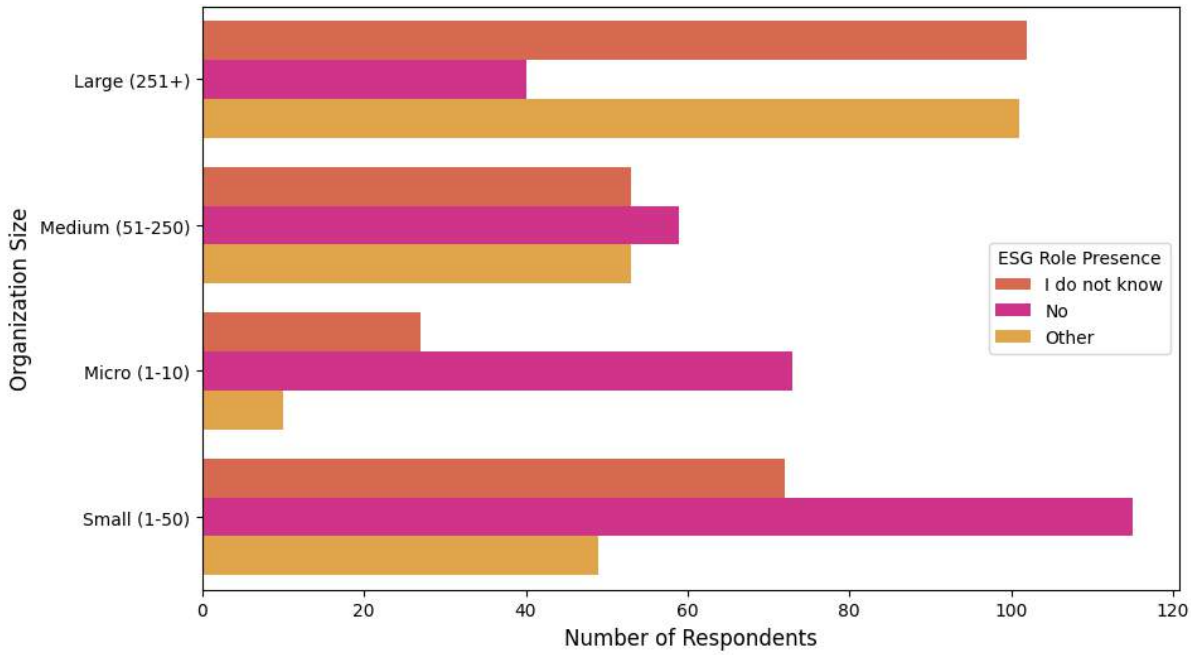
Meanwhile, **28.2% of respondents indicated that their organizations have other forms of Sustainability/ESG-specific responsibilities**, suggesting that Sustainability/ESG-specific functions may be embedded within broader roles rather than designated positions.

Figure 23 Sustainability & Responsibilities

Sustainability/ESG-Specific Roles by Organizational Size

- **Large organizations (251+ employees)** have a more balanced distribution:
  - 40 respondents (16.5%) reported no Sustainability/ESG-specific roles.
  - 101 (41.6%) reported some form of Sustainability/ESG-specific role.
  - 102 (42.0%) were unsure.
- **Smaller organizations (1–50 employees)** showed lower adoption, with a **notably high percentage (48.7%) reporting no Sustainability/ESG-specific roles.**

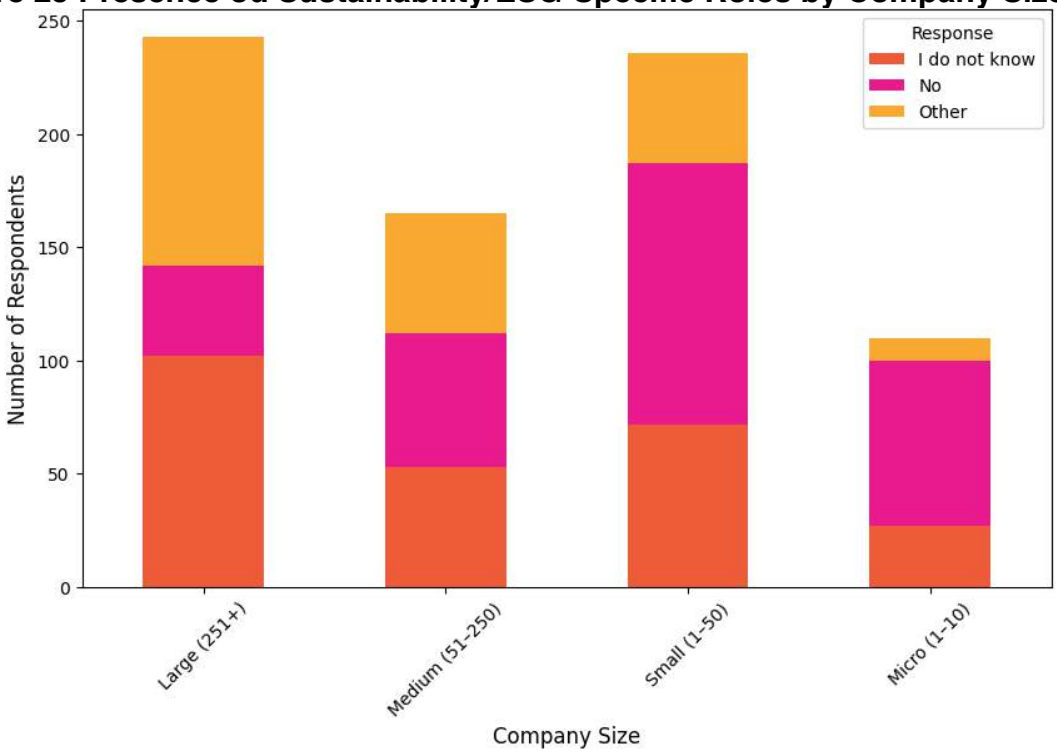
Figure 24 Sustainability/ESG-Specific Roles by Organization Size



Sustainability/ESG-Specific Roles by Organizational Age

- **Organizations operating for more than 20 years** had the highest proportion (40.4%) of respondents reporting the presence of ESG roles.
- **Newer organizations (less than 5 years old)** were least likely to have ESG-specific roles, with only **10.4% confirming** such roles.

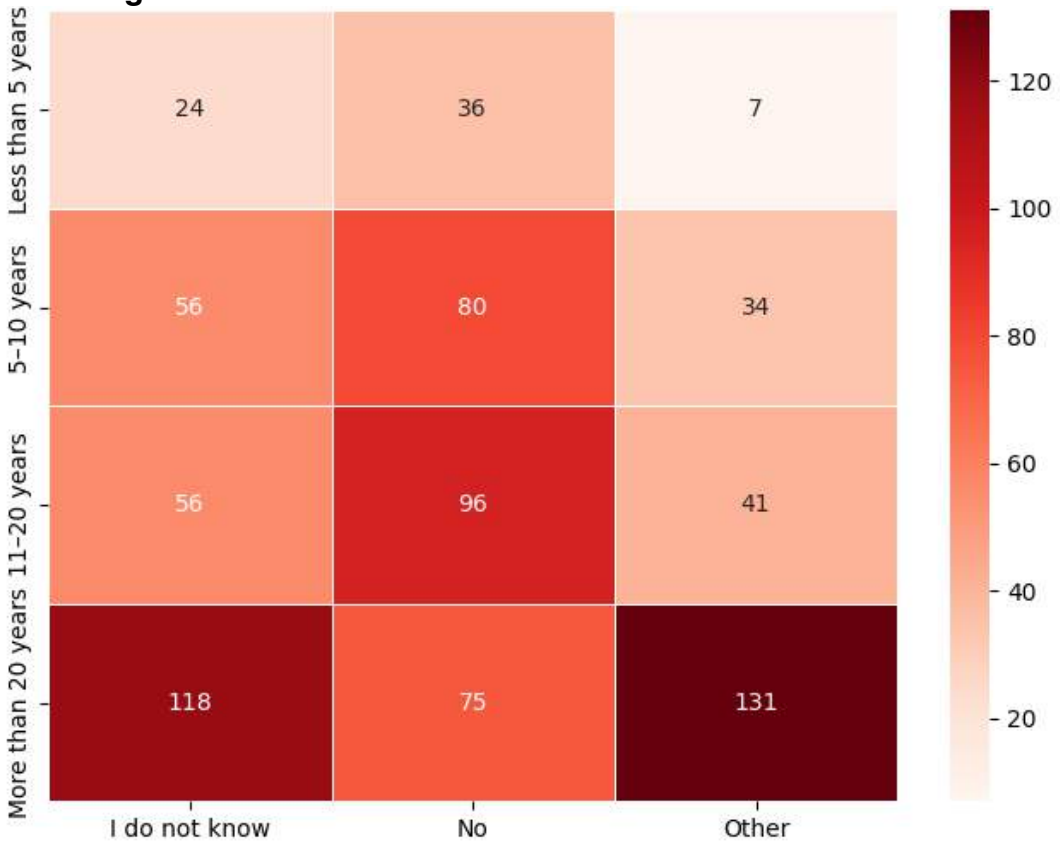
Figure 25 Presence od Sustainability/ESG-Specific Roles by Company Size



Statistical Significance

- The **Chi-Square test results ($p < 0.001$)** indicate a **statistically significant relationship** between organization characteristics (size, years of operation) and the presence of Sustainability/ESG-specific roles.

Figure 26 Correlation Between Sustainability/ESG-Specific Role Presence and Organizational Age

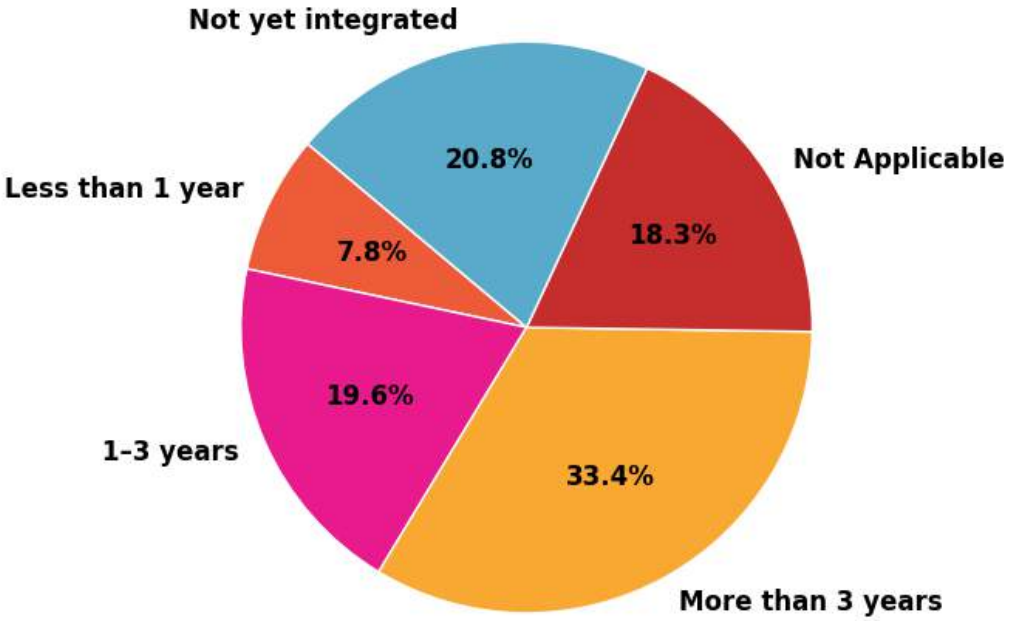


4.2.2 Duration of SPM integration in operations

Sustainability/ESG Integration Timeline

- **33.4% of organizations have been integrating Sustainability/ESG principles for more than three years**, indicating a solid foundation of sustainability initiatives.
- **19.6% have been integrating Sustainability/ESG for 1–3 years**, reflecting recent but ongoing efforts.
- **7.8% of organizations started Sustainability/ESG integration within the last year**, suggesting a growing trend in sustainable project management.
- **20.8% of organizations have not yet integrated Sustainability/ESG principles**, signaling a potential gap in awareness or prioritization.
- **18.3% consider Sustainability/ESG integration as not applicable**, likely due to industry-specific factors.

Figure 27 Duration of Sustainability/ESG Integration in Organizations



4.2.3 Organizational approach to SPM

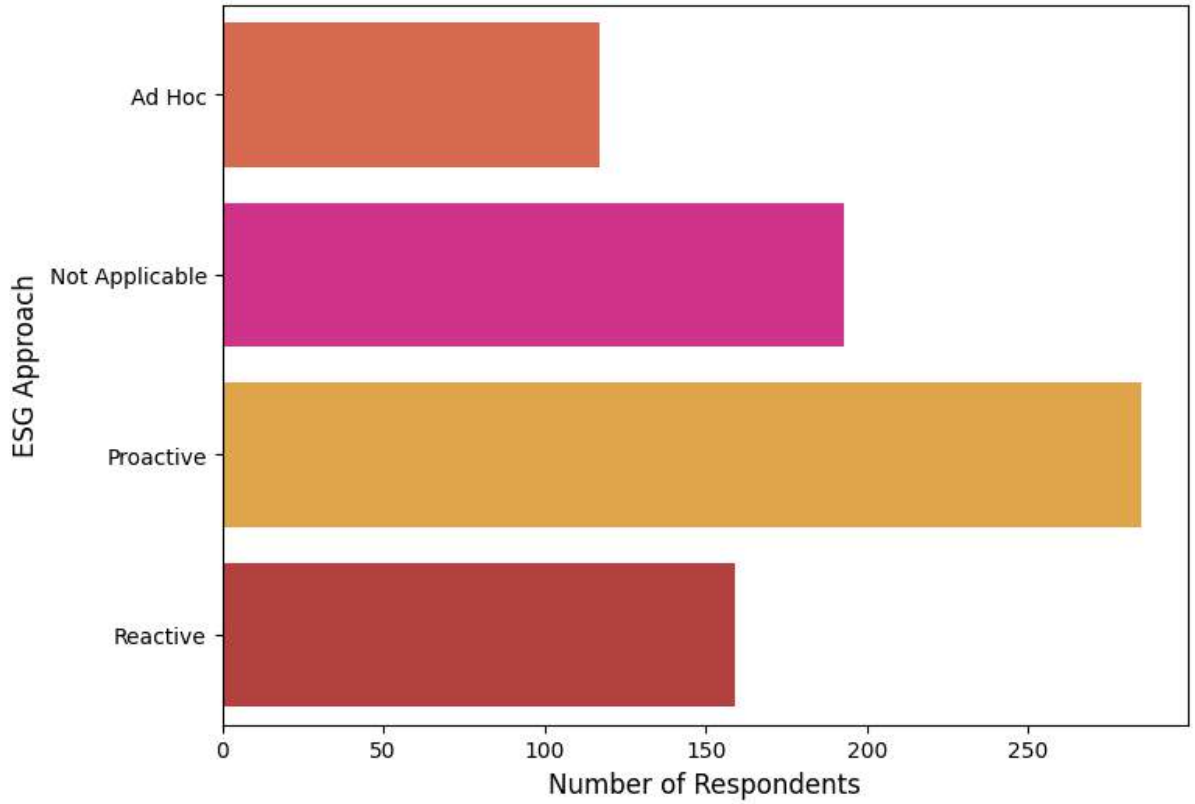
Organizational Approach to ESG Integration

- **37.8% of organizations adopt a proactive approach**, indicating that they actively embed ESG into strategic decision-making and project management frameworks.
- **21.1% follow a reactive approach**, implying that **Sustainability/ESG** considerations are addressed mainly in response to external pressures rather than as part of long-term strategy.
- **15.5% apply an ad hoc approach**, meaning **Sustainability/ESG** is incorporated inconsistently or on a project-by-project basis.
- **25.6% consider Sustainability/ESG integration not applicable**, which might reflect industry-specific constraints or limited **Sustainability/ESG** mandates.

Implications for Sustainable Project Management

- Organizations that **proactively integrate Sustainability/ESG principles** are better positioned to **align with global sustainability trends**, regulatory requirements, and stakeholder expectations.
- The significant percentage of **reactive and ad hoc approaches** suggests that many organizations **lack structured Sustainability/ESG policies** and may require further guidance and support.
- The fact that **20.8% of organizations have not yet integrated Sustainability/ESG principles** highlights the need for **increased awareness, training, and leadership commitment** in sustainability-driven project management.

Figure 28 Organizational Approach to Sustainability/ESG Integration



The findings indicate a **clear divide between organizations that proactively integrate Sustainability/ESG principles and those that either react to external pressures or have not yet considered Sustainability/ESG integration at all**. While **one-third of organizations (33.4%) have a well-established Sustainability/ESG framework**, **another third is still in the early adoption phase or has not yet integrated Sustainability/ESG principles**. The prevalence of **reactive and ad hoc approaches** suggests that further **strategic alignment, education, and leadership commitment** are required to foster sustainable project management practices across industries.

4.2.4 Key sustainability-focused initiatives

Organizations have implemented a wide range of **Sustainability/ESG initiatives**, reflecting diverse approaches to environmental, social, and governance responsibilities. The qualitative responses highlight key initiatives, including:

- **Environmental Initiatives**:
  - Reduction of **carbon footprint** through green technologies, energy efficiency programs, and renewable energy sources.

- Sustainable **waste management** programs, including recycling and circular economy initiatives.
- Implementation of **eco-friendly infrastructure**, such as photovoltaic panels and sustainable supply chains.

- **Social Initiatives**:
  - **Diversity, equity, and inclusion (DEI) programs** supporting workplace equality and fair labor practices.
  - **Community engagement efforts**, such as educational programs and social impact initiatives.
  - Employee well-being programs, ethical labor practices, and social responsibility policies.
- **Governance Initiatives**:
  - Ethical compliance policies, financial transparency, and responsible investment strategies.
  - ESG-focused **corporate governance structures**, including sustainability committees.
  - **Regulatory compliance** with international standards, such as ISO certifications and ESG reporting frameworks.

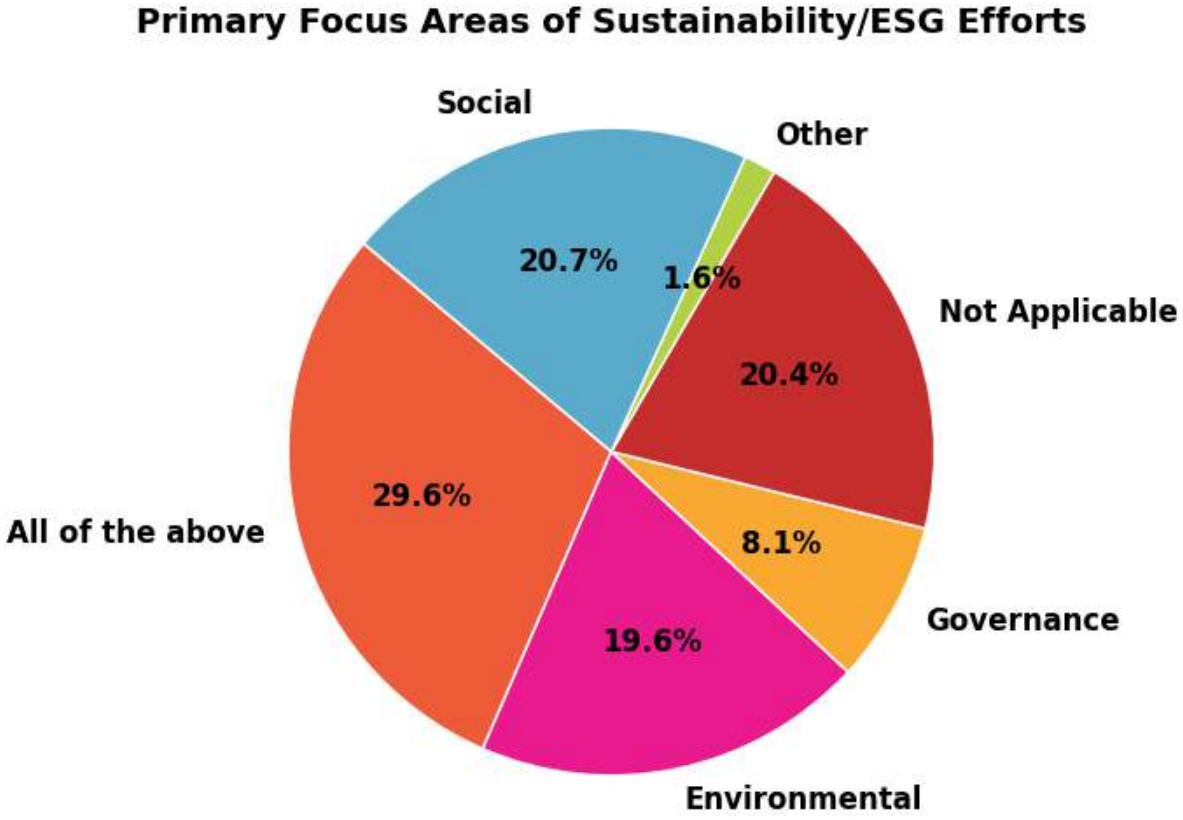
While some organizations have well-established sustainability strategies, others are still in the **early stages of Sustainability/ESG adoption**, often driven by external regulatory requirements or stakeholder expectations.

Figure 29 SPM and Sustainability/ESG initiatives

4.2.5 Focus areas (Environmental, Social, Governance aspects of SPM)

Understanding the primary focus of organizations' **Sustainability/ESG (Environmental, Social, and Governance) efforts** is crucial for assessing their commitment to sustainable project management (SPM). The survey results reveal **a diverse distribution of ESG priorities**, with some organizations focusing on a single aspect while others adopt a holistic approach.

Figure 30 SPM & ESG Focus Areas Across Organizations



Key Findings

1. **Holistic ESG Integration**
   - **29.6% of organizations focus on all three ESG aspects (Environmental, Social, and Governance)**, indicating a **comprehensive sustainability strategy**.
   - This suggests that nearly one-third of organizations **embed sustainability across multiple domains**, rather than isolating their efforts.

2. **Environmental and Social Priorities Dominate**
    - **Environmental focus (19.6%)**: Many organizations prioritize **reducing carbon footprints, implementing green technologies, and promoting sustainable operations**.
    - **Social focus (20.7%)**: Organizations also emphasize **workplace diversity, community engagement, and employee well-being**, reflecting a growing trend toward social responsibility in project management.
3. **Limited Focus on Governance**
    - **Only 8.1% of organizations prioritize governance-related improvements**, such as **ethical compliance and corporate governance structures**.
    - This highlights a **potential gap** in strengthening regulatory compliance, risk management, and leadership accountability within sustainability efforts.
4. **Lack of ESG Engagement**
    - **20.4% of respondents indicated that ESG efforts are "Not Applicable"** to their organization.
    - **1.6% of responses fell under the "Other" category**, potentially reflecting alternative sustainability strategies or unique industry-specific approaches.

Implications for Sustainable Project Management

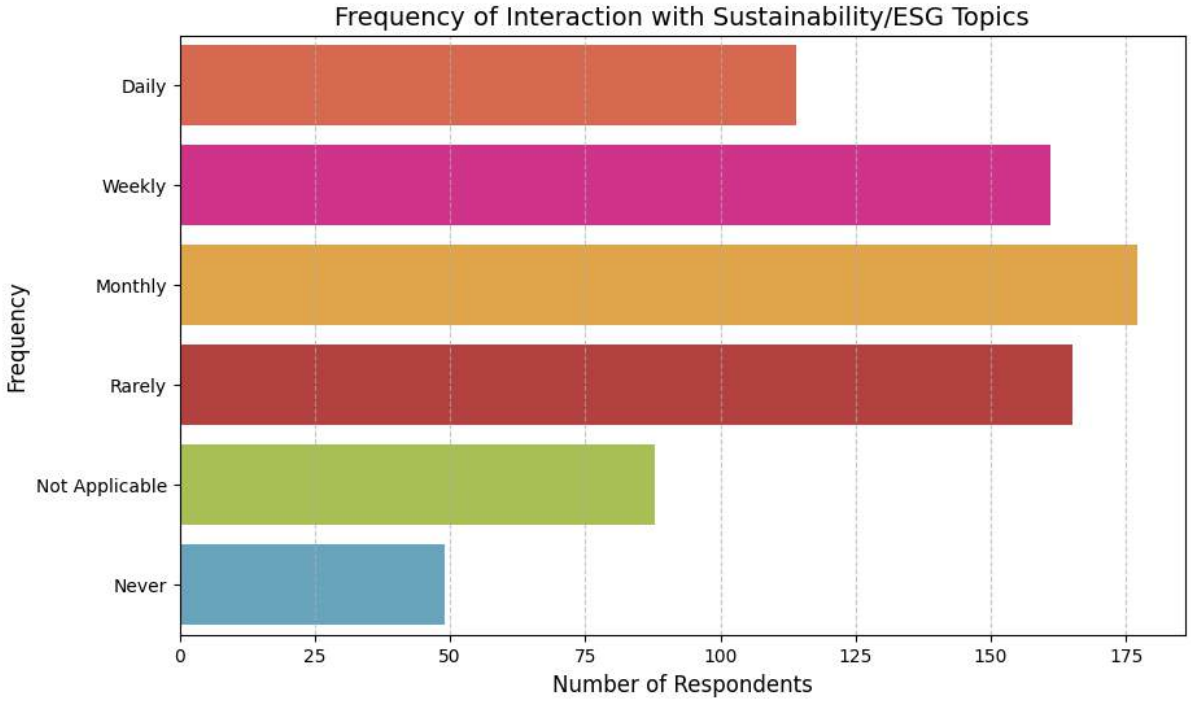
- The **prevalence of environmental and social focus areas** aligns with **global sustainability trends** and regulatory shifts encouraging green and inclusive practices.
- The **low emphasis on governance** suggests a **need for stronger ethical frameworks and governance enhancements** in sustainability strategies.
- The fact that **one-fifth of organizations (20.4%) do not engage in ESG efforts** indicates **barriers to adoption**, such as **resource limitations, industry constraints, or lack of leadership buy-in**.

The survey results indicate **a strong commitment to environmental and social sustainability**, while governance remains an **underdeveloped** aspect of ESG integration. While **some organizations take a holistic approach to sustainability**, others prioritize **specific ESG dimensions based on industry demands and internal capabilities**. These findings underscore the need for **enhanced governance frameworks and broader ESG adoption** across all sectors.

4.3 PERSONAL INTERACTION WITH SPM TOPICS

4.3.1 Frequency of engagement with SPM-related responsibilities.

Figure 31 Frequency of Engagement with SPM-Related Activities



Frequency of Engagement

- The highest proportion of respondents reported engaging with sustainability/ESG topics on a **monthly basis (23.5%)**.
- **Weekly engagement (21.4%)** and **rarely engaging (21.9%)** followed closely behind.
- **Daily interactions** with sustainability topics were reported by **15.1%** of respondents.
- A small percentage, **6.5%**, indicated they **never** interact with sustainability/ESG-related topics.
- **11.7%** of respondents stated that ESG topics are **not applicable** to their roles.

Engagement vs. Organizational Sustainability/ESG Integration

- Organizations that follow a **proactive approach** to ESG integration have the highest share of employees engaging with sustainability topics **daily (65 out of 114)**.
- Organizations with **ad-hoc** or **reactive** approaches tend to have fewer employees engaging in sustainability topics regularly.

- Employees in organizations where ESG is **not applicable** reported significantly lower engagement.

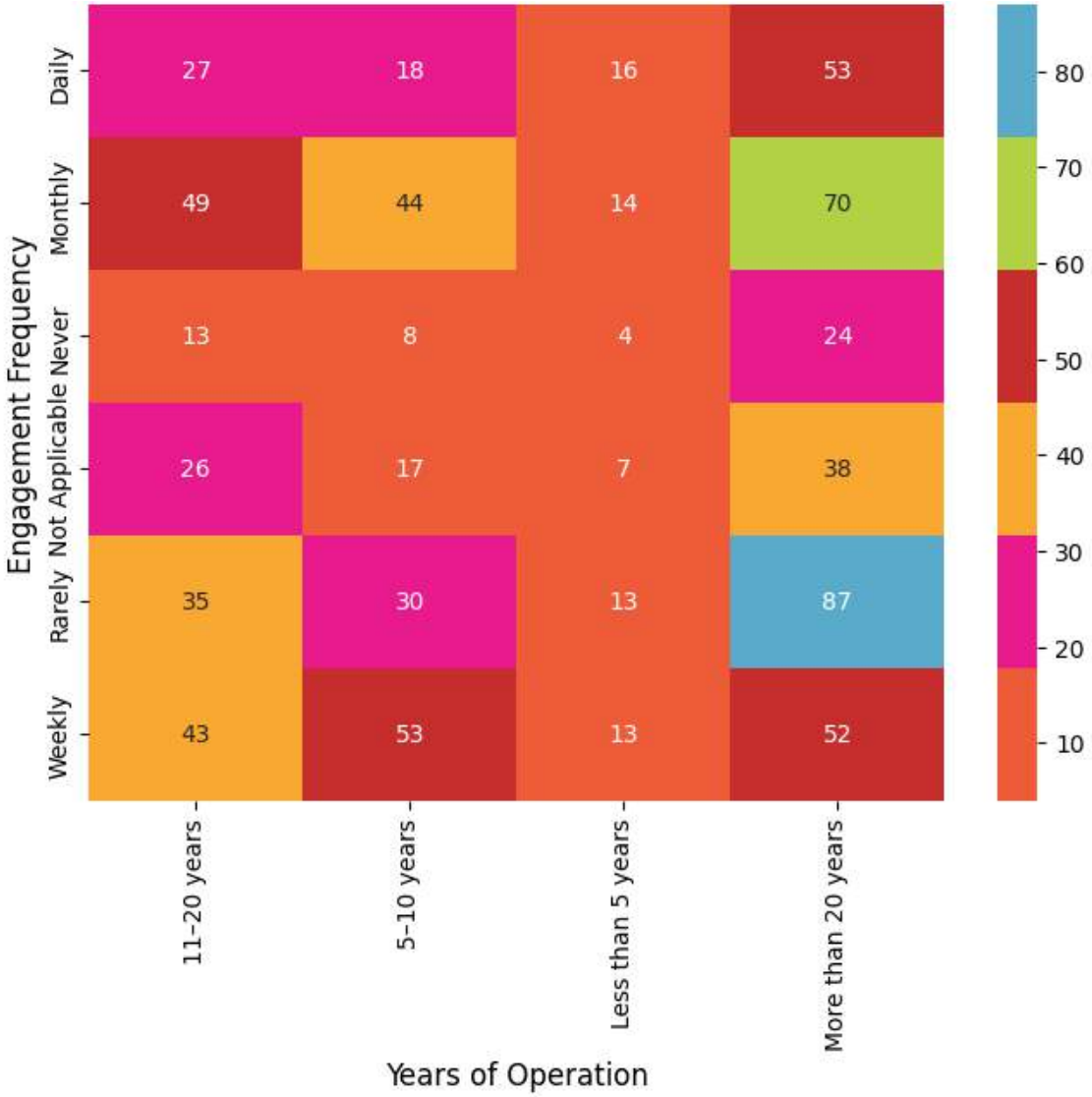
Engagement vs. Years of Operation

- Companies with over **20 years of operation** had the highest percentage of respondents who engage with sustainability topics **daily (53 out of 114)**.
- Organizations operating **less than 5 years** had the lowest daily engagement, indicating that sustainability engagement might increase as companies mature.
- Across all experience levels, **monthly and weekly engagement** remain the most common response.

Chi-Square Test Results

- The statistical tests indicate a **strong and significant relationship** between engagement frequency and the organization's ESG approach (**$p < 0.001$**).
- There is also a statistically significant relationship between engagement frequency and the years of operation (**$p = 0.018$**).

Figure 32 Engagement Frequency by Sustainability/ESG Integration Approach



There is **considerable variation in engagement frequency** with sustainability topics, suggesting differences in organizational culture and individual roles.

Proactive organizations have significantly more employees engaging **daily and weekly**, while ad-hoc and reactive organizations see lower engagement.

Organizations with **longer operational histories** tend to have **higher sustainability engagement**, particularly those with over 20 years in operation.

The **chi-square test results confirm significant relationships** between Sustainability/ESG engagement and both the organizational approach and years of operation.

This analysis highlights the need for organizations to **actively foster Sustainability/ESG engagement** through structured sustainability strategies and clearer role definitions.

5. SPM Competency Assessment

The integration of sustainability principles into project management requires a well-defined set of competencies that align with each phase of the project lifecycle. As part of the SPM² initiative, this section presents a structured assessment of Sustainable Project Management (SPM) competencies across five key phases: **Initiation, Planning, Execution, Monitoring & Control, and Closing**. The purpose is to identify which competencies are perceived as most important, how well they are currently implemented in practice, and where the largest gaps lie between expectations and performance.

Survey respondents were asked to rate a comprehensive list of SPM-related competencies on two dimensions:

1. **Importance** (how essential the competency is for sustainable project success), and
2. **Organizational Performance** (how well their organizations currently perform in that area).

These ratings provide insights into current capabilities and development priorities for embedding sustainability into project management processes.

5.1 INITIATION PHASE

The Initiation Phase lays the groundwork for sustainable project delivery. It is during this early phase that critical decisions are made regarding project objectives, stakeholder alignment, and sustainability considerations. Key competencies assessed include setting sustainability-driven goals, evaluating ESG (Environmental, Social, Governance) impacts, and integrating sustainability into governance structures. This section explores the extent to which organizations incorporate sustainability at the strategic entry point of the project lifecycle.

5.1.1 Importance vs. Performance Ratings

Table 1 Initiation Phase Competency Ratings: Importance vs. Performance

Competency	Mean Importance	Mean Performance
C1 - Define sustainability-focused objectives	3,86	3,28
C2 - Assess and document sustainability impacts	3,70	3,21
C3 - Stakeholder analysis and engagement	3,73	3,29
C4 - Integrate sustainability into governance structures	3,64	3,18
C5 - Align sustainability goals with organizational strategies	3,78	3,32
C6 - Evaluate sustainability-driven project needs	3,74	3,26
C7 - Embed preliminary sustainability metrics	3,62	3,13
C8 - Identify sustainability constraints and assumptions	3,71	3,23

The highest-rated competency in **importance** is **"Defining sustainability-focused project objectives"** (Mean: **3.86**). The **lowest-rated performance** score is for **"Embedding preliminary sustainability metrics"** (**3.13**), highlighting a gap in setting early sustainability indicators.

5.1.2 Identified competency gaps

Table 2 Initiation Phase Competency Gaps

Competency	Mean Importance	Mean Performance	Competency Gap
C1 - Define sustainability-focused objectives	3.86	3.28	0.580
C2 - Assess and document sustainability impacts	3.70	3.21	0.497
C3 - Stakeholder analysis and engagement	3.73	3.29	0.439
C4 - Integrate sustainability into governance structures	3.64	3.18	0.457
C5 - Align sustainability goals with organizational strategies	3.78	3.32	0.456
C6 - Evaluate sustainability-driven project needs	3.74	3.26	0.480
C7 - Embed preliminary sustainability metrics	3.62	3.13	0.490
C8 - Identify sustainability constraints and assumptions	3.71	3.23	0.482

The **largest competency gap** is seen in **"Defining sustainability-focused project objectives"** (**0.58**), indicating a need for better integration of sustainability in the early stages of project planning.

Figure 33 Heatmap of Importance, Performance, and Competency Gaps – Initiation Phase

Organizations recognize the importance of SPM competencies but struggle to implement them effectively. The **biggest gap** exists in **"Defining sustainability-focused project objectives"**, suggesting a need for stronger frameworks and guidelines. **Embedding sustainability metrics early in the project lifecycle** remains a challenge, indicating potential gaps in monitoring and reporting capabilities.

5.1.3 Analysis of Industry-Based Competency Gaps in the SPM Initiation Phase

Based on the **Kruskal-Wallis test results**, we analyzed **competency gaps** across different industries in the **SPM Initiation Phase**. This analysis helps identify which industries struggle most with sustainability competency implementation relative to their perceived importance.

Descriptive Statistics (Competency Gaps)

- The **mean competency gaps** range from **0.439 (C3 - Stakeholder Analysis) to 0.580 (C1 - Sustainability-Focused Objectives)**.
- The **largest variability (standard deviation)** is found in **C8 - Sustainability Constraints & Assumptions (1.10)**, indicating significant differences in perceived gaps among respondents.

Kruskal-Wallis Test for Industry Differences

The **Kruskal-Wallis test** was conducted to determine if competency gaps **significantly differ across industries**.

Table 3 Kruskal-Wallis Test Results for SPM Initiation Phase – Industry Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Define sustainability-focused objectives	17.530	0.618	❌ No
C2 - Assess and document sustainability impacts	36.335	0.014	✅ Yes
C3 - Stakeholder analysis and engagement	25.380	0.187	❌ No
C4 - Integrate sustainability into governance structures	28.153	0.106	❌ No
C5 - Align sustainability goals with organizational strategies	32.018	0.043	✅ Yes
C6 - Evaluate sustainability-driven project needs	37.807	0.009	✅ Yes
C7 - Embed preliminary sustainability metrics	32.608	0.037	✅ Yes
C8 - Identify sustainability constraints and assumptions	29.499	0.078	❌ No

Interpreting the Results

- **Statistically significant differences were found in four competencies (C2, C5, C6, C7).** This means that **some industries have much higher competency gaps than others** in these areas.
- **C6 (Evaluating sustainability-driven project needs) has the strongest industry effect (p = 0.009),** suggesting industries vary significantly in how they identify and evaluate sustainability priorities.

Which Industries Have the Highest Gaps?

From the **mean rank table**, industries with **higher mean ranks** generally have **larger competency gaps**.

- **Real Estate, Media/Entertainment, Non-Profit/NGO, and Biotechnology/Pharmaceuticals consistently rank high** in gaps, indicating they struggle more than other sectors.
- **Financial Services, Public Sector/Government, and Energy/Utilities have lower ranks**, suggesting these sectors have **smaller competency gaps**.

Table 4 Industries with the Highest Gaps for Significant Competencies

Competency	Industry with the Highest Gap
C2 - Assessing sustainability impacts	Media/Entertainment
C5 - Aligning sustainability goals	Retail/Consumer Goods
C6 - Evaluating sustainability-driven needs	Real Estate

C7 - Embedding sustainability metrics	Transportation/Logistics

These findings indicate that sectors like **Real Estate, Retail, and Logistics** face the greatest challenges in embedding sustainability at the project initiation phase.

Based on the **Kruskal-Wallis test and visualization findings**, we can conclude:

1. **Statistically significant industry differences** were found for:
   - C2 (Assess Sustainability Impacts)
   - C5 (Align Sustainability Goals)
   - C6 (Evaluate Sustainability-Driven Needs)
   - C7 (Embed Sustainability Metrics)
2. **Industries with the Largest Gaps**:
   - **Real Estate (C6 - Evaluating Sustainability-Driven Needs)**: Faces the most significant gap, indicating major challenges in project sustainability evaluation.
   - **Retail/Consumer Goods (C5 - Aligning Sustainability Goals)**: Struggles with integrating sustainability into corporate strategy.
   - **Media/Entertainment (C2 - Assessing Impacts)**: Lags behind in evaluating the environmental and social impact of projects.
   - **Transport & Logistics (C7 - Embedding Metrics)**: Has difficulty incorporating sustainability performance indicators.
3. **Policy & Training Recommendations**:
   - **Targeted training programs** for industries with the highest competency gaps.
   - **Sector-specific sustainability frameworks** for industries struggling with impact assessment and governance integration.
   - **Improved metric tracking tools** in Transport & Logistics and other underperforming sectors.

Figure 34 Industry-Based Competency Gap Analysis Heatmap – Initiation Phase

5.1.4 Analysis of Competency Gaps Based on Project Roles

The **Kruskal-Wallis test** was used to analyze differences in **competency gaps** based on **organizational role levels**. This analysis helps determine whether competency gaps in sustainability project management **vary between project, program, and portfolio-level roles**.

Kruskal-Wallis Test for Role Differences

The **Kruskal-Wallis test** was conducted to determine whether competency gaps **significantly differ based on job role**.

Table 5 Kruskal-Wallis Test Results for SPM Initiation Phase – Project Roles Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Define sustainability-focused objectives	1.936	0.586	✗ No
C2 - Assess and document sustainability impacts	4.910	0.179	✗ No
C3 - Stakeholder analysis and engagement	0.863	0.834	✗ No
C4 - Integrate sustainability into governance structures	5.460	0.141	✗ No
C5 - Align sustainability goals with organizational strategies	6.239	0.101	✗ No
C6 - Evaluate sustainability-driven project needs	3.989	0.263	✗ No
C7 - Embed preliminary sustainability metrics	3.707	0.295	✗ No
C8 - Identify sustainability constraints and assumptions	1.180	0.758	✗ No

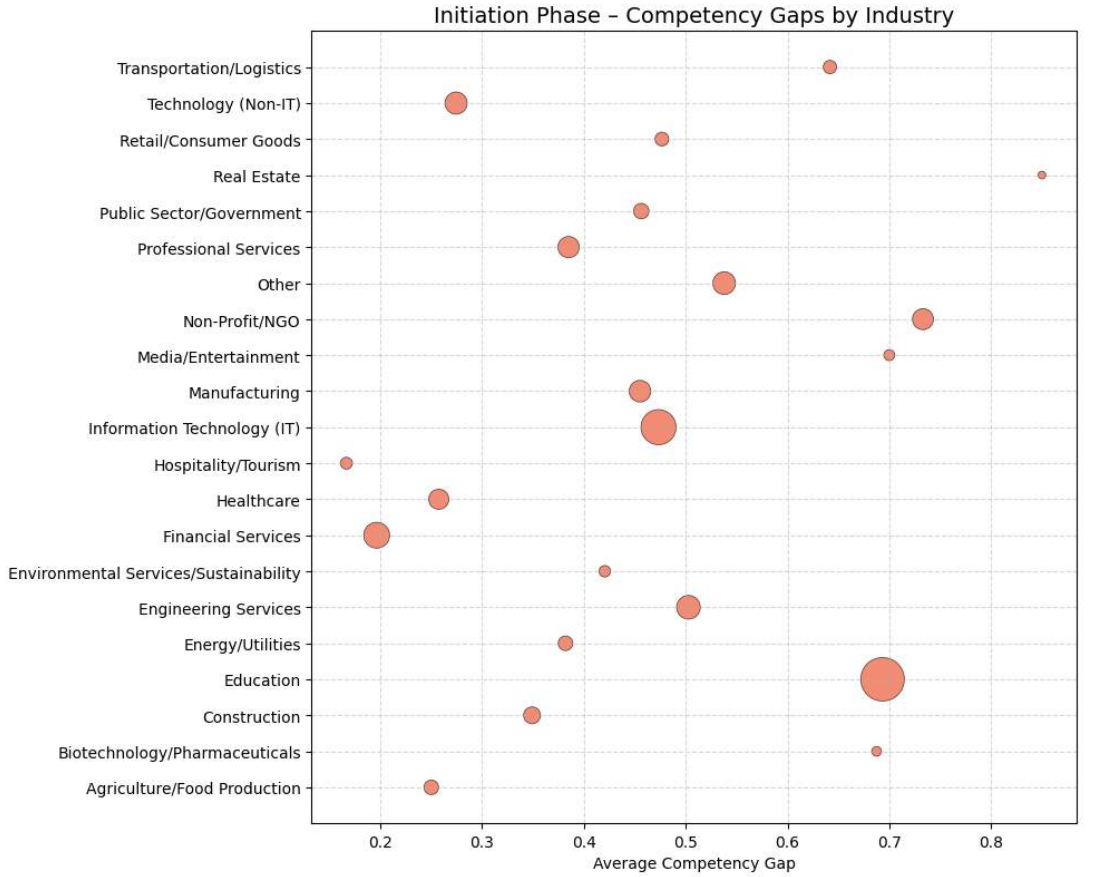
Interpretation of Results

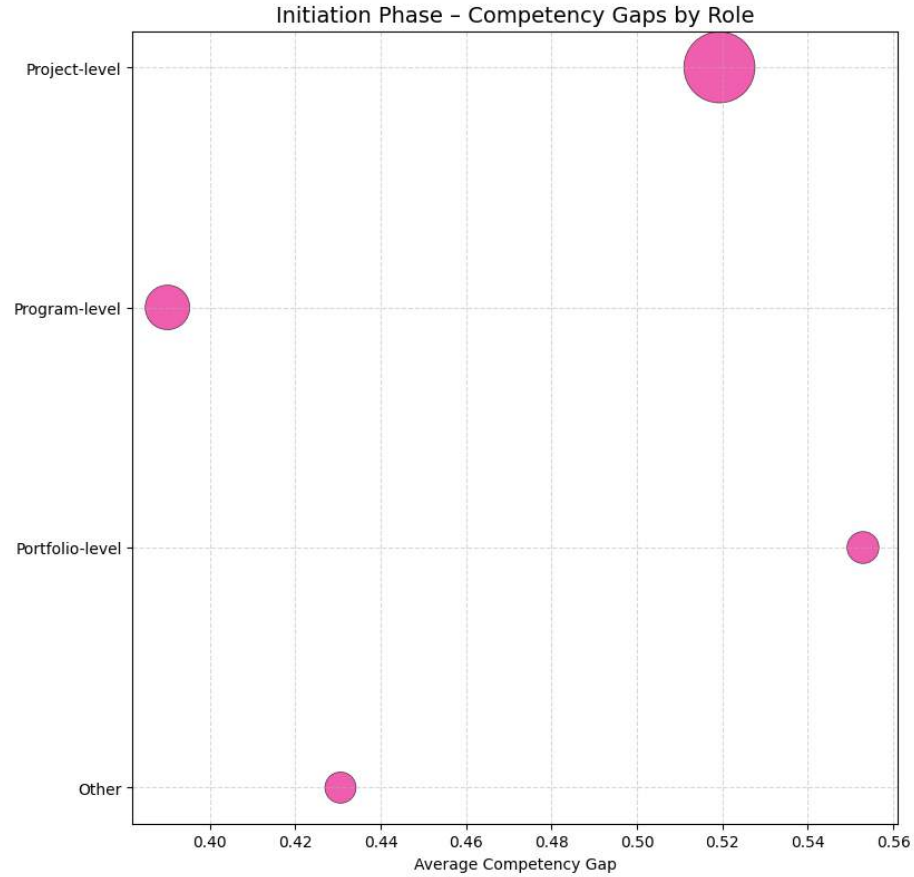
- **No statistically significant differences** ($p > 0.05$) were found in competency gaps **based on job role (Portfolio, Program, or Project level).**
- This suggests that **sustainability competency gaps are consistent across different project management levels**, meaning that all roles experience similar challenges.
- **Unlike the industry analysis**, where gaps varied significantly, here, the gaps appear **systematically present** across all roles.

Figure 35 Competency Gaps by Project Role – Initiation Phase Heatmap


Initiation Phase – Competency Gaps by Project Role
Role
Other
Portfolio-level role
Program-level role
Project-level role
0.593 0.506 0.420 0.383 0.333 0.259 0.531 0.420
0.694 0.682 0.435 0.506 0.600 0.553 0.518 0.435
0.512 0.500 0.361 0.277 0.295 0.458 0.319 0.398
0.583 0.457 0.474 0.531 0.514 0.517 0.543 0.535
C1 C2 C3 C4 C5 C6 C7 C8
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30

Figure 36 Competency Gaps by Project Role – Initiation Phase Bubble Chart


Initiation Phase – Competency Gaps by Industry
Transportation/Logistics
Technology (Non-IT)
Retail/Consumer Goods
Real Estate
Public Sector/Government
Professional Services
Other
Non-Profit/NGO
Media/Entertainment
Manufacturing
Information Technology (IT)
Hospitality/Tourism
Healthcare
Financial Services
Environmental Services/Sustainability
Engineering Services
Energy/Utilities
Education
Construction
Biotechnology/Pharmaceuticals
Agriculture/Food Production
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Average Competency Gap


Initiation Phase – Competency Gaps by Role
Project-level
Program-level
Portfolio-level
Other
0.40
0.42
0.44
0.46
0.48
0.50
0.52
0.54
0.56
Average Competency Gap

To complement the heatmaps, two bubble charts were created to visualize the average competency gaps in the Initiation phase across both industry sectors and organizational roles. These visualizations allow for an intuitive comparison of the magnitude of perceived gaps while also reflecting the relative sample size within each category.

Figure above presents the average ESG competency gap by industry. Each bubble's vertical position reflects the mean gap, while its size corresponds to the number of respondents from a given industry. Industries such as *Non-Profit/NGO*, *Education*, and *Media/Entertainment* reported notably higher average gaps, suggesting a stronger perceived need for ESG competencies at the project initiation stage in these sectors. Conversely, sectors such as *Financial Services*, *Healthcare*, and *Technology (Non-IT)* reported lower average gaps.

Figure below illustrates the competency gaps by professional role. Interestingly, *Portfolio-level* and *Project-level* professionals reported higher mean gaps than *Program-level* roles and respondents in the *Other* category. This may reflect a greater awareness or prioritization of ESG integration at the strategic and delivery ends of the project spectrum.

5.14 Correlation Analysis Summary for the Report

This section examines the relationships between sustainability competency ratings and three key organizational factors:

1. **Years of Experience** – To determine if more experienced professionals rate sustainability competencies differently.
2. **Years of Operation** – To assess whether older firms demonstrate better sustainability competency implementation.
3. **Work Environment (Remote, Hybrid, On-Site)** – To explore whether work setting influences perceived competency gaps.

Years of Experience and Competency Ratings

- **Significant but weak positive correlations were found** between years of experience and two competencies:
  - C1 - Define Sustainability-Focused Objectives (r = 0.096, p = 0.008)
  - C2 - Assess Sustainability Impacts (r = 0.093, p = 0.011)
  - C6 - Align Sustainability Goals (r = 0.113, p = 0.002)
- **Interpretation**: More experienced professionals tend to **assign slightly higher importance** to sustainability competencies, particularly in defining objectives and assessing impacts.
- **However, the correlations are weak**, indicating that **experience alone does not strongly influence competency perceptions**.

Years of Operation and Competency Ratings

- **Significant correlations were observed for several competencies**, although the relationships were weak:
  - C2 - Assess Sustainability Impacts ($r = 0.098$, $p = 0.007$)
  - C3 - Stakeholder Analysis ($r = 0.125$, $p < 0.001$)
  - C5 - Align Sustainability Goals ($r = 0.103$, $p = 0.005$)
  - C7 - Embed Preliminary Sustainability Metrics ($r = 0.090$, $p = 0.013$)
- **Interpretation**: Older, more established companies tend to **place slightly more emphasis on these competencies**, particularly in **stakeholder engagement and aligning sustainability goals**.

Work Environment and Competency Gaps

- **No significant correlations** were found between work environment (Remote, Hybrid, On-site) and competency gaps.
- **Interpretation**: The mode of work (remote, hybrid, or on-site) **does not appear to influence sustainability competency gaps**.
- **This suggests that competency gaps are systemic and not dependent on where employees work**.

5.2 PLANNING PHASE

In the Planning Phase, sustainability strategies are translated into actionable plans. Competencies evaluated in this phase include designing resource-efficient plans, establishing sustainability KPIs, applying circular economy principles, and integrating green procurement practices. The data reveals how effectively organizations plan for sustainability and to what extent they embed these goals into project blueprints.

5.2.1 Evaluation of competencies in sustainability planning

Highest rated competencies (Importance)

- "Competency to optimize cost and effort for sustainability" (**Mean = 3.798**)
- "Competency to define resource-efficient project plans" (**Mean = 3.777**)
- "Competency to align project scope with sustainability goals" (**Mean = 3.755**)

Lowest rated competencies (Importance)

- "Competency to define governance accountability for sustainability" (**Mean = 3.634**)
- "Competency to develop green procurement strategies" (**Mean = 3.653**)

Performance Ratings:

- The performance scores are consistently **lower** than importance scores, indicating gaps in competency implementation.

- The highest performance rating is for "Competency to align project scope with sustainability goals" (**Mean = 3.312**), while the lowest is for "Competency to manage sustainability risks" (**Mean = 3.198**).

Table 6 Planning Phase Competency Ratings: Importance vs. Performance

Competency	Importance (Mean)	Performance (Mean)
C1 - Define resource-efficient project plans	3.777	3.333
C2 - Establish sustainability KPIs	3.744	3.271
C3 - Develop green procurement strategies	3.653	3.203
C4 - Embed circular economy principles	3.690	3.203
C5 - Manage sustainability	3.700	3.198
C6 - Integrate sustainability into quality management	3.682	3.203
C7 - Engage stakeholders in sustainability	3.731	3.271
C8 - Align project scope with sustainability	3.755	3.312
C9 - Optimize cost and effort for sustainability	3.798	3.290
C10 - Define governance accountability for sustainability	3.634	3.195

5.2.2 Gaps in setting sustainability KPIs, green procurement, and risk management

The competency gaps (difference between **importance** and **performance**) indicate **the most challenging areas** where improvement is needed.

The **largest competency gaps**:

- "Competency to optimize cost and effort for sustainability" (**Gap = 0.5080**)
- "Competency to manage sustainability risks" (**Gap = 0.5027**)
- "Competency to integrate sustainability into quality management" (**Gap = 0.4867**)

The **smallest competency gaps**:

- "Competency to define governance accountability for sustainability" (**Gap = 0.4390**)
- "Competency to develop green procurement strategies" (**Gap = 0.4496**)

These results suggest that while organizations recognize the importance of these competencies, their actual implementation is lagging.

Table 7 Planning Phase Competency Gaps

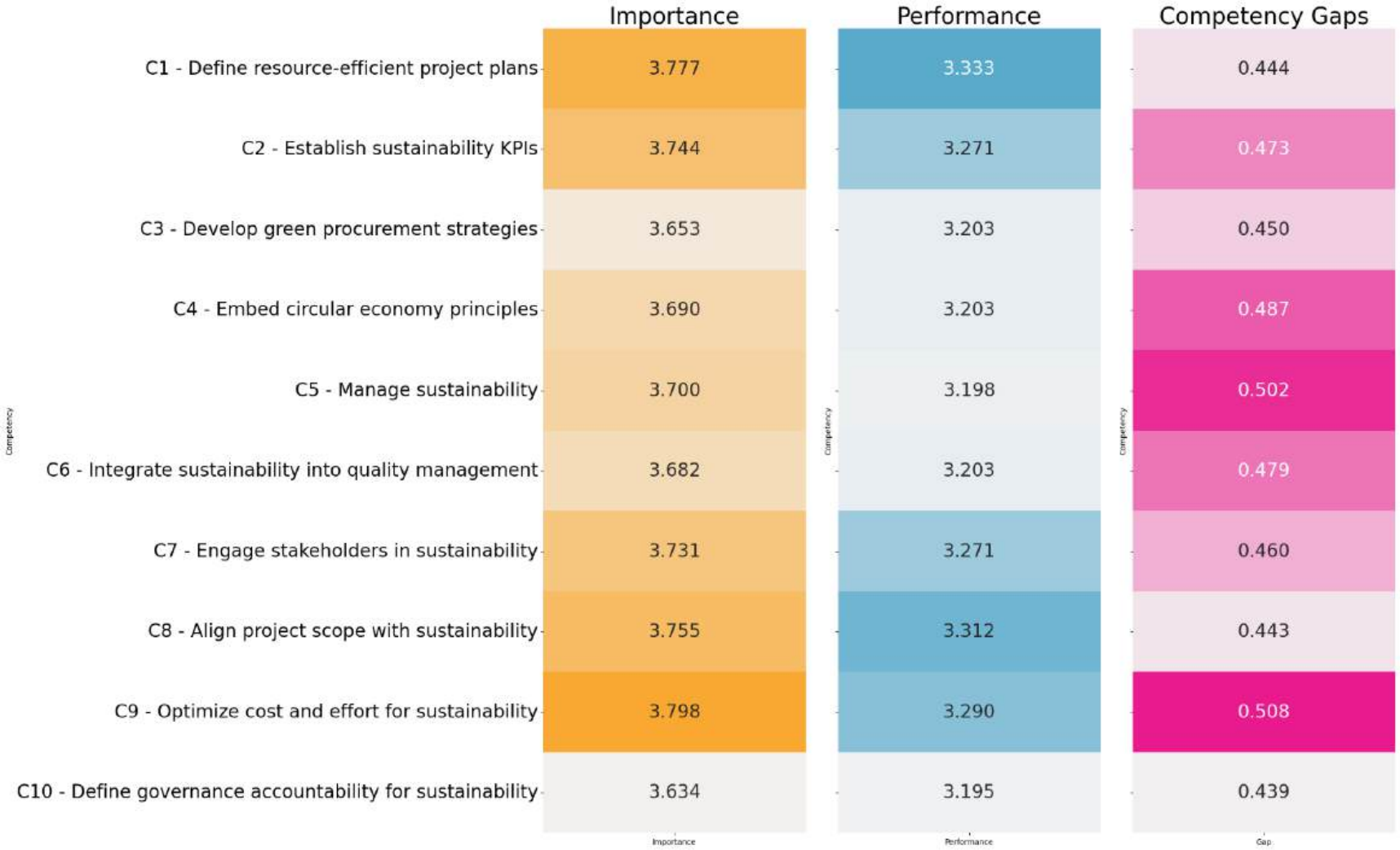
Competency	Importance (Mean)	Performance (Mean)	Competency Gap
C1 - Define resource-efficient project plans	3.777	3.333	0.444
C2 - Establish sustainability KPIs	3.744	3.271	0.473
C3 - Develop green procurement strategies	3.653	3.203	0.450
C4 - Embed circular economy principles	3.690	3.203	0.487
C5 - Manage sustainability	3.700	3.198	0.502
C6 - Integrate sustainability into quality management	3.682	3.203	0.479
C7 - Engage stakeholders in sustainability	3.731	3.271	0.460
C8 - Align project scope with sustainability	3.755	3.312	0.443
C9 - Optimize cost and effort for sustainability	3.798	3.290	0.508
C10 - Define governance accountability for sustainability	3.634	3.195	0.439

All competencies show a performance gap, indicating room for improvement in sustainability planning.

The most significant gaps are in cost/effort optimization, risk management, and quality integration.

Governance accountability has the lowest gap, suggesting better alignment between importance and execution.

Figure 37 Heatmap of Importance, Performance, and Competency Gaps – Planning Phase



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5.2.3 Analysis of Industry-Based Competency Gaps in the SPM Planning Phase

The Kruskal-Wallis test was conducted to analyze differences in competency gaps across various industries. The results indicate statistically significant differences in competency gaps for several sustainability planning competencies, suggesting that competency development varies across industry sectors. These competencies exhibit significant differences in sustainability planning gaps among industries. For example, **SPM_Planning_C4_Gap** (related to embedding circular economy principles) shows the strongest statistical significance (p = 0.001), meaning that its gap varies widely across industries.

Table 8 Kruskal-Wallis Test Results for SPM Planning Phase – Industry Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Define resource-efficient project plans	14.302	0.033	✅ Yes
C2 - Establish sustainability KPIs	13.876	0.034	✅ Yes
C3 - Develop green procurement strategies	16.274	0.01	✅ Yes
C4 - Embed circular economy principles	20.157	0.001	✅ Yes
C5 - Manage sustainability	10.549	0.231	❌ No
C6 - Integrate sustainability into quality management	9.776	0.27	❌ No
C7 - Engage stakeholders in sustainability	8.432	0.148	❌ No
C8 - Align project scope with sustainability	11.305	0.104	❌ No
C9 - Optimize cost and effort for sustainability	21.342	0.001	✅ Yes
C10 - Define governance accountability for sustainability	18.54	0.007	✅ Yes

Competencies without Statistically Significant Differences (p > 0.05): These results suggest that the competency gaps in these areas are more consistent across industries, with no strong evidence of industry-specific differences.

Industry-Specific Observations

- **Industries with Higher Mean Ranks:**
  - **Technology (Non-IT)** and **Transportation/Logistics** industries tend to show larger competency gaps in multiple categories.
  - **Real Estate** and **Biotechnology/Pharmaceuticals** industries also appear among those with higher ranks in certain competencies.
- **Industries with Lower Mean Ranks:**

- **Financial Services** and **Healthcare** consistently have lower ranks, suggesting smaller competency gaps in sustainability planning.

These insights imply that industries such as **Technology, Real Estate, and Biotechnology** may require more focused sustainability competency development, while **Financial Services and Healthcare** may already have stronger sustainability planning frameworks in place.

Figure 38 Industry-Based Competency Gap Analysis Heatmap – Planning Phase

5.2.4 Analysis of Competency Gaps Based on Project Roles

Here is a summary of the Kruskal-Wallis test results based on the SPSS output. This table presents the competency gaps in the **Planning Phase**, along with test statistics and their significance.

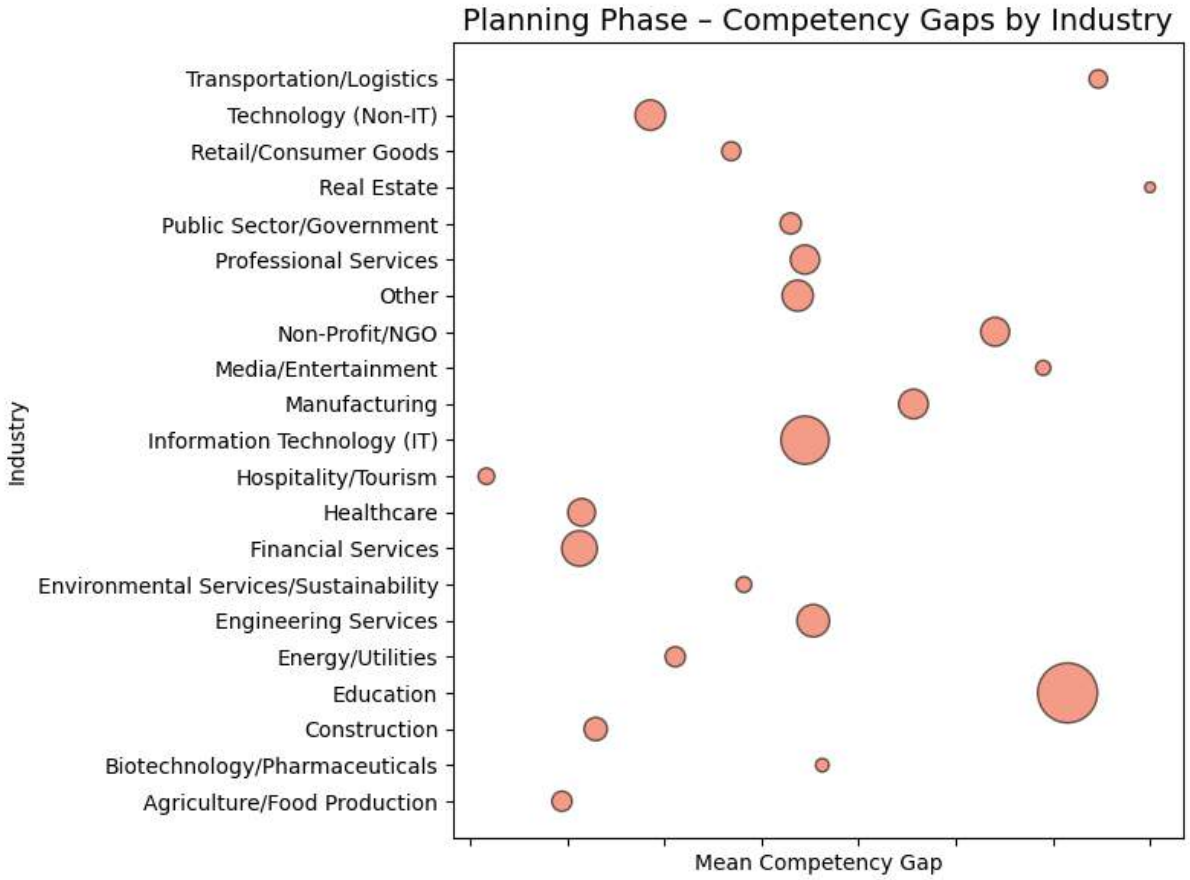
Table 9 Kruskal-Wallis Test Results for SPM Planning Phase – Project Roles Differences in Competency Gaps

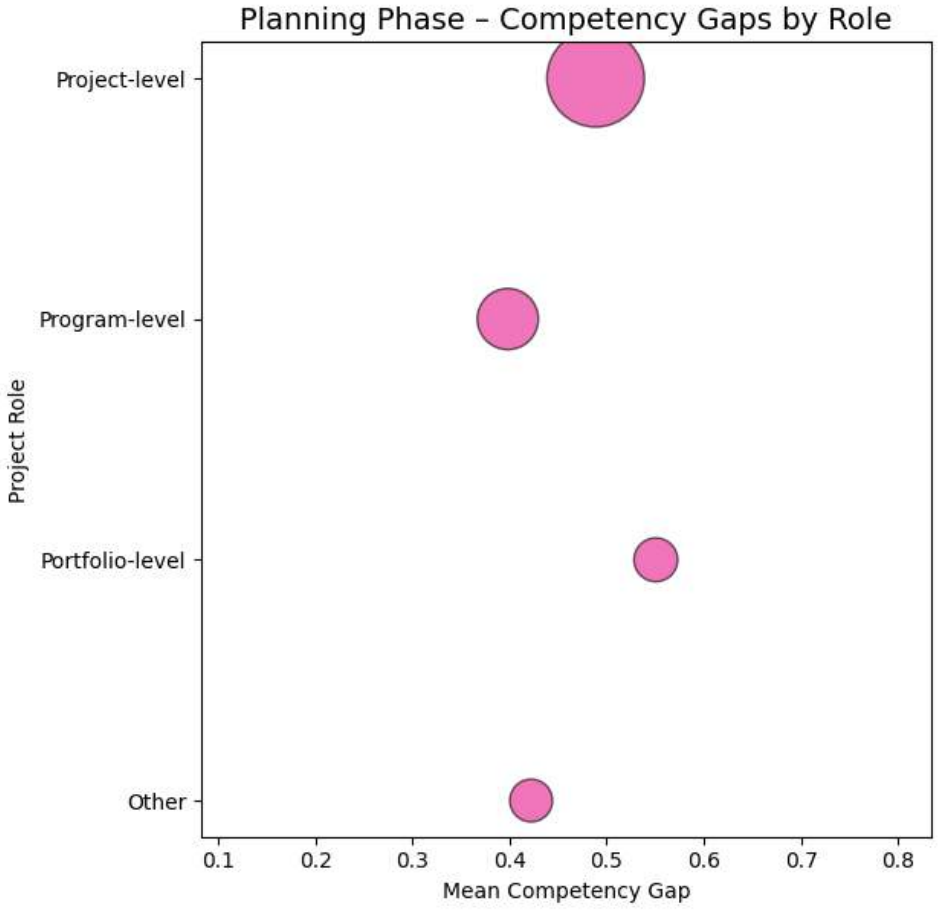
Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Define resource-efficient project plans	5.412	0.144	No
C2 - Establish sustainability KPIs	1.904	0.593	No
C3 - Develop green procurement strategies	5.462	0.141	No
C4 - Embed circular economy principles	1.226	0.747	No
C5 - Manage sustainability risks	3.158	0.368	No
C6 - Integrate sustainability into quality management	2.144	0.543	No
C7 - Engage stakeholders in sustainability planning	1.580	0.664	No
C8 - Align project scope with sustainability goals	2.019	0.569	No
C9 - Optimize cost and effort for sustainability	4.616	0.202	No
C10 - Define governance accountability for sustainability	7.286	0.063	No

None of the competency gaps in the Planning Phase show **statistically significant differences** across roles at **p < 0.05**, indicating that sustainability competency gaps are similar across different roles in organizations.

Figure 39 Competency Gaps by Project Role – Planning Phase Heatmap

Figure 40 Competency Gaps by Project Role – Planning Phase Bubble Chart


Planning Phase – Competency Gaps by Industry
Industry
Transportation/Logistics
Technology (Non-IT)
Retail/Consumer Goods
Real Estate
Public Sector/Government
Professional Services
Other
Non-Profit/NGO
Media/Entertainment
Manufacturing
Information Technology (IT)
Hospitality/Tourism
Healthcare
Financial Services
Environmental Services/Sustainability
Engineering Services
Energy/Utilities
Education
Construction
Biotechnology/Pharmaceuticals
Agriculture/Food Production
Mean Competency Gap


Planning Phase – Competency Gaps by Role
Project Role
Project-level
Program-level
Portfolio-level
Other
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Mean Competency Gap

The bubble charts presented above provide a visual representation of the average competency gaps identified during the planning phase, segmented by industry (top chart) and project role (bottom chart). Each bubble's position on the x-axis represents the mean gap value (difference between perceived importance and actual performance), while the size of the bubble indicates the sample size (N) for that category.

In terms of industry differences, the largest gaps were reported in *Real Estate* (0.800), *Transportation/Logistics* (0.747), *Education* (0.715), and *Media/Entertainment* (0.690). These findings highlight sectors where project planning competencies are perceived as highly important but are currently underdeveloped or insufficiently implemented. Conversely, industries such as *Hospitality/Tourism* (0.117), *Agriculture/Food Production* (0.194), and *Financial Services* (0.213) exhibit relatively lower gaps, suggesting either better alignment or lower competency demands during the planning phase.

When comparing project roles, *Portfolio-level roles* report the highest gap (0.551), followed by *Project-level roles* (0.489). *Program-level roles* show a slightly lower gap (0.398), and respondents in the *Other* category reported a moderate average gap of 0.422. These differences may reflect the distinct responsibilities and expectations associated with each role in the planning phase, as well as their varying proximity to decision-making and execution of sustainability-oriented planning practices.

5.2.5 Correlation Analysis Summary for the SPM Planning Phase

The correlation analysis presents Spearman's rank correlation coefficients between sustainability planning competencies and three organizational characteristics: **years of experience in project-oriented environments, years of operation, and staff headcount**. Below is a structured interpretation:

Key Findings:

1. **Years of Experience in Project-Oriented Environments**:
    - No significant correlations were found between years of experience and the importance ratings of planning competencies.
    - The highest correlation coefficient was **0.056** (not significant at $p<0.05$), indicating no strong link between experience and perceived importance.
2. **Years of Operation**:
    - A few significant positive correlations were observed.
    - The highest correlation was with **"Competency to establish sustainability KPIs" (0.163, $p<0.001$)**, indicating that organizations with more years of operation tend to value this competency more.
    - Other competencies, such as **"Developing green procurement strategies"** and **"Engaging stakeholders in sustainability planning"**, also had weaker but significant correlations.

3. **Staff Headcount**:
    - There were some weak but significant correlations.
    - **"Competency to establish sustainability KPIs" (0.113, p=0.002)** had the strongest link, implying that larger organizations may prioritize measuring sustainability more systematically.
    - **"Competency to define resource-efficient project plans" (0.101, p=0.006)** was also slightly correlated with organizational size.

5.3 EXECUTION PHASE

The Execution Phase is where sustainability plans are put into practice. This involves deploying sustainable solutions, engaging stakeholders, optimizing resource use, and complying with ESG standards. In this section, we examine how well organizations execute sustainability strategies in real-time, focusing on operational competencies and team engagement in sustainable practices.

5.3.1 Evaluation of competencies in sustainability-focused solutions

The analysis of importance ratings suggests that all competencies within the execution phase are valued by project management professionals, with mean ratings ranging from **3.63 to 3.82**. The highest-rated competency in terms of importance is **"Monitoring efficient resource utilization" (Mean = 3.82, SD = 1.052)**, followed closely by **"Delivering sustainable outputs" (Mean = 3.81, SD = 1.057)**. These findings indicate a strong industry-wide recognition of the need for resource efficiency and sustainability-driven project outcomes.

Conversely, performance ratings are generally lower across all competencies, with means ranging from **3.16 to 3.34**, highlighting a consistent gap between expectations and actual implementation. The lowest-rated competency in performance is **"Tracking sustainability-related changes" (Mean = 3.16, SD = 1.089)**, which suggests a potential challenge in integrating adaptive sustainability tracking mechanisms within project execution processes.

Key Findings:

- The largest discrepancies between importance and performance were observed in **"Implementing sustainability-focused solutions" (Importance = 3.80, Performance = 3.31, Gap = 0.49)** and **"Delivering sustainable outputs" (Importance = 3.81, Performance = 3.30, Gap = 0.51)**.
- Competencies related to **compliance with sustainability standards** and **risk management in execution** also exhibited notable gaps, indicating the need for strengthened governance mechanisms in sustainable project delivery.

These results underscore a critical need for **enhanced training, tools, and methodologies** to bridge the implementation gap, particularly in sustainability performance monitoring and risk mitigation.

Table 10 Execution Phase Competency Ratings: Importance vs. Performance

Competency	Importance (Mean)	Performance (Mean)
C1 - Implement sustainability-focused solutions	3.800	3.310
C2 - Maintain stakeholder engagement for sustainability	3.723	3.293
C3 - Align team efforts with sustainability objectives	3.710	3.280
C4 - Monitor efficient resource utilization	3.820	3.322
C5 - Ensure compliance with sustainability standards	3.696	3.255
C6 - Track sustainability-related changes	3.634	3.159
C7 - Maintain sustainability quality assurance	3.682	3.245
C8 - Promote eco-conscious behavior	3.771	3.336
C9 - Address sustainability risks during execution	3.704	3.248
C10 - Deliver sustainable outputs	3.813	3.301

5.2.2 Gaps in competencies in sustainability-focused solutions

To further understand the disparities between perceived importance and actual performance, an analysis of competency gaps was conducted. The findings indicate that sustainability execution challenges persist across various competencies, reflecting different levels of maturity in sustainability integration.

Table 11 Execution Phase Competency Gaps

Competency	Importance (Mean)	Performance (Mean)	Gap (Mean)
C1 - Implement sustainability-focused solutions	3.800	3.310	0.489
C2 - Maintain stakeholder engagement for sustainability	3.723	3.293	0.430
C3 - Align team efforts with sustainability objectives	3.710	3.280	0.430
C4 - Monitor efficient resource utilization	3.820	3.322	0.497
C5 - Ensure compliance with sustainability standards	3.696	3.255	0.442
C6 - Track sustainability-related changes	3.634	3.159	0.475
C7 - Maintain sustainability quality assurance	3.682	3.245	0.436
C8 - Promote eco-conscious behavior	3.771	3.336	0.435
C9 - Address sustainability risks during execution	3.704	3.248	0.456
C10 - Deliver sustainable outputs	3.813	3.301	0.512

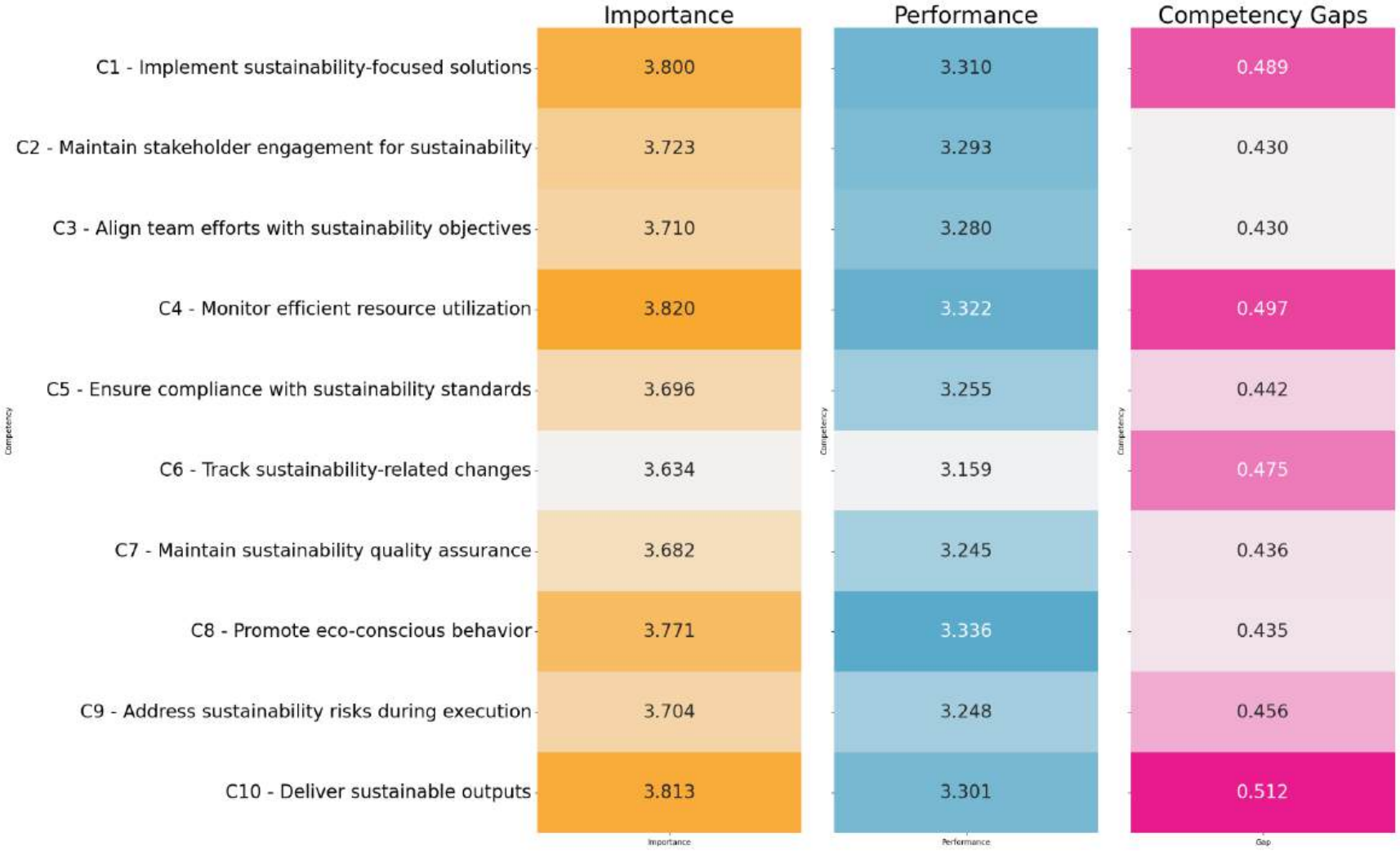
Competency Gaps Overview:

- The highest competency gap was observed in **"Delivering sustainable outputs" (Gap = 0.51)**, indicating that while this competency is highly valued, organizations struggle to fully implement it.
- **"Implementing sustainability-focused solutions" (Gap = 0.49)** and **"Monitoring efficient resource utilization" (Gap = 0.50)** also exhibit significant gaps, suggesting that resource efficiency remains a challenge in sustainable project execution.
- **"Tracking sustainability-related changes" (Gap = 0.47)** and **"Ensuring compliance with sustainability standards" (Gap = 0.44)** highlight areas where structured sustainability monitoring and regulatory adherence need to be reinforced.

Key Insights:

- The widest competency gaps are consistently observed in areas that require **structured tracking, compliance mechanisms, and effective execution strategies**.
- A strong focus is needed on **improving sustainability monitoring systems** to better align execution with sustainability goals.
- Bridging these competency gaps requires a **multifaceted approach**, including **enhanced training programs, improved governance structures, and better integration of sustainability tracking mechanisms** to ensure that execution aligns with strategic sustainability objectives.

Figure 41 Heatmap of Importance, Performance, and Competency Gaps – Execution Phase



5.3.3 Analysis of Industry-Based Competency Gaps in the SPM Execution Phase

The results of the Kruskal-Wallis test (H statistic and p-values) are presented in the table below:

Table 12 Kruskal-Wallis Test Results for SPM Execution Phase – Industry Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Implement sustainability-focused solutions	25.431	0.185	❌ No
C2 - Maintain stakeholder engagement for sustainability	25.968	0.167	❌ No
C3 - Align team efforts with sustainability objectives	24.630	0.216	❌ No
C4 - Monitor efficient resource utilization	35.653	0.017	✅ Yes
C5 - Ensure compliance with sustainability standards	31.008	0.055	❌ No
C6 - Track sustainability-related changes	25.884	0.170	❌ No
C7 - Maintain sustainability quality assurance	28.694	0.094	❌ No
C8 - Promote eco-conscious behavior	23.612	0.260	❌ No
C9 - Address sustainability risks during execution	31.320	0.051	❌ No
C10 - Deliver sustainable outputs	15.233	0.763	❌ No

Interpretation of Findings

The Kruskal-Wallis test identified one statistically significant difference in competency gaps across industries: **monitoring efficient resource utilization (C4)**, with a p-value of **0.017**. This suggests that the perception of the gap in this competency varies significantly depending on the industry sector. Industries may have different levels of resource efficiency practices and sustainability-driven operational constraints, leading to discrepancies in execution capability.

For the remaining competencies, the differences in gaps across industries were not statistically significant ($p > 0.05$). This indicates that, despite variations in sustainability practices, competency gaps in execution-related sustainability skills are relatively consistent across industries.

Implications for Sustainable Project Management

- The significant competency gap in **monitoring efficient resource utilization** suggests that certain industries struggle more with optimizing sustainability-driven resource management practices. Tailored strategies and industry-specific training programs may be required to address these disparities.
- The lack of significant differences in most competencies suggests that **sustainability execution challenges are widespread**, rather than industry-specific, reinforcing the need for broad-based improvements in sustainable project management practices.
- Organizations should focus on **enhancing cross-industry knowledge sharing** to leverage best practices in sustainability-focused project execution, particularly in resource efficiency and stakeholder engagement.

These findings provide valuable insights into how different industries experience sustainability competency gaps during project execution. Addressing these challenges through **targeted interventions, training programs, and strategic improvements** will be crucial in advancing sustainable project management practices across diverse sectors.

Figure 42 Industry-Based Competency Gap Analysis Heatmap – Execution Phase

5.3.4 Analysis of Competency Gaps Based on Project Roles

To assess whether competency gaps differ based on project roles, the Kruskal-Wallis test was conducted. This test helps determine whether statistically significant differences exist among competency gaps across four role categories: **Portfolio-level roles (e.g., Portfolio Manager, Portfolio Analyst), Program-level roles (e.g., Program Manager, Program Coordinator), Project-level roles (e.g., Project Manager, Team Leader, Project Team Member), and Other roles.**

Results of the Kruskal-Wallis Test

The results of the Kruskal-Wallis test (H statistic and p-values) for competency gaps across different project roles are presented in the table below:

Table 13 Kruskal-Wallis Test Results for SPM Execution Phase – Project Roles Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Implement sustainability-focused solutions	4.165	0.244	✗ No
C2 - Maintain stakeholder engagement for sustainability	4.615	0.202	✗ No

C3 - Align team efforts with sustainability objectives	6.651	0.084	No
C4 - Monitor efficient resource utilization	6.039	0.110	No
C5 - Ensure compliance with sustainability standards	7.026	0.071	No
C6 - Track sustainability-related changes	6.934	0.074	No
C7 - Maintain sustainability quality assurance	6.964	0.073	No
C8 - Promote eco-conscious behavior	4.066	0.254	No
C9 - Address sustainability risks during execution	2.294	0.514	No
C10 - Deliver sustainable outputs	1.300	0.729	No

Interpretation of Findings

The analysis indicates that **none of the competency gaps show statistically significant differences** across project roles ($p > 0.05$). This suggests that sustainability-related execution challenges are relatively consistent across different managerial and operational roles within project-based organizations.

Key takeaways from these findings include:

- **No role-specific disparities:** Regardless of whether an individual operates at the **portfolio, program, or project level**, their perceived competency gaps in sustainable execution are similar.
- **Broad-based sustainability challenges:** The lack of significant differences implies that **systemic issues in sustainable execution span across all hierarchical levels** rather than being isolated to a specific role type.
- **Uniform need for competency development:** Given the uniformity of competency gaps across roles, organizations should **adopt holistic training programs** that address sustainability execution competencies at all levels rather than tailoring interventions to specific roles.

Implications for Sustainable Project Management

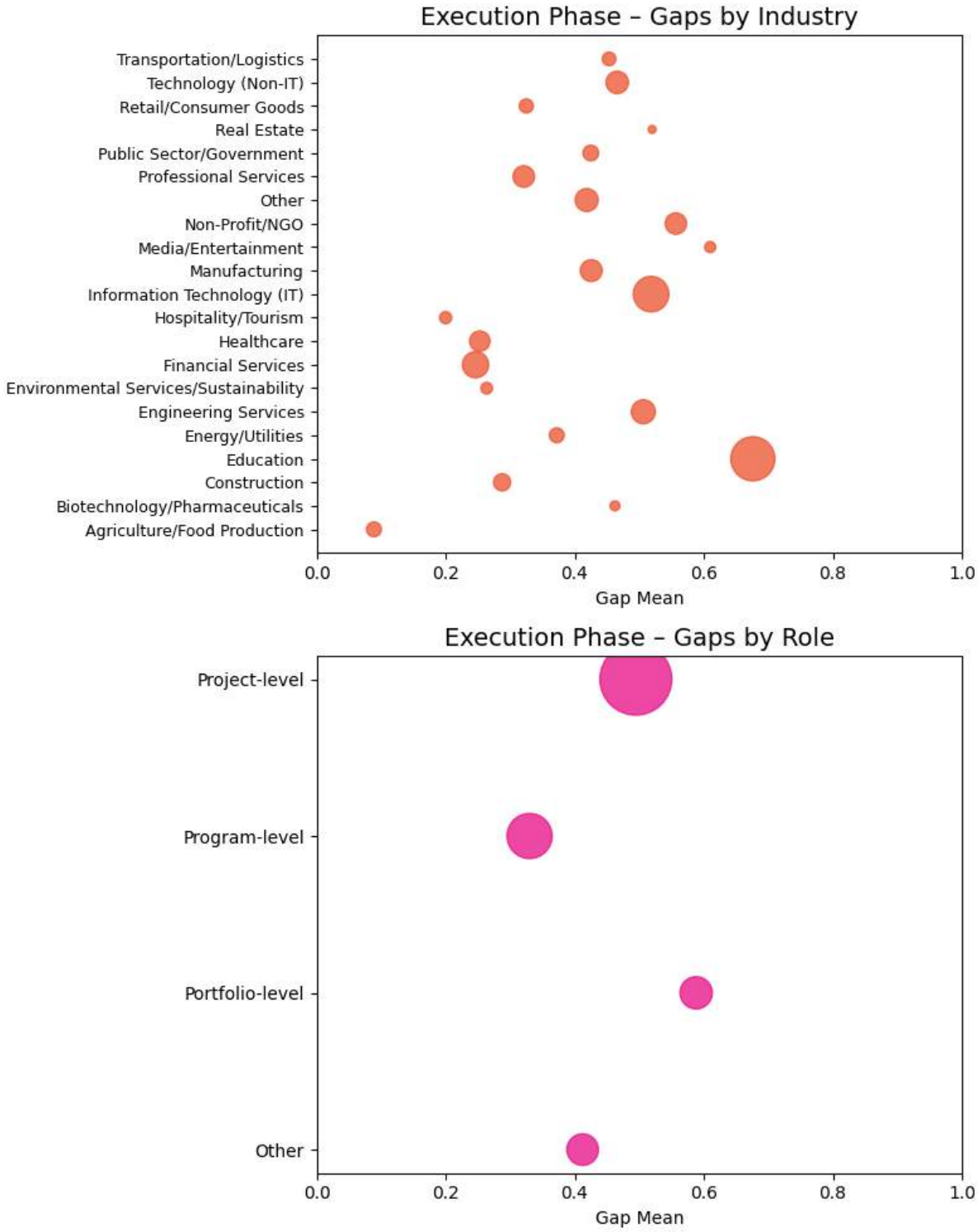
Since competency gaps are consistent across project roles, organizations should focus on:

- Developing **cross-functional sustainability training programs** to enhance execution-related competencies at all levels.
- Strengthening **collaborative sustainability practices** that integrate input from portfolio, program, and project managers alike.
- Implementing **role-independent sustainability frameworks** to ensure a coherent approach to sustainable project execution across all hierarchical levels.

These results reinforce the idea that sustainability execution is an organization-wide concern that requires a **unified, cross-role strategy** to bridge existing competency gaps effectively.

Figure 43 Competency Gaps by Project Role – Execution Phase Heatmap

Figure 44 Competency Gaps by Project Role – Execution Phase Bubble Chart



The bubble charts below illustrate the average perceived gaps in the Execution phase of sustainable project management across different industries and professional roles. Each bubble represents the mean gap reported by respondents, with the size indicating the number of responses (N) per group.

The largest gaps were reported in the Education sector (M = 0.6761), Media/Entertainment (M = 0.6100), and Non-Profit/NGO (M = 0.5568). These results suggest a stronger perceived need for ESG-aligned competencies during the execution of projects in these sectors.

The highest gap was noted among professionals in portfolio-level roles (M = 0.5882), followed by those in project-level positions (M = 0.4948). Program-level roles indicated comparatively smaller gaps (M = 0.3301), potentially reflecting more structured ESG integration at the program management layer.

5.3.5 Correlation Analysis Summary for the SPM Execution Phase

This section presents the correlation analysis for competency gaps in the execution phase of sustainable project management (SPM²). The analysis was conducted using **Spearman's rank correlation coefficient** to assess relationships between competency gaps and organizational characteristics, including **staff headcount, years of experience in project-oriented environments, and organizational tenure.**

Key Findings

1. Correlation Between Staff Headcount and Competency Gaps

- The results indicate that **there are no significant correlations between staff headcount and competency gaps** ($p > 0.05$ across all competencies).
- This suggests that the size of an organization does not influence how competency gaps are perceived in the execution phase of sustainable project management.

2. Correlation Between Years of Experience in Project-Oriented Environments and Competency Gaps

- A weak but statistically significant correlation was observed between **years of experience in project-oriented environments and the competency gap for SPM_Executing_C9 ($r = 0.074$, $p = 0.043$)**.
- For all other competencies, no significant correlations were found ($p > 0.05$).
- This suggests that experience in project-oriented environments does not systematically impact how competency gaps are perceived, apart from a slight tendency in **Competency C9 (Addressing sustainability risks during execution).**

3. Correlation Between Years of Organizational Operation and Competency Gaps

- **No significant correlations** were found between how long an organization has been operating and any of the competency gaps ($p > 0.05$ for all competencies).

- This indicates that **organizational maturity does not appear to affect the perception of competency gaps in sustainability-focused project execution.**

Interpretation of Results

The results of this correlation analysis indicate that **organizational characteristics such as staff size, experience in project-oriented environments, and organizational tenure have limited impact on competency gaps in sustainable project execution.**

Key takeaways:

- **Competency gaps in execution are relatively independent of company size, industry tenure, and experience levels.**
- **The only statistically significant correlation (SPM_Executing_C9) suggests that organizations with more experienced project teams may face slightly greater challenges in addressing sustainability risks during execution.**
- These findings reinforce the need for **broad-based interventions to address sustainability execution challenges across all types of organizations, irrespective of their size or experience.**

Implications for Sustainable Project Management

Given that competency gaps persist regardless of organizational characteristics, strategies for improvement should focus on:

1. **Integrating sustainability-focused training programs at all experience levels** to ensure that project teams are equipped to address execution challenges.
2. **Emphasizing cross-functional collaboration** in sustainability execution efforts to bridge competency gaps effectively.

The findings suggest that competency development efforts should be **targeted across all levels of project management and organizational structures, rather than being tailored based on staff size, experience, or tenure alone.**

5.4 MONITORING & CONTROL PHASE

Sustainable projects require robust mechanisms for tracking performance, managing risks, and ensuring ongoing compliance. This phase evaluates competencies such as monitoring ESG indicators, implementing quality control aligned with sustainability standards, and managing risks related to environmental or social impacts. Insights from this phase highlight the maturity of sustainability-focused oversight mechanisms.

5.4.1 Evaluation of competencies in tracking sustainability performance

Based on **descriptive statistics**, the highest-rated competency in terms of **importance** is **"Competency to track sustainability performance metrics"** (Mean = **3.78**, SD = **1.031**), followed closely by **"Competency to sustain resource optimization"** (Mean = **3.74**, SD = **1.034**). The lowest-rated competency is **"Competency to manage changes for sustainability outcomes"** (Mean = **3.64**, SD = **1.018**).

When considering **performance**, the highest-rated competency is **"Competency to maintain transparency in sustainability performance"** (Mean = **3.32**, SD = **1.126**), while the lowest-rated competency is **"Competency to conduct iterative improvements"** (Mean = **3.19**, SD = **1.100**). Across all competencies, performance scores are generally lower than importance scores, indicating competency gaps.

Table 14 Monitoring & Control Phase Competency Ratings: Importance vs. Performance

Competency	Importance (Mean)	Performance (Mean)
C1 - Competency to track sustainability performance metrics	3.78	3.29
C2 - Competency to ensure compliance with sustainability standards	3.61	3.20
C3 - Competency to monitor sustainability-related risks	3.68	3.21
C4 - Competency to conduct iterative improvements	3.65	3.19
C5 - Competency to manage changes for sustainability outcomes	3.64	3.21
C6 - Competency to verify sustainability quality assurance	3.66	3.23
C7 - Competency to document and report sustainability progress	3.68	3.31
C8 - Competency to sustain resource optimization	3.74	3.27
C9 - Competency to maintain transparency in sustainability performance	3.74	3.32
C10 - Competency to align progress with sustainability goals	3.73	3.26

5.2.2 Gaps in competencies in in tracking sustainability performance

The competency gap is calculated as the difference between **importance** and **performance** scores. The largest competency gap is observed for **"Competency to track sustainability performance metrics"** (**Mean Gap = 0.4828**, SD = **1.01534**), while the smallest competency gap is reported for **"Competency to sustain resource optimization"** (**Mean Gap = 0.3740**, SD = **1.04895**).

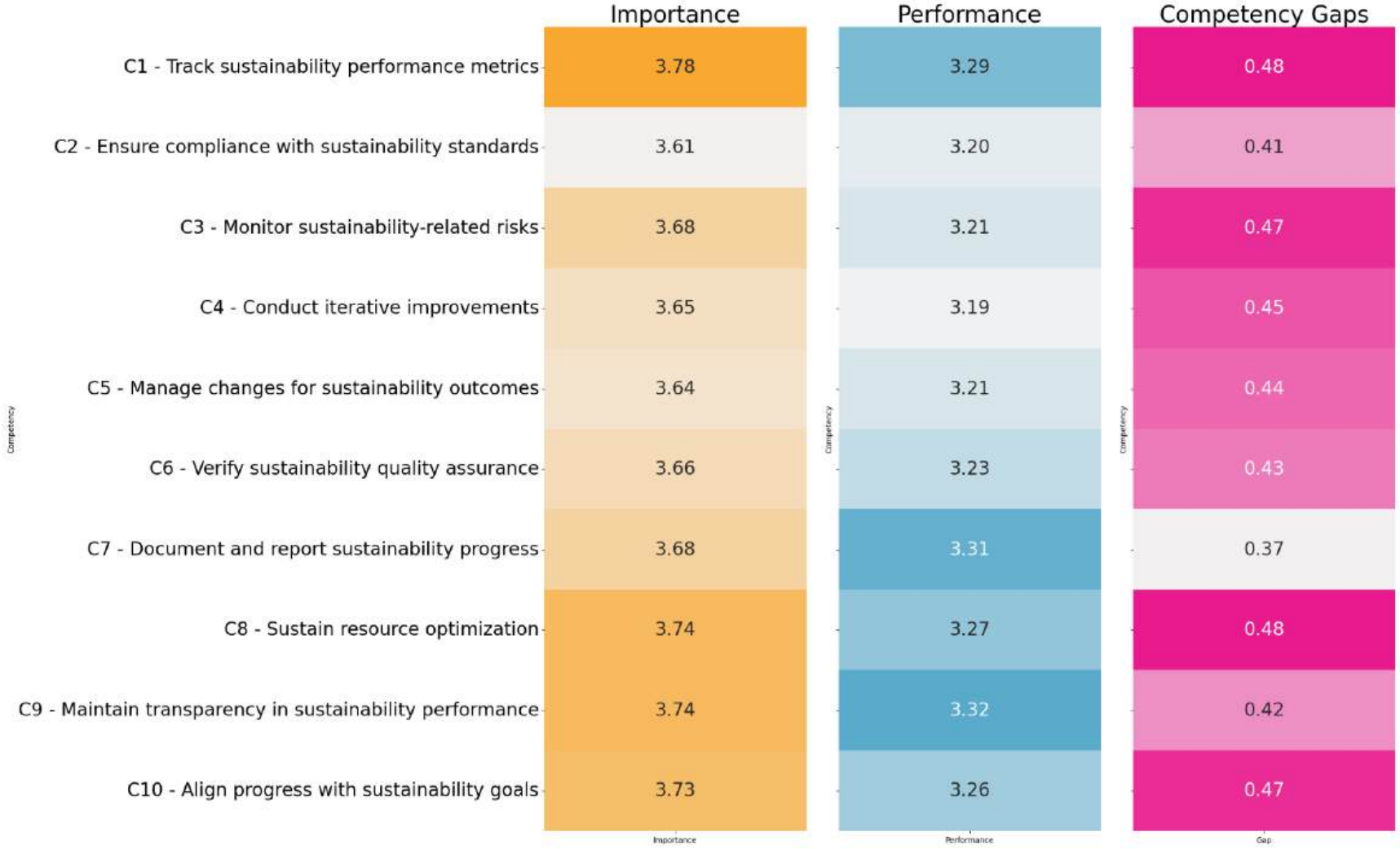
Table 15 Monitoring & Control Phase Competency Gaps

Competency	Importance (Mean)	Performance (Mean)	Gap (Mean)
C1 - Competency to track sustainability performance metrics	3.78	3.29	0.48
C2 - Competency to ensure compliance with sustainability standards	3.61	3.20	0.41
C3 - Competency to monitor sustainability-related risks	3.68	3.21	0.47
C4 - Competency to conduct iterative improvements	3.65	3.19	0.45
C5 - Competency to manage changes for sustainability outcomes	3.64	3.21	0.44
C6 - Competency to verify sustainability quality assurance	3.66	3.23	0.43
C7 - Competency to document and report sustainability progress	3.68	3.31	0.37
C8 - Competency to sustain resource optimization	3.74	3.27	0.48
C9 - Competency to maintain transparency in sustainability performance	3.74	3.32	0.42
C10 - Competency to align progress with sustainability goals	3.73	3.26	0.47

The presence of significant competency gaps suggests that, although respondents recognize the importance of these competencies, their actual execution within organizations remains **suboptimal**. This highlights the need for targeted **training, process improvements, and governance mechanisms** to bridge these gaps.

To further illustrate these differences, a **heatmap visualization** of importance, performance, and competency gaps is provided below. The **gap column is shaded** to highlight the largest discrepancies.

Figure 45 Heatmap of Importance, Performance, and Competency Gaps – Monitoring & Control Phase



5.4.3 Analysis of Industry-Based Competency Gaps in the SPM Monitoring & Control Phase

This section presents an industry-based analysis of competency gaps in the **Monitoring & Control** phase of **Sustainable Project Management (SPM²)**. The Kruskal-Wallis test was conducted to determine whether significant differences exist between industries regarding competency gaps.

Key Findings

1. **Significant Differences Across Industries**. The Kruskal-Wallis test results indicate statistically significant differences across industries for several competency gaps:
    - SPM_Monitoring_Control_C2_Gap (p = 0.029)
    - SPM_Monitoring_Control_C4_Gap (p = 0.019)
    - SPM_Monitoring_Control_C6_Gap (p = 0.044)
    - SPM_Monitoring_Control_C7_Gap (p = 0.032)
    - SPM_Monitoring_Control_C8_Gap (p = 0.001)
2. **Largest Competency Gaps**. The most pronounced competency gaps were observed in industries such as **Education, Energy/Utilities, and Technology (Non-IT)**. Specifically:
    - The **Education sector** reported the highest competency gap in **SPM_Monitoring_Control_C8_Gap (Competency to sustain resource optimization).**
    - The **Energy/Utilities industry** showed significant gaps in **SPM_Monitoring_Control_C6_Gap (Competency to verify sustainability quality assurance)**.
    - The **Technology (Non-IT) sector** had a notable gap in **SPM_Monitoring_Control_C7_Gap (Competency to document and report sustainability progress)**.
3. **Industries with Minimal Gaps**. Industries such as **Financial Services, Biotechnology/Pharmaceuticals, and Public Sector/Government** reported smaller competency gaps across all categories.

Table 16 Kruskal-Wallis Test Results for SPM Monitoring & Control Phase – Industry Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Competency to track sustainability performance metrics	14.081	0.826	❌ No
C2 - Competency to ensure compliance with sustainability standards	33.634	0.029	✅ Yes
C3 - Competency to monitor sustainability-related risks	26.328	0.155	❌ No
C4 - Competency to conduct iterative improvements	35.134	0.019	✅ Yes
C5 - Competency to manage changes for sustainability outcomes	19.907	0.464	❌ No
C6 - Competency to verify sustainability quality assurance	31.970	0.044	✅ Yes
C7 - Competency to document and report sustainability progress	33.268	0.032	✅ Yes
C8 - Competency to sustain resource optimization	44.718	0.001	✅ Yes
C9 - Competency to maintain transparency in sustainability performance	26.651	0.145	❌ No
C10 - Competency to align progress with sustainability goals	22.624	0.308	❌ No

Conclusion

The findings indicate that competency gaps in Monitoring & Control vary significantly across industries. Organizations in the **Education, Technology (Non-IT), and Energy/Utilities** sectors require focused interventions to bridge competency gaps in sustainability monitoring and control.

Figure 46 Industry-Based Competency Gap Analysis Heatmap – Monitoring & Control Phase

5.4.4 Analysis of Competency Gaps Based on Project Roles

The **Kruskal-Wallis H test** was conducted to assess whether there are significant differences in competency gaps across project roles. The results are presented in Table 17.

Table 17 Kruskal-Wallis Test Results for SPM Monitoring & Control Phase – Project Roles Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Competency to track sustainability performance metrics	0.902	0.825	❌ No
C2 - Competency to ensure compliance with sustainability standards	8.818	0.032	✅ Yes
C3 - Competency to monitor sustainability-related risks	5.192	0.158	❌ No
C4 - Competency to conduct iterative improvements	7.996	0.046	✅ Yes
C5 - Competency to manage changes for sustainability outcomes	2.053	0.562	❌ No
C6 - Competency to verify sustainability quality assurance	3.608	0.307	❌ No
C7 - Competency to document and report sustainability progress	1.983	0.576	❌ No
C8 - Competency to sustain resource optimization	3.201	0.362	❌ No
C9 - Competency to maintain transparency in sustainability performance	2.116	0.549	❌ No
C10 - Competency to align progress with sustainability goals	4.313	0.230	❌ No

From the above results:

- **Competency 2 (C2) and Competency 4 (C4) exhibit significant differences** across project roles (**$p < 0.05$**).
- For other competencies, no statistically significant differences were observed.

This indicates that professionals in different project roles perceive varying gaps in competencies **related to compliance with sustainability standards (C2) and managing changes for sustainability outcomes (C4)**. These differences suggest that **customized training interventions may be required** based on an individual's role in the organization.

Figure 47 Competency Gaps by Project Role – Monitoring & Control Phase Heatmap

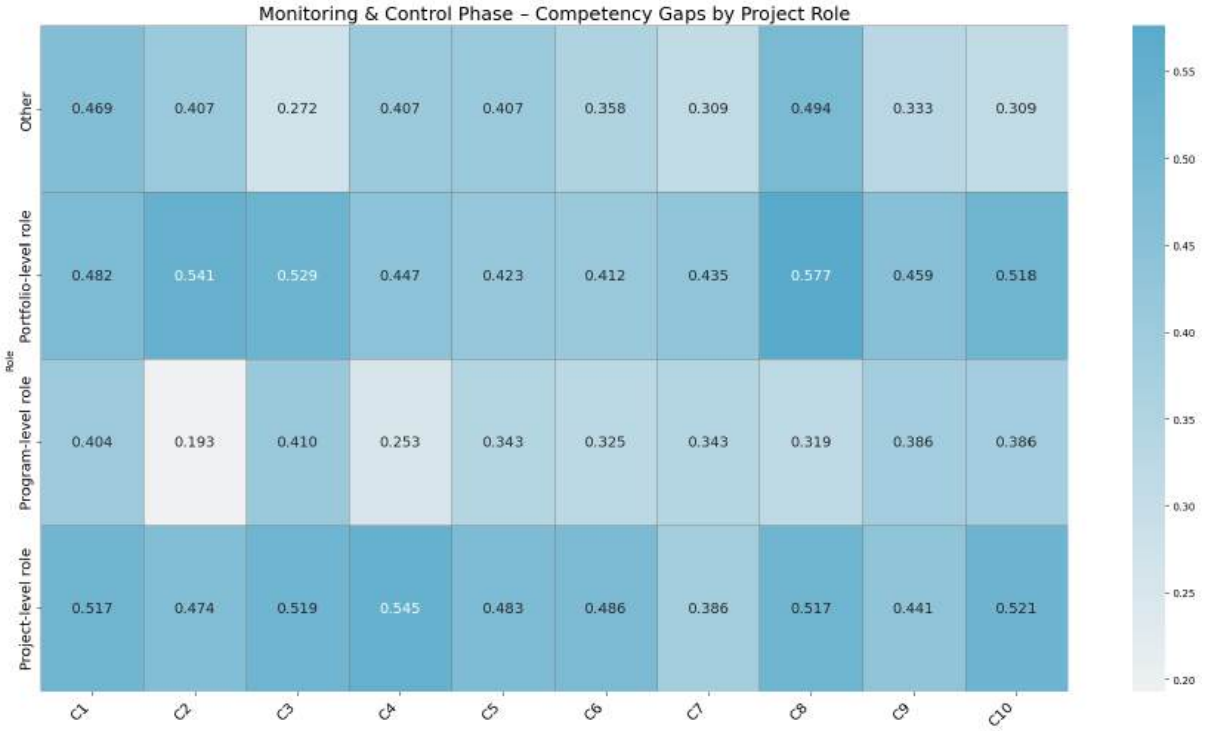
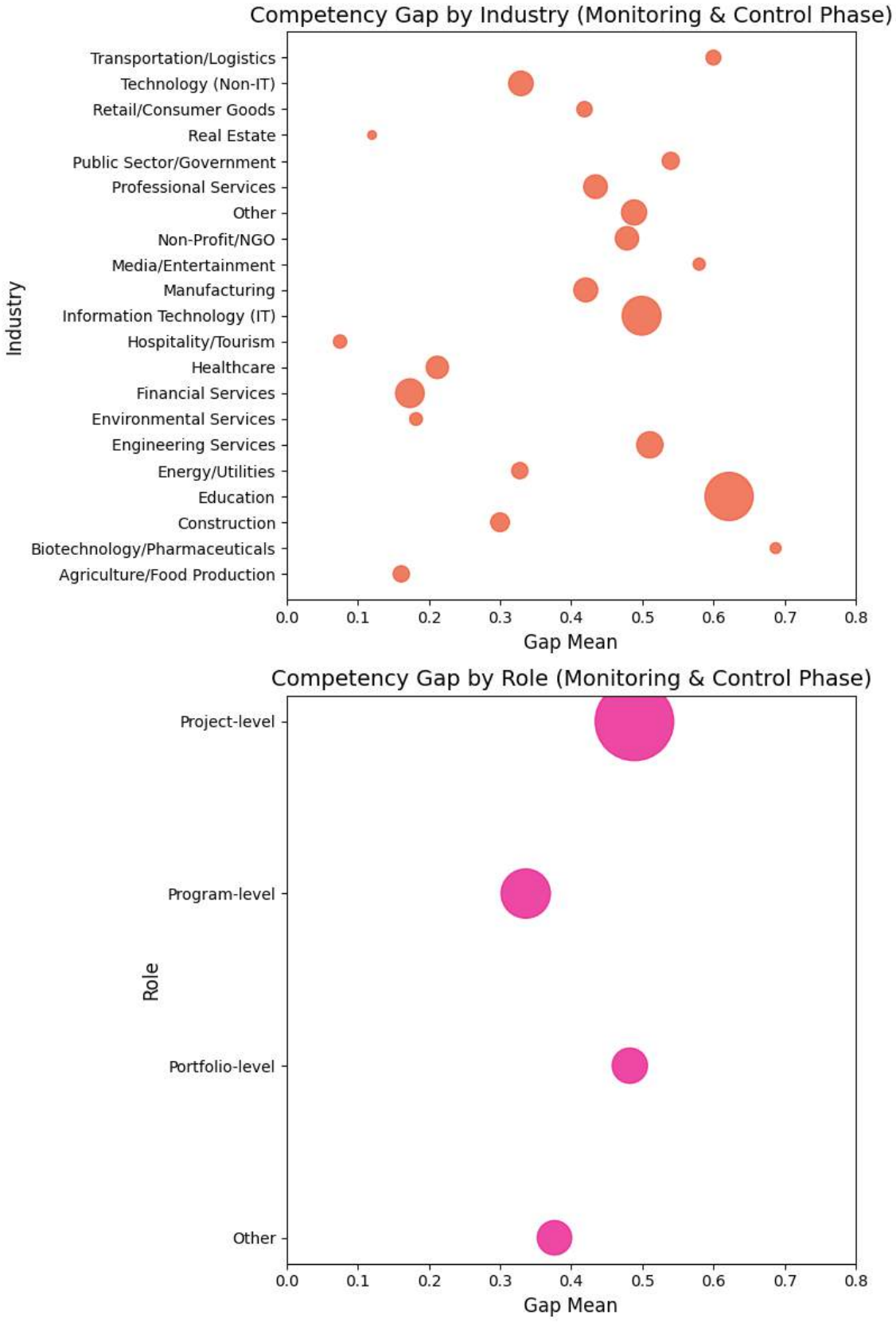


Figure 48 Competency Gaps by Project Role – Monitoring & Control Phase Bubble Chart



The largest gaps were observed in **Biotechnology/Pharmaceuticals**, **Transportation/Logistics**, and **Education**, with gap means exceeding 0.60. These results indicate significant competency challenges in these sectors during the Monitoring & Control phase.

In contrast, industries such as **Hospitality/Tourism**, **Financial Services**, and **Healthcare** reported considerably lower gaps, suggesting relatively better alignment between current and expected ESG competencies.

Across roles, the **Project-level** and **Portfolio-level** respondents reported the highest gaps (0.4889 and 0.4824 respectively), whereas **Program-level** roles had the lowest gap (0.3361). This may reflect greater operational pressure at the delivery and oversight levels of project execution.

The "Other" category exhibited a mid-range gap value of 0.3765, though further qualitative analysis may be necessary to understand the variability within this group.

These insights help highlight where targeted training or organizational development initiatives may be most needed to strengthen ESG competency alignment during the Monitoring & Control phase.

5.4.5 Correlation Analysis Summary for the SPM Monitoring & Control Phase

This section presents a **correlation analysis** between competency gaps and key organizational variables: **years of operation, years of experience in project-oriented environments, and staff headcount**. The correlations were measured using **Spearman's rank correlation coefficient**, which assesses the strength and direction of relationships.

Key Findings

- **Years of Operation**: There is no strong correlation between an organization's years of operation and competency gaps. Only **C5_Gap (p = 0.026, r = -0.081)** showed a weak negative correlation.
- **Years of Experience in Project-Oriented Environments**: There is **no statistically significant** relationship between years of experience in project environments and competency gaps, except for **C10_Gap (p = 0.020, r = 0.085)**.
- **Staff Headcount**: There is **a weak but significant correlation between C6_Gap and staff headcount (p = 0.027, r = -0.081)**, suggesting that larger organizations may have fewer competency gaps in **sustainability quality assurance**.

5.5 CLOSING PHASE

The Closing Phase is essential for ensuring that sustainability outcomes are documented, evaluated, and preserved for future use. Respondents assessed competencies such as capturing sustainability-related lessons learned, conducting post-project ESG evaluations, and ensuring the long-term value of deliverables. This section provides insights into how sustainability is institutionalized through project closure processes.

5.5.1 1 Evaluation of competencies in capturing sustainability lessons learned

The analysis of importance, performance, and competency gaps in the SPM Closing Phase provides insights into the effectiveness of organizations in closing sustainability-related project activities. The descriptive statistics highlight a notable gap between the perceived importance of these competencies and their actual performance levels, suggesting areas that require targeted interventions.

The table below summarizes the descriptive statistics for competencies in the Closing Phase:

Table 18 Closing Phase Competency Ratings: Importance vs. Performance

Competency	Importance (Mean)	Performance (Mean)
C1 - Competency to capture sustainability lessons learned	3.80	3.30
C2 - Competency to evaluate success in meeting sustainability goals	3.73	3.39
C3 - Competency to develop sustainability-focused final reports	3.68	3.28
C4 - Competency to institutionalize sustainability knowledge	3.68	3.21
C5 - Competency to recognize and communicate sustainability achievements	3.70	3.32
C6 - Competency to ensure long-term sustainability value of deliverables	3.70	3.21
C7 - Competency to transfer sustainability outcomes to operations	3.74	3.25
C8 - Competency to evaluate stakeholder satisfaction with sustainability	3.68	3.26
C9 - Competency to review and close sustainability risks	3.68	3.19
C10 - Competency to identify opportunities for future sustainability improvements	3.75	3.26

5.2.2 Gaps in competencies in capturing sustainability lessons learned

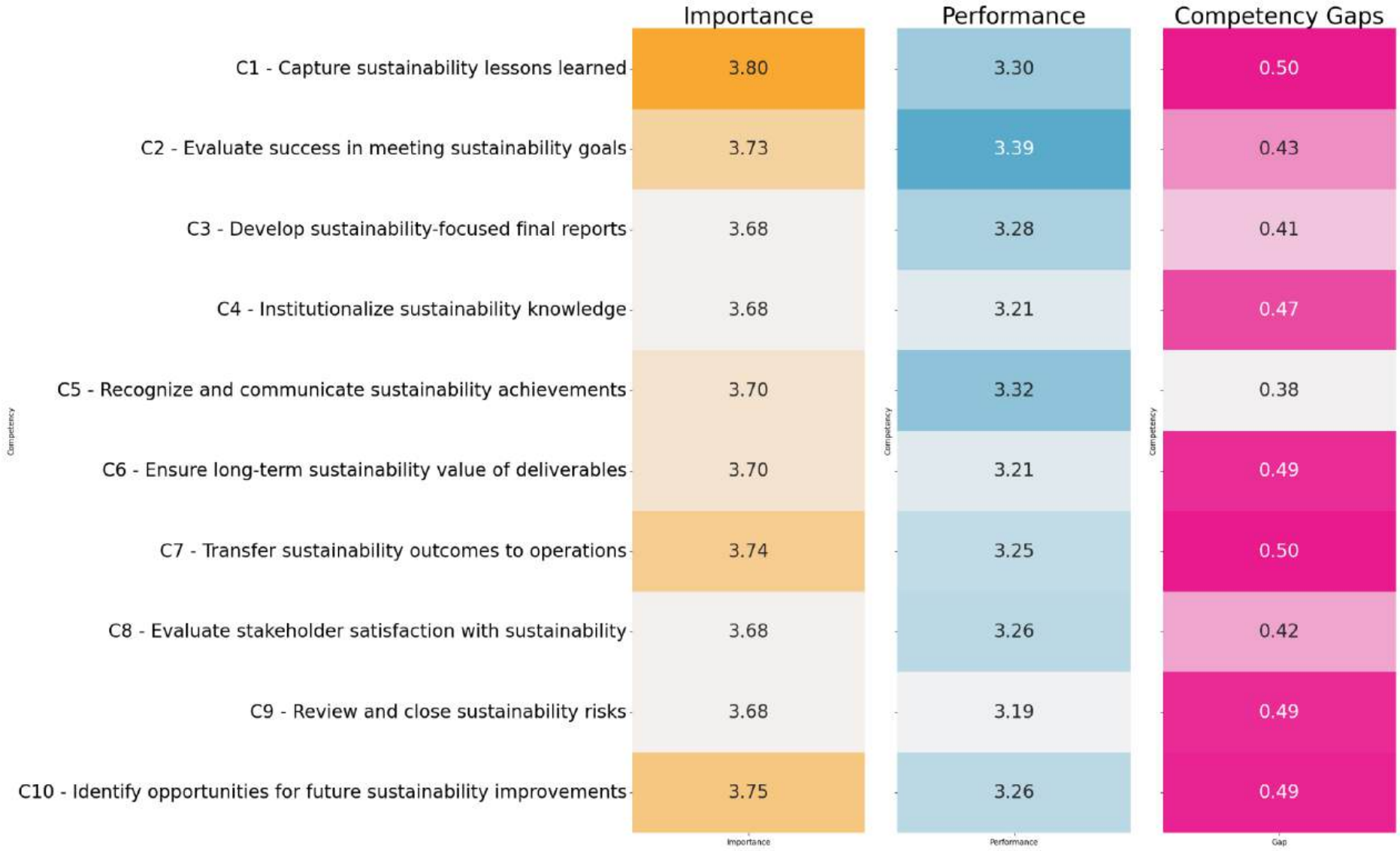
The highest competency gap is observed in "Competency to capture sustainability lessons learned" (0.4973), highlighting the need for organizations to focus on structured documentation and knowledge transfer mechanisms. Similarly, competencies related to "transferring sustainability outcomes to operations" (0.4973)

and "reviewing and closing sustainability risks" (0.4881) also exhibit substantial gaps, indicating potential weaknesses in sustainability continuity planning.

Table 19 Closing Phase Competency Gaps

Competency	Importance (Mean)	Performance (Mean)	Gap (Mean)
C1 - Competency to capture sustainability lessons learned	3.80	3.30	0.497
C2 - Competency to evaluate success in meeting sustainability goals	3.73	3.39	0.435
C3 - Competency to develop sustainability-focused final reports	3.68	3.28	0.405
C4 - Competency to institutionalize sustainability knowledge	3.68	3.21	0.471
C5 - Competency to recognize and communicate sustainability achievements	3.70	3.32	0.382
C6 - Competency to ensure long-term sustainability value of deliverables	3.70	3.21	0.487
C7 - Competency to transfer sustainability outcomes to operations	3.74	3.25	0.497
C8 - Competency to evaluate stakeholder satisfaction with sustainability	3.68	3.26	0.422
C9 - Competency to review and close sustainability risks	3.68	3.19	0.488
C10 - Competency to identify opportunities for future sustainability improvements	3.75	3.26	0.492

Figure 49 Heatmap of Importance, Performance, and Competency Gaps – Closing Phase



5.5.2 Analysis of Industry-Based Competency Gaps in the SPM Closing Phase

This section examines the competency gaps in the SPM Closing Phase across various industries. The analysis aims to identify sector-specific discrepancies in sustainability-related competencies and assess whether these gaps significantly differ across industries. The Kruskal-Wallis test was conducted to determine if there are statistically significant differences in competency gaps based on the industry sector.

Statistical Analysis

The Kruskal-Wallis H test results, presented in the table below, indicate the presence of variations in competency gaps among industries. The test was applied to ten competency gaps, assessing whether the industry type significantly impacts these gaps.

Table 20 Kruskal-Wallis Test Results for SPM Closing Phase – Industry Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant? (p < 0.05)
C1 - Competency to capture sustainability lessons learned	16.070	0.712	❌ No
C2 - Competency to evaluate success in meeting sustainability goals	31.298	0.051	❌ No
C3 - Competency to develop sustainability-focused final reports	30.431	0.063	❌ No
C4 - Competency to institutionalize sustainability knowledge	22.242	0.328	❌ No
C5 - Competency to recognize and communicate sustainability achievements	21.348	0.377	❌ No
C6 - Competency to ensure long-term sustainability value of deliverables	31.156	0.053	❌ No
C7 - Competency to transfer sustainability outcomes to operations	32.254	0.041	✅ Yes
C8 - Competency to evaluate stakeholder satisfaction with sustainability	40.990	0.004	✅ Yes
C9 - Competency to review and close sustainability risks	25.964	0.167	❌ No
C10 - Competency to identify opportunities for future sustainability improvements	20.948	0.400	❌ No

The results indicate that industry-based differences in competency gaps are statistically significant for two competencies: **SPM_Closing_C7_Gap (p = 0.041)** and **SPM_Closing_C8_Gap (p = 0.004)**. These results suggest that certain industries may

face more pronounced challenges in competencies related to stakeholder engagement and long-term sustainability integration in the project closing phase. Other competencies, while showing variations, did not reach the threshold for statistical significance.

Figure 50 Industry-Based Competency Gap Analysis Heatmap – Closing Phase

5.5.3 Analysis of Competency Gaps Based on Project Roles

The **Kruskal-Wallis test** was performed to determine whether there are significant differences in competency gaps among different **project roles**. The table below summarizes the test results:

Table 21 Kruskal-Wallis Test Results for SPM Closing Phase – Project Roles Differences in Competency Gaps

Competency	Kruskal-Wallis H	p-value (Asymp. Sig.)	Significant (p < 0.05)?
C1 - Competency to capture sustainability lessons learned	2.735	0.434	❌ No
C2 - Competency to evaluate success in meeting sustainability goals	4.100	0.251	❌ No
C3 - Competency to develop sustainability-focused final reports	3.737	0.291	❌ No
C4 - Competency to institutionalize sustainability knowledge	2.823	0.420	❌ No
C5 - Competency to recognize and communicate sustainability achievements	0.937	0.817	❌ No
C6 - Competency to ensure long-term sustainability value of deliverables	4.893	0.180	❌ No
C7 - Competency to transfer sustainability outcomes to operations	2.861	0.414	❌ No
C8 - Competency to evaluate stakeholder satisfaction with sustainability	3.325	0.344	❌ No
C9 - Competency to review and close sustainability risks	2.839	0.417	❌ No
C10 - Competency to identify opportunities for future sustainability improvements	9.219	0.027	✅ Yes

The **only significant difference** was found for **C10: Identify opportunities for future sustainability improvements (p = 0.027)**, indicating that project roles influence perceived gaps in this competency.

- Overall, competency gaps **do not significantly differ across project roles**, except for **C10 (opportunities for future sustainability improvements)**.
- **Portfolio-level roles** tend to perceive **higher competency gaps** than other roles.
- **Project-level roles** show the **lowest gaps in some competencies**, indicating they may be more equipped for sustainability tasks in the Closing Phase.

Figure 51 Competency Gaps by Project Role – Closing Phase Heatmap

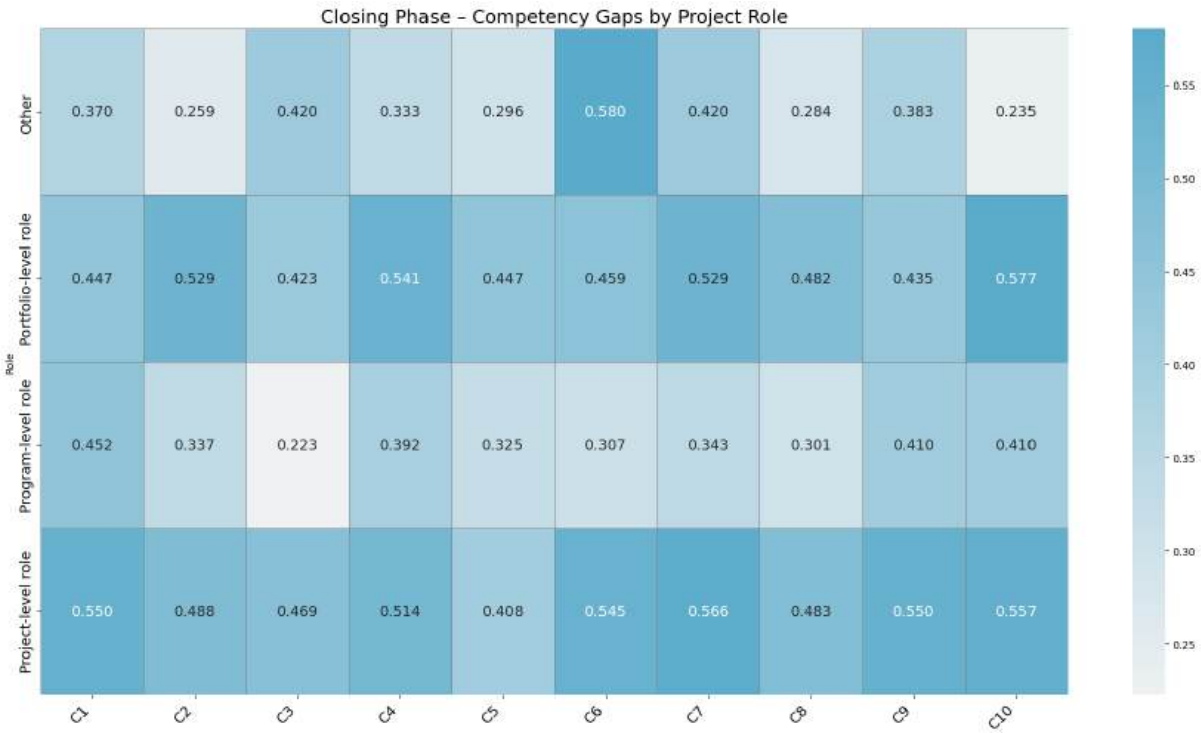
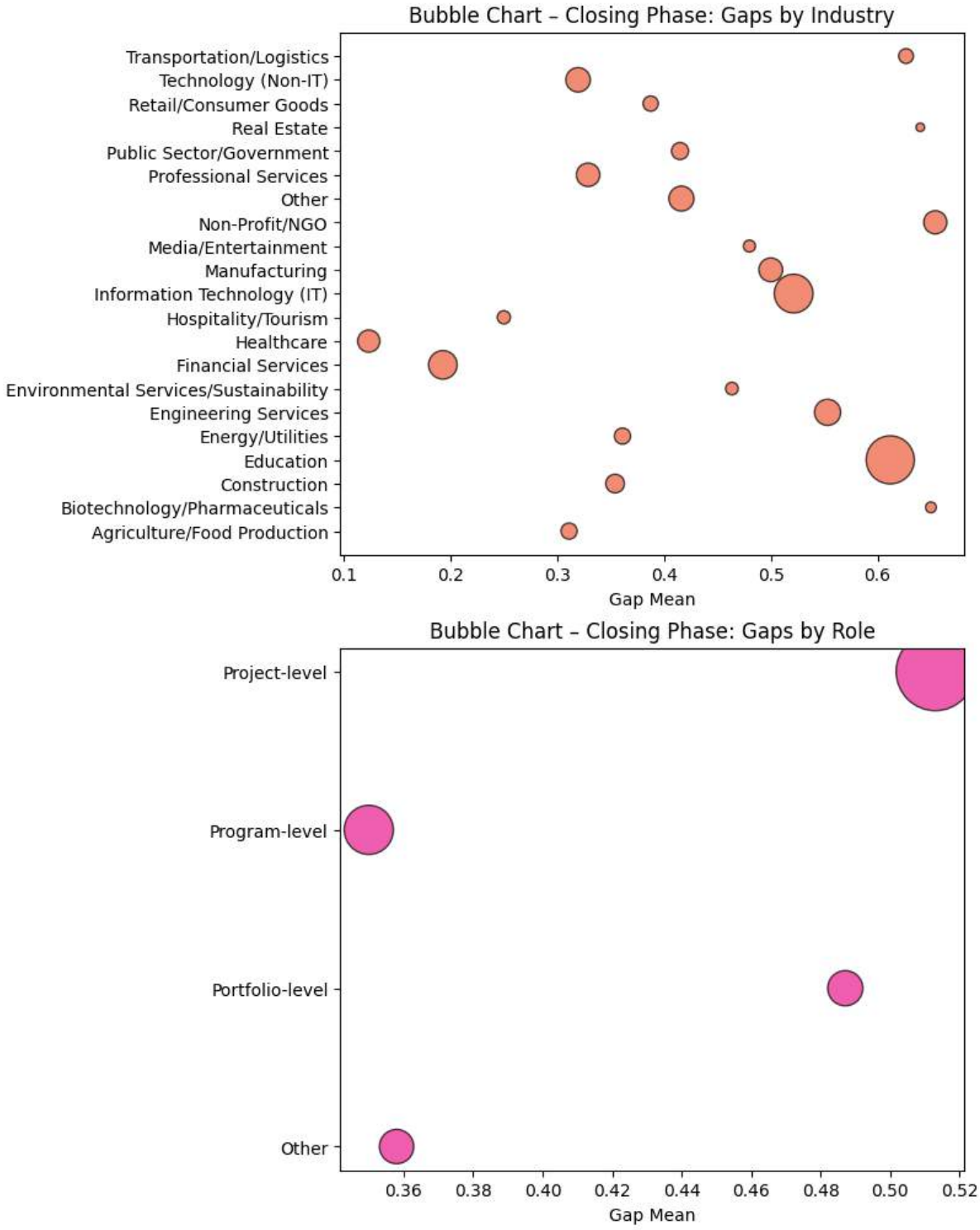


Figure 52 Competency Gaps by Project Role – Closing Phase Bubble Chart



The visualizations for the Closing phase highlight discrepancies between the perceived importance and organizational performance in ESG-related competencies. Industries such as *Biotechnology/Pharmaceuticals*, *Education*, *Engineering Services*, and *Transportation/Logistics* exhibit relatively large competency gaps. In contrast,

sectors like *Financial Services*, *Healthcare*, and *Hospitality/Tourism* report lower gaps, indicating more alignment between expectations and current capabilities.
From a role-based perspective, the highest average gap is reported by professionals in *Project-level roles* (e.g., Project Managers, Team Leaders), followed closely by *Portfolio-level roles*. In contrast, *Program-level roles* report significantly smaller gaps, which may reflect a stronger integration of ESG competencies at the program coordination level.

These patterns emphasize the need for targeted upskilling strategies tailored both by industry and project role to ensure effective sustainability integration in the project closing phase.

5.5.4 Correlation Analysis Summary for the SPM Closing Phase

This section presents the correlation analysis results between competency gaps in the Closing Phase of the SPM² model and selected background variables, including organizational staff headcount, years of experience in project-oriented environments, and organizational age.

1. Correlation with Staff Headcount

Spearman's rho analysis showed no statistically significant correlation between the size of the organization (staff headcount) and any of the Closing Phase competency gaps. All p-values were above the threshold of 0.05 (e.g., C1: $\rho = -0.058$, $p = 0.111$; C10: $\rho = -0.040$, $p = 0.270$). This suggests that the competency gaps identified in the Closing Phase are not influenced by how large or small the respondent's organization is.

2. Correlation with Experience in Project-Oriented Environments

The number of years of experience working in project-oriented environments also showed no significant correlation with the identified competency gaps. All correlation coefficients were very weak (close to zero), and none reached statistical significance (e.g., C1: $\rho = -0.011$, $p = 0.756$; C10: $\rho = 0.005$, $p = 0.898$). These findings indicate that years of professional experience do not influence how participants perceive gaps in sustainability-related competencies during the project closing phase.

3. Correlation with Organizational Age

Similarly, no significant correlations were observed between the number of years an organization has been operating and the identified competency gaps. All coefficients were weak and not statistically significant (e.g., C1: $\rho = -0.038$, $p = 0.304$; C10: $\rho = -0.007$, $p = 0.858$), implying that the age of the organization is not associated with its ability to close sustainability gaps effectively.

4. Inter-Competency Correlations

Interestingly, strong and statistically significant positive correlations ($p < 0.01$) were found between all Closing Phase competency gaps. For example, C1 and C2 gaps were correlated at $\rho = 0.498$, while C6 and C7 gaps were correlated at $\rho = 0.593$. This pattern suggests that when one competency gap is present, others are likely to co-occur, indicating a systemic issue in how sustainability practices are integrated during project closure. This clustering effect underscores the need for a holistic approach to strengthening sustainability competencies, as improvements in one area may positively impact others.

5.5 DISCUSSION OF COMPETENCY GAPS

The competency assessment conducted across the project lifecycle reveals a **consistent and systemic gap** between the *perceived importance* of sustainability-related competencies and the *actual performance* of organizations in these areas. This pattern appears across all phases of project management—initiation, planning, execution, monitoring & control, and closing—demonstrating a widespread misalignment between sustainability aspirations and implementation capacity.

Key Cross-Phase Insights:

1. **High Importance – Moderate Performance Across the Board:** In nearly all assessed competencies, mean importance ratings are above 3.6 on a 5-point scale, while mean performance ratings remain in the 3.1–3.3 range. This leads to competency gaps averaging between **0.4 and 0.6**, indicating that while sustainability is valued in theory, its operationalization remains a challenge.
2. **Initiation and Planning Phases Show Foundational Gaps:** The **largest single competency gap** was recorded for *"Define sustainability-focused project objectives"* (Gap = 0.580), underscoring that sustainability is often not adequately embedded at the very outset of the project. Other initiation-phase competencies such as assessing sustainability impacts and integrating sustainability into governance structures also exhibit gaps above 0.45, suggesting that **sustainability is frequently under-prioritized during the strategic design phase**.
3. **Execution Phase Gaps Indicate Delivery Challenges:** Several execution-related competencies—including *"Deliver sustainable outputs"*, *"Monitor efficient resource utilization"*, and *"Implement sustainability-focused solutions"*—ranked among the highest gaps (all >0.48). These findings point to **difficulties in operationalizing sustainability plans**, possibly due to lack of tools, expertise, or organizational support during project delivery.
4. **Planning Phase Exposes Systemic Integration Deficiencies:** Competencies like *"Manage sustainability risks"*, *"Optimize cost and effort for*

sustainability", and *"Embed circular economy principles"* each have gaps above 0.5. This illustrates that **project planning processes are struggling to internalize sustainability dimensions**, especially in risk and resource allocation strategies.

5. **Closing Phase Highlights Weaknesses in Continuity and Knowledge Transfer:**
   Several competencies critical for **embedding long-term sustainability** into project outcomes—such as *"Transfer sustainability outcomes to operations"* and *"Identify opportunities for future sustainability improvements"*—demonstrated gaps of nearly 0.5. These results suggest missed opportunities to consolidate sustainability achievements and build organizational learning for future initiatives.

6. **Monitoring & Control Phase Shows Gaps in Performance Tracking:** While slightly lower than other phases, gaps still hover around 0.47–0.48 for competencies related to tracking sustainability metrics and risks. The results indicate that **quantitative monitoring and feedback mechanisms for sustainability are underdeveloped**, limiting the ability to steer projects dynamically toward sustainable outcomes.

7. **Top 10 Gaps Span All Phases:** Importantly, the **top ten ranked competency gaps** (see summary table in Appendix 9.X) span across initiation, planning, execution, and closing phases—showing that the competency shortfall is **not limited to a single phase but rather pervasive across the lifecycle**.

The consolidated analysis clearly indicates a **systematic importance–performance gap across all core sustainability competencies in project management**. This gap highlights a pressing need for targeted capacity-building initiatives, practical tools, and structural changes in how sustainability is embedded into projects. Educational programs, training efforts, and organizational frameworks must focus on these high-gap areas, particularly in early-stage project definition and late-stage outcome transfer. Without such targeted interventions, sustainability will remain a stated priority rather than a realized practice in most project environments.

5.5.5 Gender-Based Differences in Perceived SPM Competency Gaps

To examine whether perceptions of sustainability-related competency gaps differ by gender, a series of non-parametric Mann–Whitney U tests were conducted across the five phases of the project lifecycle. The competency gap score was defined as the difference between perceived importance and observed performance of sustainability competencies, aggregated by phase.

The results showed **no statistically significant differences** between female and male respondents across any of the project phases:

Table 22 Mann–Whitney U Test Results – Gender-Based Gap Differences by Phase

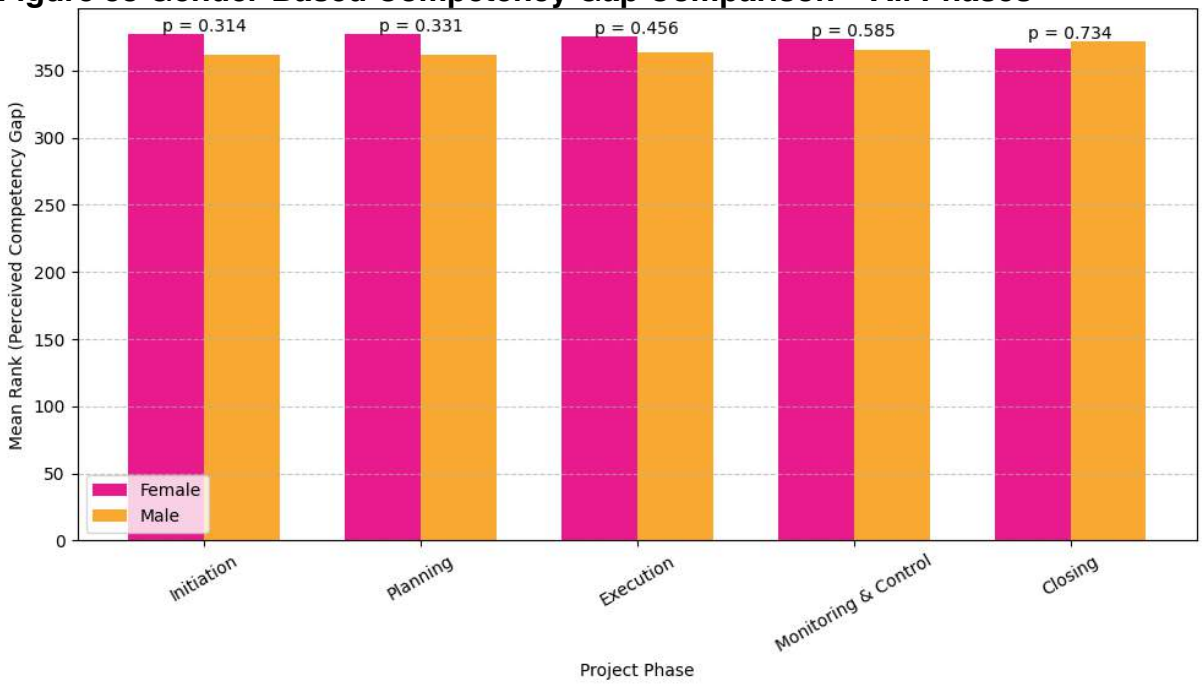
Project Phase	U Statistic	Z	p-value	Significant?
Initiation	64,919.5	–1.006	.314	No
Planning	65,015.0	–0.972	.331	No
Execution	65,662.5	–0.746	.456	No
Monitoring & Control	66,242.0	–0.546	.585	No
Closing	66,830.0	–0.340	.734	No

The results suggest that both women and men perceive similar gaps between the expected and actual performance of sustainability competencies, regardless of project phase. Therefore, competency development initiatives and training programs can be designed in a gender-inclusive manner, without the need for tailoring based on perceived differences.

The analysis utilized the **Mann–Whitney U test**, which is appropriate for comparing ordinal or non-normally distributed continuous variables across two independent groups. This test was chosen due to the potential non-normality of the gap scores and the unequal group sizes (Female: N = 355; Male: N = 382). Competency gaps were calculated as the difference between importance and performance ratings, averaged within each project phase for each respondent.

The top five competencies with the largest inter-gender gap differences will be analyzed separately to assess whether isolated differences exist despite the overall phase-level uniformity.

Figure 53 Gender-Based Competency Gap Comparison – All Phases



Detailed Competency-Level Analysis

Although phase-level analyses showed no significant gender differences in perceived competency gaps, a follow-up test was conducted for the five individual competencies with the largest rank differences between female and male respondents. These included:

- **C1 (Initiation):** Stakeholder identification and analysis
- **C2 (Initiation):** Project sustainability justification
- **C5 (Planning):** Integration of sustainability objectives into project plans
- **C9 (Planning):** Risk management for ESG factors
- **C10 (Execution):** Communication of ESG performance indicators

A Mann–Whitney U test was applied to compare gender-based differences in the perceived gap (Importance – Performance) for each competency.

Table 23 Mann–Whitney U Test Results – Gender Differences in Five Key Competencies

Competency	Phase	Z	p-value	Significant?
C1	Initiation	–1.263	0.206	No
C2	Initiation	–0.080	0.936	No
C5	Planning	–0.699	0.484	No
C9	Planning	–1.817	0.069	*Marginal*
C10	Execution	–0.896	0.370	No

Only one competency (**C9 – ESG-related risk management**) approached statistical significance (p = .069), with female respondents perceiving a slightly higher gap than males. While this is not conclusive at the traditional alpha = .05 level, it may indicate a tendency that warrants further exploration in future studies or targeted training.

Other competencies showed no statistically meaningful differences, reinforcing earlier conclusions that sustainability competency gaps are perceived similarly by men and women across the board.

5.5.6 Differences in Competency Gaps Based on PM Certification Status

To explore whether holding a project management (PM) certification influences perceptions of sustainability-related competency gaps, Mann–Whitney U tests were conducted across the five project lifecycle phases. The results showed that **certified respondents consistently perceived larger competency gaps** than non-certified ones.

Table 24 Mann–Whitney U Test Results – Certification Status vs. Gap (All Phases)

Project Phase	U Statistic	Z	p-value	Significant?

Initiation	45,076.5	–1.431	.152	No
Planning	44,026.0	–1.858	.063	Marginal
Execution	41,832.0	–2.749	.006	**Yes**
Monitoring & Control	42,035.0	–2.673	.008	**Yes**
Closing	42,350.5	–2.542	.011	**Yes**

Certified professionals reported significantly higher perceived gaps in three of the five phases: **Execution, Monitoring & Control, and Closing**. These results suggest that certified project managers may have higher expectations for sustainability implementation — or greater awareness of where practice diverges from standards — which could explain their elevated gap perceptions.

These findings highlight the potential value of certification in fostering critical reflection on sustainability performance in projects. Certification might be linked to increased awareness, sensitivity, or ambition regarding ESG implementation, especially in the later stages of the project lifecycle.

Based on earlier analyses of average competency gap scores across the five project lifecycle phases, statistically significant differences between certified and non-certified respondents were observed only in the **Execution**, **Monitoring & Control**, and **Closing** phases. Therefore, in-depth competency-level analysis was limited to these three phases to identify which specific sustainability competencies contributed to these observed differences.

Execution Phase – Detailed Analysis

A Mann–Whitney U test was conducted for each of the ten sustainability-related competencies assigned to the Execution phase (C1–C10), comparing the perceived gap scores between certified and non-certified project professionals.

Table 25 Execution Phase – Certification-Based Differences in Ten Competencies

Competency	Z	p-value	Significant?
C1	–1.047	0.295	No
C2	–1.387	0.165	No
C3	–2.047	0.041	**Yes**
C4	–1.230	0.219	No
C5	–1.022	0.307	No
C6	–2.495	0.013	**Yes**
C7	–2.646	0.008	**Yes**
C8	–1.358	0.174	No
C9	–2.058	0.040	**Yes**
C10	–2.130	0.033	**Yes**

Out of ten competencies in the Execution phase, **five** showed statistically significant differences in perceived competency gaps between certified and non-certified respondents:

- **C3:** Coordination of sustainability-related resources
- **C6:** Ensuring team alignment with ESG goals during execution
- **C7:** Monitoring ESG indicators during project delivery
- **C9:** Identifying deviations from ESG objectives
- **C10:** Reporting on ESG implementation progress

In all five cases, certified professionals reported significantly larger gaps than their non-certified peers. This suggests that certified individuals may hold higher expectations for the execution of sustainability practices or have more critical insight into actual performance.

The findings highlight a potential **perception-performance awareness gap**, where individuals with formal PM education and certification are more attuned to deficiencies in ESG execution. This should be considered when designing targeted upskilling programs — especially for non-certified project team members who may benefit from enhanced training in the execution of sustainability objectives.

Monitoring & Control Phase – Detailed Analysis

To explore which specific competencies contributed to the statistically significant phase-level difference observed in the Monitoring & Control phase, Mann–Whitney U tests were conducted for each of the ten related competencies (C1–C10).

Table 26 Monitoring & Control Phase – Certification-Based Differences in Ten Competencies

Competency	Z	p-value	Significant?
C1	–2.115	0.034	**Yes**
C2	–3.009	0.003	**Yes**
C3	–2.489	0.013	**Yes**
C4	–0.721	0.471	No
C5	–2.469	0.014	**Yes**
C6	–1.648	0.099	Marginal
C7	–1.189	0.234	No
C8	–0.981	0.326	No
C9	–1.832	0.067	Marginal
C10	–1.232	0.218	No

Of the ten competencies related to the Monitoring & Control phase, **four** exhibited statistically significant differences between certified and non-certified respondents:

- **C1:** Integration of sustainability KPIs into performance measurement systems
- **C2:** Regular monitoring of ESG performance indicators
- **C3:** Communication of ESG results during monitoring
- **C5:** Adjusting project execution based on ESG performance

Certified respondents reported higher perceived competency gaps in all these areas. This may reflect a heightened awareness of ESG tracking and responsiveness requirements among certified project managers. Additionally, competencies C6 and C9 approached significance, suggesting potential sensitivity to deviation detection and governance.

These findings further confirm that **certified professionals are more likely to recognize underperformance** or underimplementation in sustainability-related monitoring tasks. Addressing these gaps through targeted support and knowledge-sharing — especially for non-certified team members — could lead to improved ESG oversight throughout the project lifecycle.

Closing Phase – Detailed Analysis

As in the previous phases, Mann–Whitney U tests were conducted to assess whether perceptions of sustainability competency gaps differed between certified and non-certified project professionals across the ten competencies associated with the Closing Phase (C1–C10).

Table 27 Closing Phase – Certification-Based Differences in Ten Competencies

Competency	Z	p-value	Significant?
C1	–2.085	0.037	**Yes**
C2	–1.235	0.217	No
C3	–2.103	0.035	**Yes**
C4	–1.878	0.060	Marginal
C5	–1.207	0.227	No
C6	–2.099	0.036	**Yes**
C7	–1.895	0.058	Marginal
C8	–3.201	0.001	**Yes**
C9	–1.996	0.046	**Yes**
C10	–0.581	0.561	No

Five of the ten competencies related to the Closing Phase revealed significant or marginally significant differences between certified and non-certified respondents. Certified individuals reported **higher competency gaps** in:

- **C1:** Assessment of sustainability outcomes
- **C3:** Documentation of ESG achievements and lessons learned
- **C6:** Communicating final ESG performance to stakeholders
- **C8:** Integration of sustainability feedback into organizational learning
- **C9:** Evaluating long-term impacts on stakeholders and environment

Additionally, competencies **C4** and **C7** approached significance, reinforcing the trend of greater awareness among certified professionals.

These results imply that certified project managers are more likely to identify gaps in the processes related to capturing and institutionalizing sustainability knowledge at the project's conclusion. The ability to formally evaluate, document, and transfer ESG insights appears to be more acutely recognized among this group.

The findings emphasize the need to improve **sustainability-focused project closure practices**, particularly among non-certified staff. Capacity-building initiatives should address not only technical closure tasks but also the strategic capture of sustainability outcomes.

5.5.7 Perceived Gaps by Primary ESG Focus Area

While the survey included an open-ended question about participants' functional area, it was not suitable for direct statistical comparison due to unstructured textual responses. Instead, we analyzed the categorical responses to the question:

"What is the primary focus of your organization's Sustainability/ESG efforts?" Respondents could indicate whether their organization's sustainability activities focused primarily on environmental, social, or governance aspects, all of the above, or other areas.

To assess whether this ESG focus influences the perceived sustainability competency gap in project management, Kruskal–Wallis H tests were applied to compare mean GAP scores across five focus groups for each phase of the project lifecycle.

Table 28 Kruskal–Wallis Test – ESG Focus vs. Competency Gaps by Phase

Project Phase	H Statistic	p-value	Significant?
Initiation	15.554	.004	**Yes**
Planning	9.738	.045	**Yes**
Execution	8.163	.086	No
Monitoring & Control	11.955	.018	**Yes**
Closing	5.174	.270	No

In the **Initiation**, **Planning**, and **Monitoring & Control** phases, statistically significant differences were found in perceived competency gaps depending on the ESG focus of the respondent's organization.

The mean ranks indicate that respondents selecting **"Other"** as their primary ESG focus consistently reported the **highest perceived gaps**, while those focused on **Governance** rated the gaps the lowest across multiple phases.

These results suggest that organizational sustainability orientation may shape how project professionals perceive competency gaps. Respondents whose organizations report a **broad or undefined ESG focus ("Other")** seem to perceive a greater disconnect between importance and performance in implementing sustainable project practices.

This may reflect:

- A lack of structured ESG integration within project processes in "Other"-oriented organizations.
- Higher expectations in cross-cutting ESG domains not explicitly captured by E, S, or G alone.

On the other hand, **governance-focused organizations** may already have established structures (e.g., compliance systems, stakeholder reporting) that contribute to **lower perceived gaps**, especially in early and mid-project phases.

Previous phase-level analyses showed significant differences in the Initiation, Planning, and Monitoring & Control phases. This follow-up analysis examined specific

competencies within these three phases.

Table 29 Competency-Level Differences by ESG Focus – Initiation, Planning, Monitoring & Control

Phase	Competencies with Significant Differences (p ≤ .05)
Initiation	C4, C5, C6, C7, C8
Planning	C9
Monitoring & Control	C4, C5, C6, C9, C10

Key Findings

- In the **Initiation Phase**, competencies such as identifying ESG opportunities (C4), analyzing stakeholder needs (C5), or establishing ESG governance (C6–C8) varied significantly by organizational ESG focus.
  → Respondents from "**Other**" ESG contexts consistently reported **higher perceived gaps**, especially compared to those from **Governance**-oriented organizations.
- In the **Planning Phase**, only one competency showed a significant difference:
  - **C9 (Defining ESG-related success criteria)** revealed that respondents from **"Other"** organizations again reported the highest gap levels.
- The **Monitoring & Control Phase** displayed the most varied results, with five out of ten competencies (C4–C6, C9, C10) yielding significant differences.
  → Similar patterns emerged: higher gaps in "Other" and "Environmental"-focused organizations; lower gaps in **Governance**-oriented ones.

These findings suggest that organizations with **less defined or less integrated ESG focus areas** tend to exhibit greater perceived gaps in sustainability competencies, particularly during the early and middle stages of the project lifecycle.

- **"Other" responses** may reflect immature or ad-hoc ESG strategies, leading to greater awareness of performance shortcomings.
- **Governance-focused organizations**, in contrast, may already have compliance structures and procedures in place that mitigate perceived gaps.

Differences were especially pronounced in competencies involving:

- Stakeholder integration (e.g., C5)
- Governance alignment (e.g., C6)
- ESG goal-setting and evaluation (e.g., C9, C10)

These insights can inform tailored training or policy efforts, depending on the organization's ESG maturity and priority domain.

5.5.8 Impact of Organization Longevity on Competency Gaps

To explore whether the number of years an organization has been operating is associated with perceived gaps in sustainability-related project management competencies, we conducted Kruskal–Wallis tests for each phase of the project lifecycle. The variable used for grouping was: **"How many years has your organization been operating?"**, with four categories: *Less than 5 years*, *5–10 years*, *11–20 years*, and *More than 20 years*.

The analysis did not reveal statistically significant differences in mean competency gaps across organization age categories for any of the five project lifecycle phases. The p-values for the Kruskal–Wallis H test ranged from 0.175 (Planning) to 0.800 (Execution), all exceeding the conventional significance threshold of 0.05:

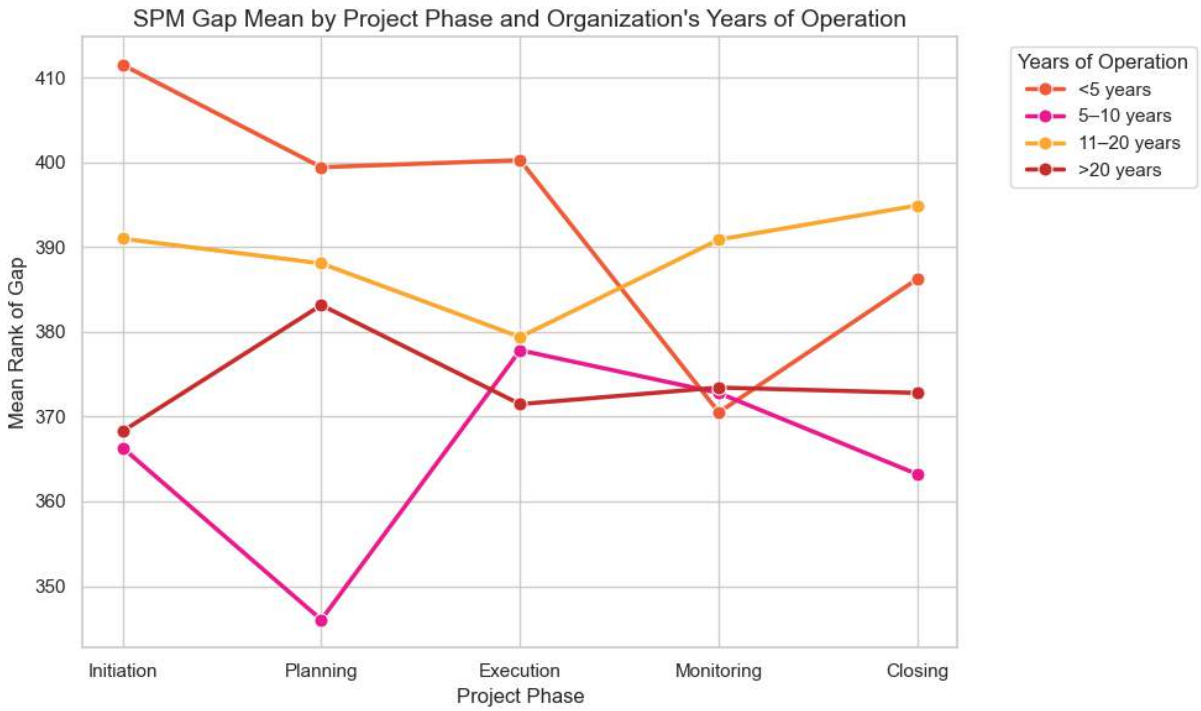
Table 30 Kruskal–Wallis Test – Organization Longevity vs. Competency Gaps by Phase

Phase	Kruskal–Wallis H	df	p-value
Initiation	3.453	3	0.327
Planning	4.961	3	0.175
Execution	1.007	3	0.800
Monitoring & Control	1.007	3	0.799
Closing	2.262	3	0.520

Although descriptive statistics show that organizations with fewer than 5 years of operation tended to report higher mean ranks of competency gaps—suggesting a possibly heightened awareness or greater challenges in these younger entities—these differences were not statistically significant.

These findings indicate that the number of years an organization has been in operation does not significantly influence the perceived gaps between required and current sustainability competencies in project management. Therefore, any training or development interventions should not be strictly prioritized based on organizational age but rather focus on other more discriminating factors identified in this study.

Figure 54 Competency Gap Averages by Organization Longevity – All Phases



The line chart illustrates differences in average competency gaps across project phases depending on how long the respondent's organization has been operating. Higher mean ranks indicate larger gaps between the importance of sustainable project management (SPM) competencies and their perceived current level.

Key observations:

- Organizations operating for less than 5 years report the largest gaps, particularly during the Initiation and Planning phases.
- Organizations with 11–20 years of experience show relatively stable and lower gap levels across all phases.
- More mature organizations (>20 years) demonstrate lower gaps in the Execution phase, suggesting stronger operational alignment with sustainability competencies.

This suggests that organizational maturity may be associated with improved competency alignment in sustainable project management.

5.5.9 Competency Gaps by Company Size

To explore potential differences in competency gaps across organizations of different sizes, we examined responses grouped by staff headcount: Micro (1–10 employees), Small (1–50), Medium (51–250), and Large (251+ employees). Kruskal–Wallis tests were conducted across the five project phases to compare the distribution of mean gap ranks.

Although minor differences in mean ranks were observed—particularly higher ranks for micro and small organizations in some phases—none of the differences reached statistical significance. All p-values exceeded the conventional threshold of 0.05 (e.g., p = .261 for Initiation, p = .609 for Planning). This suggests that the perceived competency gaps in sustainable project management practices do not significantly vary by company size.

These findings indicate that the challenges in aligning ESG-related competencies with project needs are shared relatively evenly across companies of different workforce sizes, regardless of their scale.

6. Future Needs and Challenges for SPM Education

6.1 INDUSTRY TRENDS AFFECTING SPM COMPETENCIES

6.1.1 Projected demand for SPM-related skills over the next 5 years

The analysis of the projected demand for Sustainable Project Management (SPM) and ESG Project Management-related skills over the next five years highlights a growing need for sustainability expertise in various industries.

Key Findings:

1. **Overall Trend:**
   - The majority of respondents (48.5%) anticipate a **moderate increase** in demand for SPM and ESG PM-related skills.
   - A significant proportion (34.9%) expects a **substantial increase**, reinforcing the growing importance of sustainability in project management.
   - Only **2.5%** foresee a decrease, while **13.8%** believe the demand will remain unchanged.
2. **Industry-Specific Insights:**
   - The **education sector** shows the highest expectation for increased demand, with 78 respondents predicting a moderate increase and 51 expecting a significant increase.
   - **IT and Engineering Services** industries also demonstrate strong anticipation for growth in SPM-related skills.
   - **Financial services** and **healthcare** sectors report moderate increases, reflecting a shift toward integrating sustainability principles.
   - **Public Sector/Government** responses indicate a more cautious outlook, with some predicting stagnation in demand.
3. **Chi-Square Analysis:**
   - The **Pearson Chi-Square test (p = 0.113)** suggests no statistically significant relationship between the industry type and the projected demand increase, though trends indicate a higher demand across multiple sectors.

Implications for Sustainable Project Management (SPM):

- The findings suggest a **broad consensus on the increasing importance of ESG and SPM competencies**.
- Organizations across industries should consider **investing in ESG-focused training programs** to equip project managers with sustainability expertise.
- **Cross-sector collaboration** could be key in developing best practices for integrating sustainability within project management frameworks.

Figure 55 Project Demand for SPM-related Skills Over the Next 5 Years

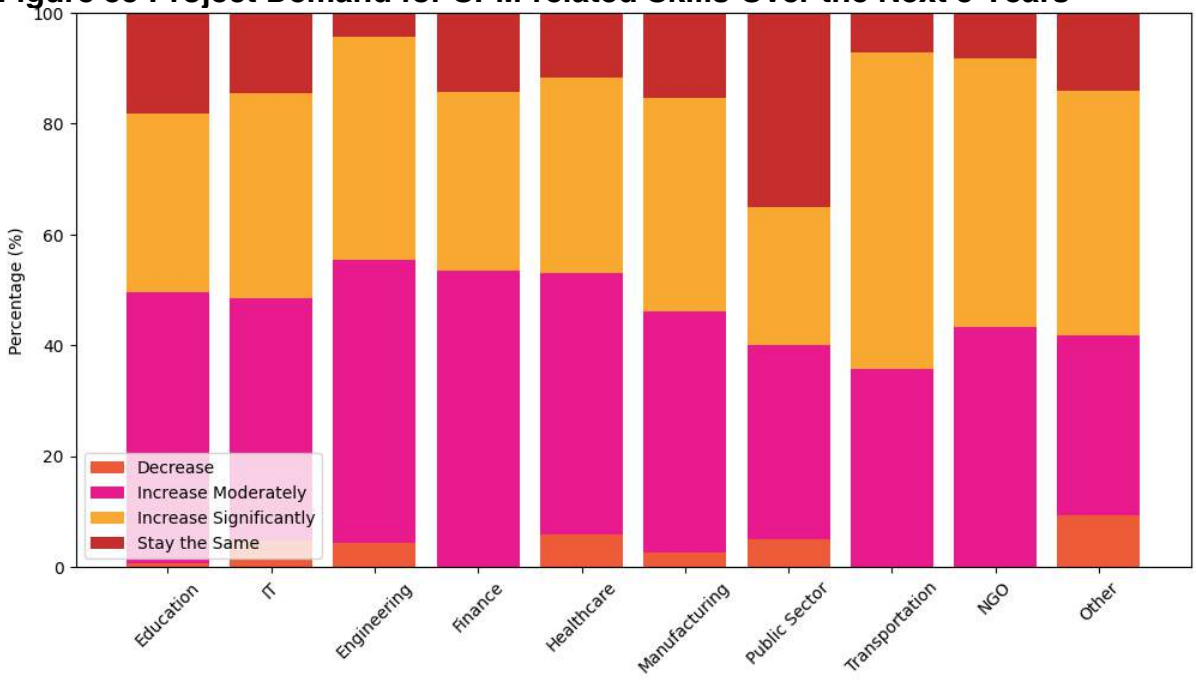
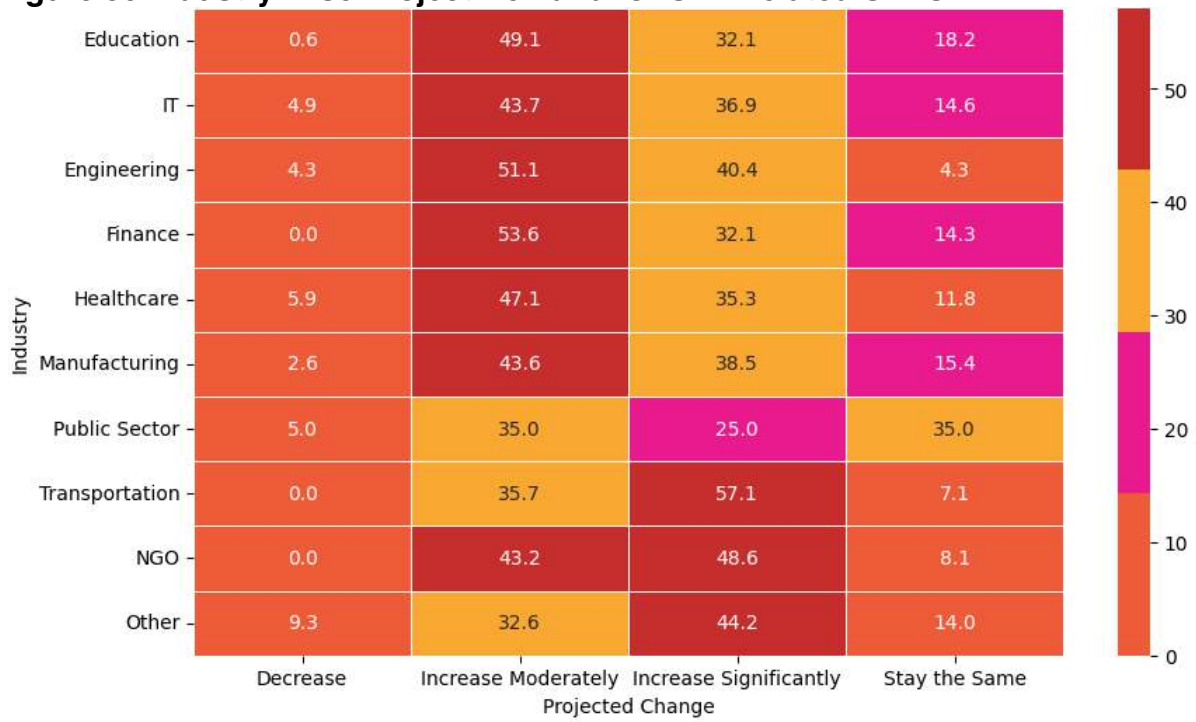


Figure 56 Industry-wise Project Demand for SPM-related Skills



6.1.2 Key drivers influencing SPM integration

The findings highlight the key industry trends that are expected to influence the importance of **Sustainability Project Management (SPM) and ESG PM competencies** in the coming years. Among the surveyed professionals, **Regulatory changes and compliance requirements (41.1%)** and **Digital transformation and**

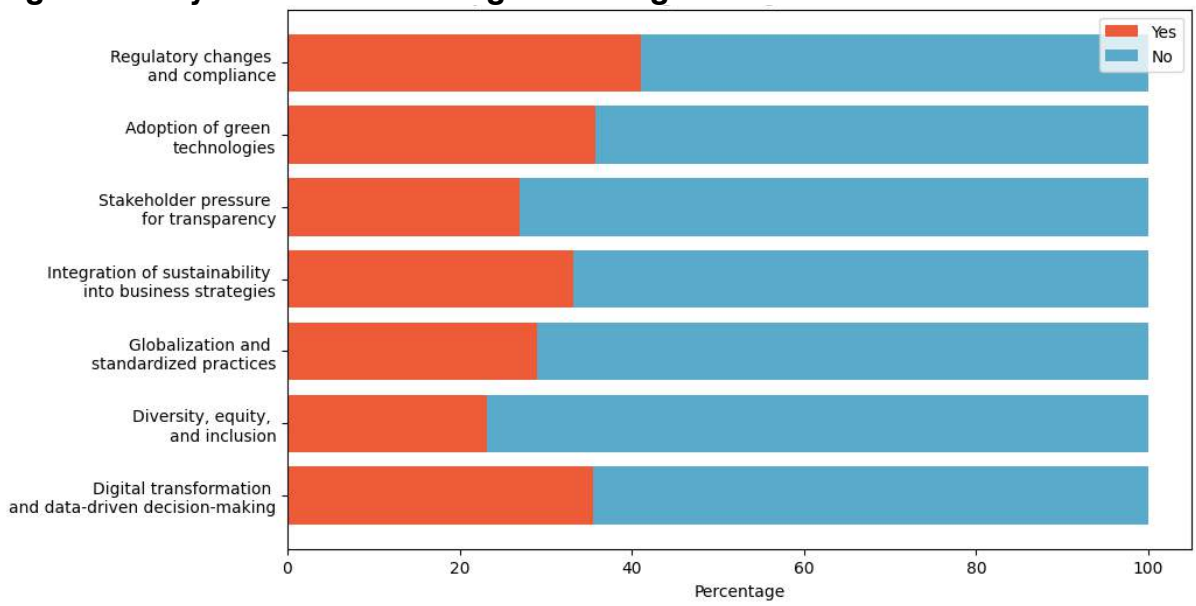
data-driven decision-making (35.5%) are identified as the most significant drivers of SPM integration.

Other important influencing factors include:

- **Adoption of green technologies (35.8%)** – Many organizations recognize the need for sustainable technology solutions.
- **Integration of sustainability into core business strategies (33.2%)** – Sustainability is moving from an auxiliary concern to a strategic priority.
- **Globalization and the need for standardized practices (29.0%)** – Companies are adapting to global ESG frameworks and standards.
- **Increased stakeholder pressure for transparency and accountability (26.9%)** – Investors and customers are pushing for more ESG-aligned operations.
- **Increased focus on diversity, equity, and inclusion (23.2%)** – Social sustainability factors are gaining traction.

Despite these trends, **a significant proportion of respondents still do not see these factors as crucial in shaping SPM integration**. This suggests a need for stronger policy incentives, corporate governance shifts, and awareness campaigns to drive ESG and SPM adoption further.

Figure 57 Key Drivers Influencing SPM Integration



6.2 EDUCATION & TRAINING NEEDS

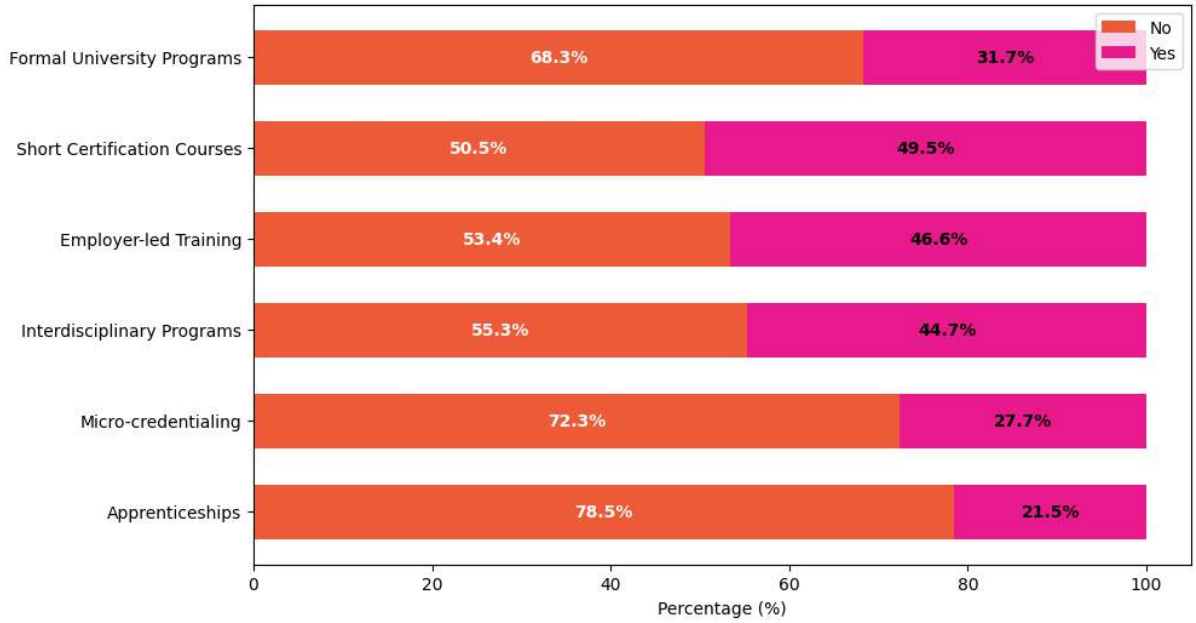
6.2.1 Preferred training formats

The survey examined respondents' preferences regarding the most effective educational formats for addressing ESG and Sustainable Project Management (SPM) skill gaps. The findings indicate a varied perspective on the effectiveness of different training formats:

- **Short certification courses (online or in-person)** were the most preferred option, with **49.5%** of respondents endorsing them as an effective way to address ESG and SPM skill gaps.
- **Employer-led training and workshops** ranked second, with **46.6%** support, emphasizing the role of corporate-led initiatives in fostering ESG competencies.
- **Interdisciplinary programs combining sustainability and project management** received **44.7%** approval, indicating a strong interest in integrated educational approaches.
- **Formal university programs (e.g., Bachelor's, Master's degrees)** were considered effective by **31.7%** of respondents, suggesting that while formal education plays a role, it is not the most favored option.
- **Micro-credentialing (focused, stackable learning modules)** had a lower preference at **27.7%**, reflecting limited enthusiasm for modular learning approaches.
- **Apprenticeship or work-based learning programs** were the least favored, with only **21.5%** of respondents viewing them as an effective method.

These findings suggest that professionals prefer flexible, shorter-term training solutions over traditional academic programs, with a strong inclination toward industry-led and interdisciplinary approaches.

Figure 58 Preferred Educational Formats for ESG & SPM Skill Development

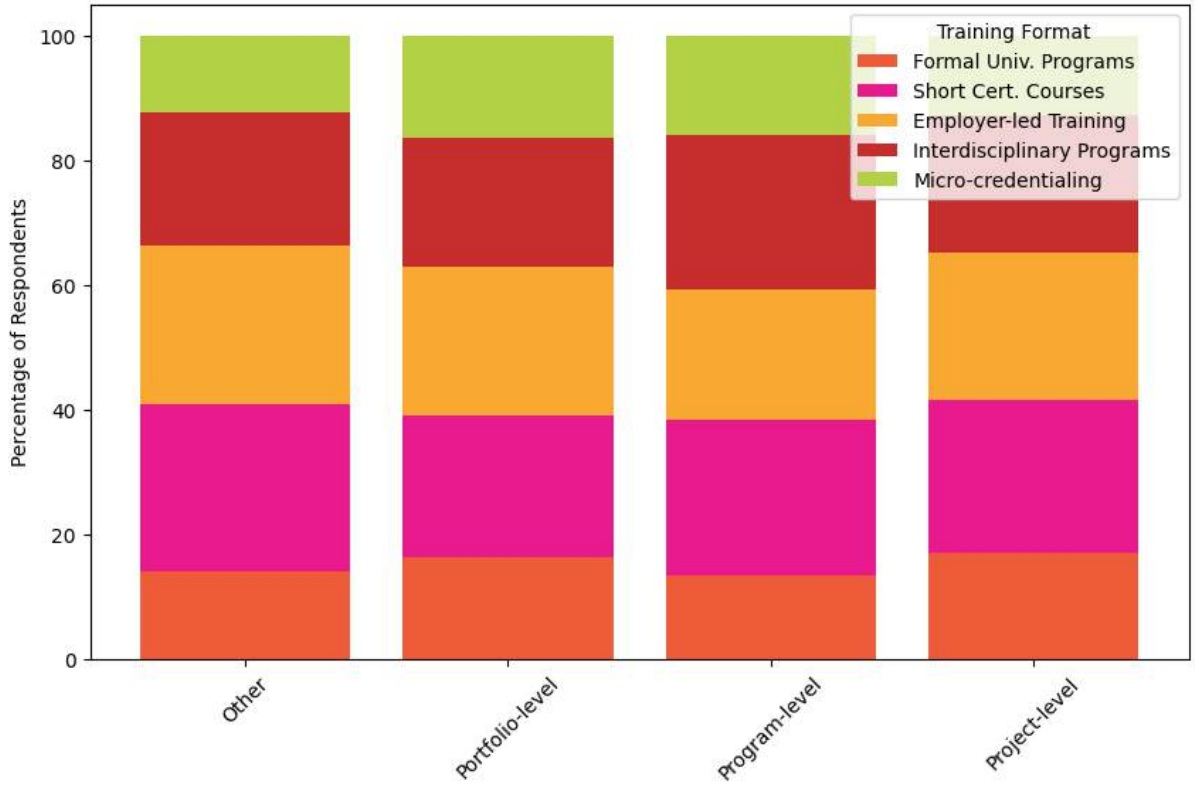


The analysis of preferred training formats for addressing **ESG and SPM skill gaps** reveals distinct preferences based on job roles:

- **Project-level roles** (e.g., Project Managers, Team Leaders) show a strong preference for **short certification courses (48.5%)** and **employer-led training (46.6%)**.
- **Program-level roles** (e.g., Program Managers, Coordinators) lean towards **interdisciplinary programs (45.8%)** and **employer-led training (38.6%)**.
- **Portfolio-level professionals** prefer **short certification courses (50.6%)**, likely due to their applicability to strategic decision-making.
- **Formal university programs** and **micro-credentialing** remain less favored overall, though some support exists from specific professional groups.

These insights suggest that **practical, hands-on, and flexible training formats** (e.g., **short courses and employer-led workshops**) are the most attractive options for sustainability-focused project management skills development.

Figure 59 Preferred Training Formats by Job Role



6.2.2 Barriers to integrating SPM into formal education

The survey results indicate several key barriers to integrating Sustainability and ESG Project Management (SPM) training into formal education and professional development programs.

1. **Lack of Awareness About ESG and SPM Importance (51.1%)** - The most frequently cited barrier is the general lack of awareness about the importance of ESG and SPM competencies, with **51.1%** of respondents acknowledging this as a major challenge.

- Project managers (226 respondents, 58.7%) were most concerned, highlighting gaps in industry-wide awareness.
- Portfolio and program managers also noted a lack of ESG recognition in organizations.

2. **Lack of Qualified Trainers or Faculty** – Reported by **33.4%** of respondents, this is one of the top concerns. The availability of expert trainers with both sustainability and project management expertise remains a challenge.
    - The highest concern was among project-level roles (148 respondents, 58.7%), followed by program-level roles (51 respondents, 20.2%).
    - Portfolio managers and "Other" roles showed the least concern.
3. **Limited Availability of Interdisciplinary Programs** – Identified by **27.9%** of respondents, highlighting the lack of programs that effectively integrate sustainability concepts with project management education.
    - **Project-level professionals (117 respondents, 55.7%)** were most affected, followed by program managers.
    - This suggests a need for interdisciplinary curricula integrating sustainability with project management.
4. **High Costs of Training Programs** – Noted by **30.5%**, indicating that financial constraints remain a significant obstacle to widespread adoption.
    - **Project managers (126 respondents, 54.8%)** saw this as a significant issue, indicating budget constraints in accessing training.
    - Portfolio-level professionals and others had lower concerns.
5. **Insufficient Employer Support for Ongoing Education** – A barrier for **32.5%** of respondents, suggesting that organizations may not prioritize or fund ESG and SPM-related training for their employees.
    - **Project managers (135 respondents, 55.1%)** and program managers (57 respondents, 23.3%) felt this the most.
    - Employer-sponsored training programs appear insufficient.
6. **Difficulty in Translating Theoretical Knowledge into Practical Skills** – Cited by **31.6%**, underlining a common issue in sustainability education, where applied learning opportunities are limited.
7. **Other Factors** – A small portion of respondents (1.7%) raised additional concerns, including market demand, lack of incentives, resistance to ESG integration, and the perception that ESG training may be secondary to business profitability.

Figure 60 Barriers to Integrating SPM into Formal Education

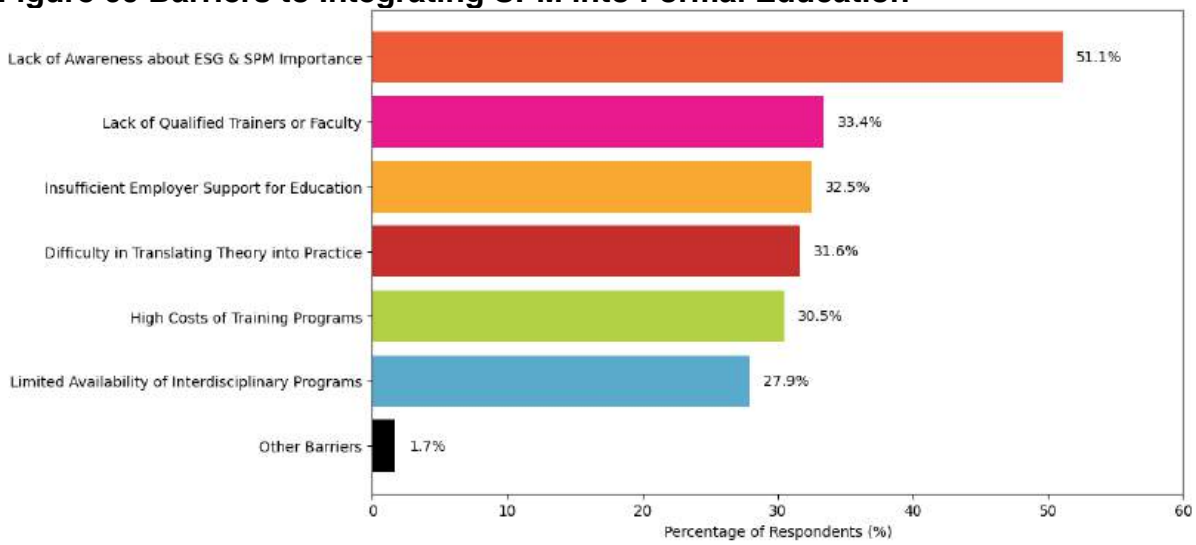
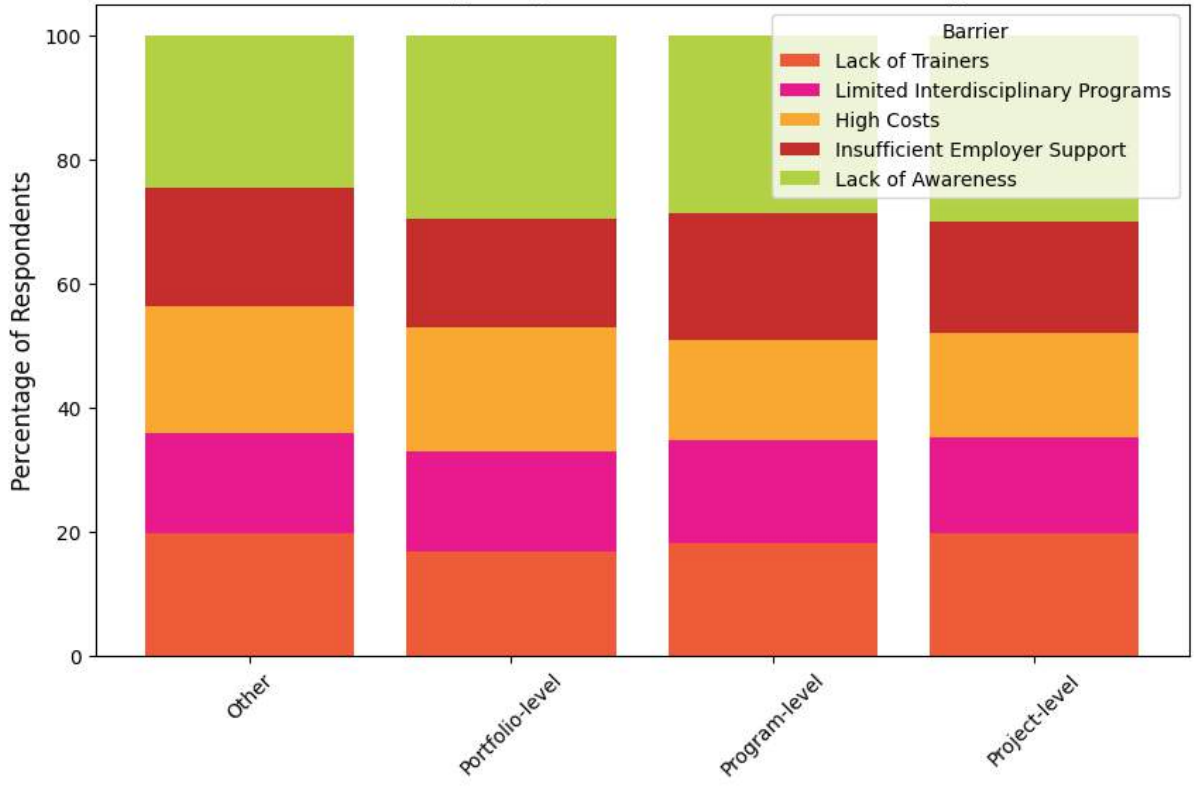


Figure 61 Barriers to Integrating SPM into Formal Education by Role



6.2.3 Preferred SPM certification models

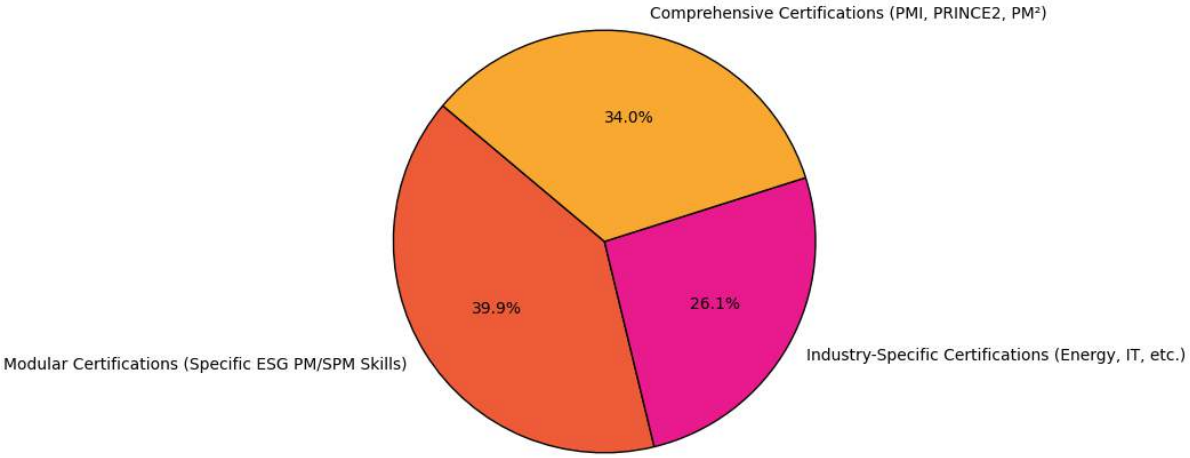
The survey results highlight preferences for different **SPM (Sustainable Project Management) certification models**, reflecting varying needs across industries and professional levels. The three primary certification types evaluated were:

1. **Modular Certifications Focused on Specific ESG PM or SPM Skills (39.9%)**

- The most preferred format, chosen by **39.9% of respondents**, consists of modular certifications that target **specific skills** within ESG PM or SPM. These are particularly appealing for professionals seeking **specialized knowledge** without committing to full-scale programs.

2. **Comprehensive, Globally Recognized Certifications (34.0%)**
   - Certifications such as **PRINCE2, PMI, or PM²** are preferred by **34% of respondents**, indicating that a significant portion of professionals value **internationally recognized standards** that can be applied across industries.
3. **Industry-Specific Certifications Tailored to Sectors Like Energy, Construction, or IT (26.1%)**
   - The least chosen option, but still relevant, with **26.1% of respondents** favoring **sector-specific** certifications tailored to **energy, construction, or IT sectors**. These certifications offer deep industry expertise but may not be as transferable across different fields.

Figure 62 Preferred SPM Certification Model



6.3 CROSS-SECTOR COLLABORATION IN SPM EDUCATION

6.3.1 Perspectives on interdisciplinary learning in SPM

The survey responses reveal varied perspectives on the **inclusion of SPM and ESG PM certifications** in formal education or training programs to enhance **employability**. The key findings are:

1. **Certifications as an Optional Qualification (57.4%)**
   - The **majority of respondents (57.4%)** believe that SPM and ESG PM certifications **should be offered as an additional qualification**, rather than being mandatory.

- This suggests that professionals value flexibility, allowing learners to **customize their learning paths** based on career goals.

2. **Mandatory Certifications for All Graduates & Professionals (34.5%)**
   - A significant portion (**34.5%**) believes that such certifications **should be mandatory** for **all project management graduates and professionals**.
   - This indicates strong support for **standardized sustainability-focused education**, ensuring that all project managers are equipped with ESG competencies.
3. **Formal Education Without Certifications (8.1%)**
   - A smaller group (**8.1%**) argues that formal education **is sufficient without additional certifications**.
   - This suggests that some professionals feel traditional education **already covers necessary competencies**, or that certifications may not be essential for career progression.

Figure 63 Agreement on ESG&SPM as a Core Component in Education

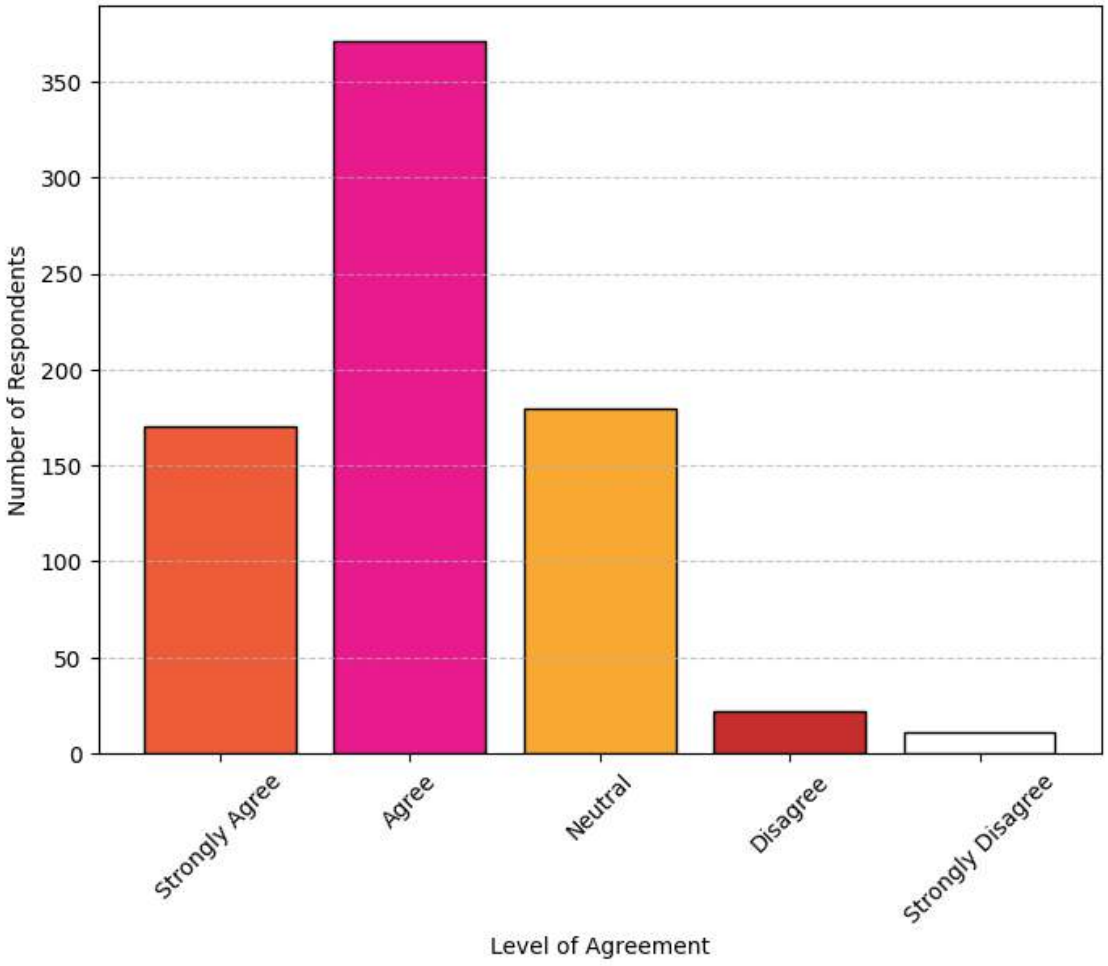
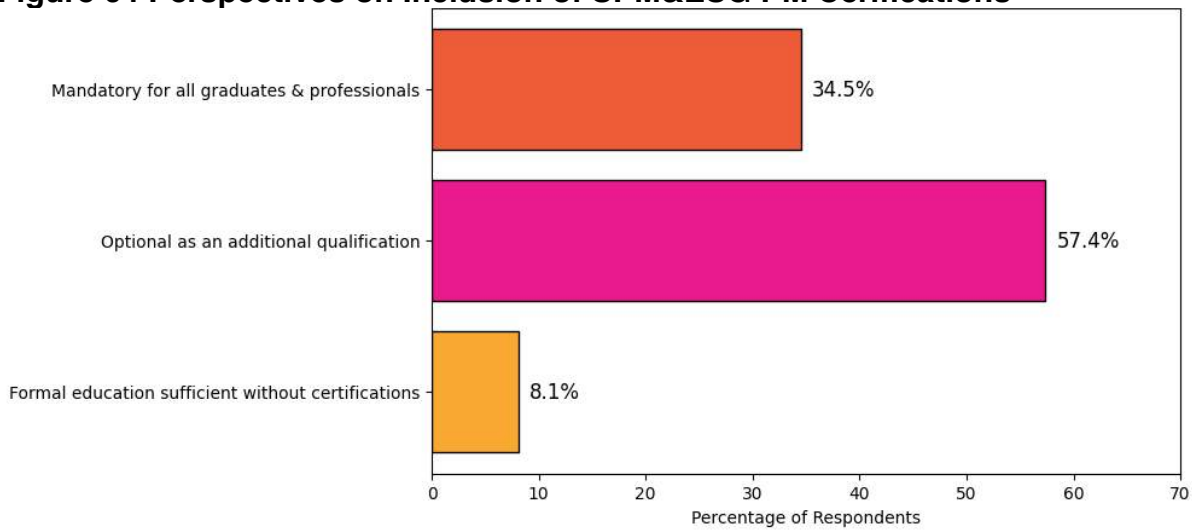


Figure 64 Perspectives on Inclusion of SPM&ESG PM Cerifications



Flexibility is a Priority: The largest group supports **optional** certification rather than a **mandatory approach**.

Growing Support for ESG-Focused Education: Over **90%** believe ESG PM certifications should be **available**, either as a requirement or an option.

Education Institutions & Employers Should Take Note: Programs should consider integrating **certification pathways** while **preserving choice** for learners.

These findings emphasize the **need for a balanced approach**—providing **opportunities for specialized ESG certifications** while maintaining **accessibility and choice** for professionals.

6.3.2. Level of agreement on prioritizing SPM in formal project management education

The results indicate a strong consensus among respondents regarding the integration of Sustainability Project Management (SPM) into formal project management education. The majority (71.5%) believe that higher education institutions (HEIs) and training initiatives should integrate cross-sectoral collaboration for ESG PM and SPM. Meanwhile, 28.5% think that individual sector-specific training is more effective.

Regarding the prioritization of ESG and SPM as core components in formal project management education, the results show:

- **49.2% agree** and **22.5% strongly agree** that ESG and SPM should be prioritized.
- **23.9% remain neutral**, indicating some level of uncertainty or indecisiveness.
- A small percentage **(4.4%)** disagrees, with only **1.5% strongly disagreeing**.

When analyzing these results by job role:

- Project-level professionals, including **Project Managers, Team Leaders, and Project Team Members**, show the highest support for cross-sectoral collaboration (**69.7%** in favor).
- Program and Portfolio-level professionals are also in favor but with slightly lower levels of strong agreement.

These findings suggest that while there is significant support for incorporating ESG and SPM principles into project management education, a portion of respondents still prefer sector-specific training. Additionally, while most respondents support integrating ESG and SPM into the curriculum, a notable percentage remains neutral, suggesting potential barriers such as lack of familiarity or perceived relevance.

6.3 GROUPING OF SUSTAINABILITY COMPETENCIES – PCA FINDINGS

To better understand the internal structure of sustainability competencies in project management, a Principal Component Analysis (PCA) with Varimax rotation was conducted on importance ratings across all project phases. The analysis aimed to reveal latent factors—underlying clusters of interrelated competencies—that could inform more coherent training and curriculum design.

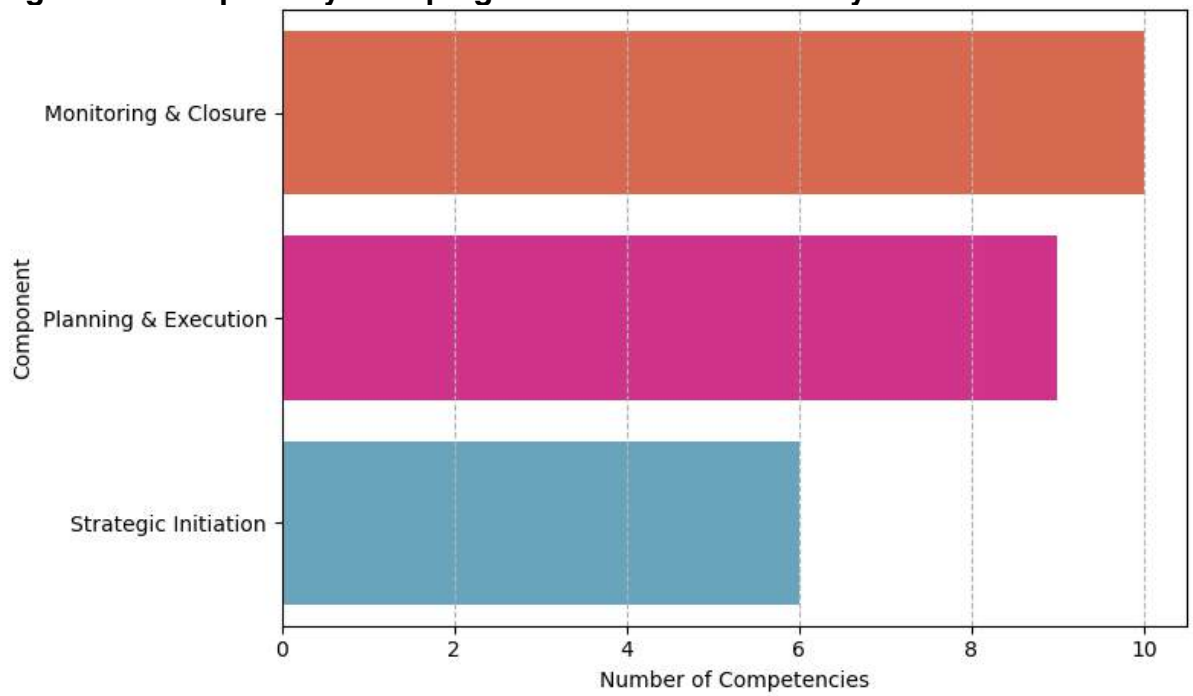
Methodology

The analysis yielded a clean and interpretable factor structure, supported by:

- **KMO = 0.924** (excellent sampling adequacy),
- **Bartlett's test** significant at $p < 0.001$,
- **Three factors extracted** based on eigenvalues > 1.

The rotated solution converged in 10 iterations and accounted for a substantial share of total variance. The loadings revealed clear thematic groupings across project phases.

Figure 65 Competency Groupings Based on Factor Analysis



Identified Components

Component 1: Monitoring & Closure

This factor groups competencies related to:

- tracking sustainability metrics,
- capturing lessons learned,
- verifying ESG quality assurance,
- evaluating long-term value and stakeholder satisfaction,
- institutionalizing sustainability knowledge post-project.

Interpretation: A strong emphasis on accountability, legacy, and institutional learning—crucial for project closure and organizational improvement.

Component 2: Planning & Execution

Includes competencies involving:

- implementing sustainability solutions,
- resource optimization,
- aligning team and stakeholder efforts,
- maintaining sustainability standards during project delivery.

Interpretation: Reflects the operational core of SPM—translating strategy into execution through methods, behaviors, and deliverables.

Component 3: Strategic Initiation

Encompasses competencies such as:

- defining sustainability-focused objectives,
- integrating sustainability into governance structures,
- aligning with organizational strategies,
- assessing impacts early in the project lifecycle.

Interpretation: Strategy-setting and upstream alignment, ensuring sustainability is embedded from the very start of the project.

Implications for Education and Training

This factor-based structure supports:

- **Modular curriculum design**: Each factor can represent a distinct learning module.
- **Tailored capacity building**: Organizations can focus on the weakest cluster based on maturity.
- **Certification architecture**: Future SPM² microcredentials can reflect these clusters (e.g., a certificate in "Sustainability Monitoring & Closure").

6.4 CLUSTER ANALYSIS AND RESPONDENT SEGMENTATION

To complement the factor analysis, a hierarchical cluster analysis was conducted using Ward's method and squared Euclidean distance. This aimed to identify meaningful segments among survey respondents based on their ratings of importance for the 50 sustainable project management (SPM²) competencies. Based on dendrogram inspection and agglomeration coefficients, a 3-cluster solution was selected as optimal.

Identified Clusters

1. **Cluster 1: Sustainability Champions**: These respondents consistently rated all sustainability competencies as highly important (means around 4.3–4.5). They are proactive advocates of embedding sustainability at every project phase. Likely include sustainability-focused professionals, ESG officers, or advanced practitioners.

Figure 66 Persona Profile Card "Sustainability Champion"

This persona represents respondents who view sustainability as integral to every phase of project management. They are proactive leaders and early adopters, often pushing their organizations toward ESG-driven innovation and transformation.

Sustainability Champion

Cluster-based Respondent Persona

Profile Highlights:

- Highly values all sustainability competencies.
- Advocates for ESG integration across all project phases.
- Often works in sectors like renewables, green construction, or policy-aligned NGOs.

Key Needs:

- Advanced ESG metrics and leadership tools.
- Strategic alignment frameworks.
- Access to communities of practice.

2. **Cluster 2: Balanced Realists**
   This segment shows moderate-high appreciation for sustainability competencies (means between 3.7–3.9), especially in planning and execution. They prioritize feasibility and integration of sustainability, but with some caution regarding practical implementation.

Figure 67 Persona Profile Card "Balanced Realists"

Balanced Realists value sustainability but weigh it carefully against project feasibility and resource constraints. They tend to seek practical, context-sensitive solutions rather than idealistic approaches.

Balanced Realist

Cluster-based Respondent Persona

Profile Highlights:

- Values sustainability with practical constraints.
- Focuses on planning and execution feasibility.
- Likely from sectors in ESG transition (IT, finance, engineering).

Key Needs:

- Pragmatic tools and case-based training.
- Cross-functional collaboration techniques.
- Templates for integrating sustainability in practice.

3. **Cluster 3: Traditionalists**
   These respondents rated sustainability-related competencies significantly lower than the other two clusters (around 3.0–3.2). They likely represent traditional project managers or individuals in sectors where sustainability integration is still emerging.

Figure 68 Persona Profile Card "Traditionalist"

Traditionalists show limited engagement with sustainability competencies and tend to prioritize conventional project success metrics like time, scope, and budget. Their perspective reflects sectors or environments where ESG integration is still emerging.

Traditionalist

Cluster-based Respondent Persona

Profile Highlights:

- Low to moderate emphasis on sustainability.
- More comfortable with conventional PM standards.
- Represents legacy organizations or infrastructure-heavy sectors.

Key Needs:

- Introductory SPM training and awareness.
- Incentives to adopt sustainability KPIs.
- Simple tools to align with ESG goals.

Table 31 Cluster Profiles – Respondent Segmentation

Competency Cluster	Cluster 1: Sustainability Champions	Cluster 2: Balanced Realists	Cluster 3: Traditionalists
Strategic Initiation	4.50	3.80	3.10
Planning & Execution	4.30	3.90	3.20
Monitoring & Closure	4.40	3.70	3.00

Implications for Training Design

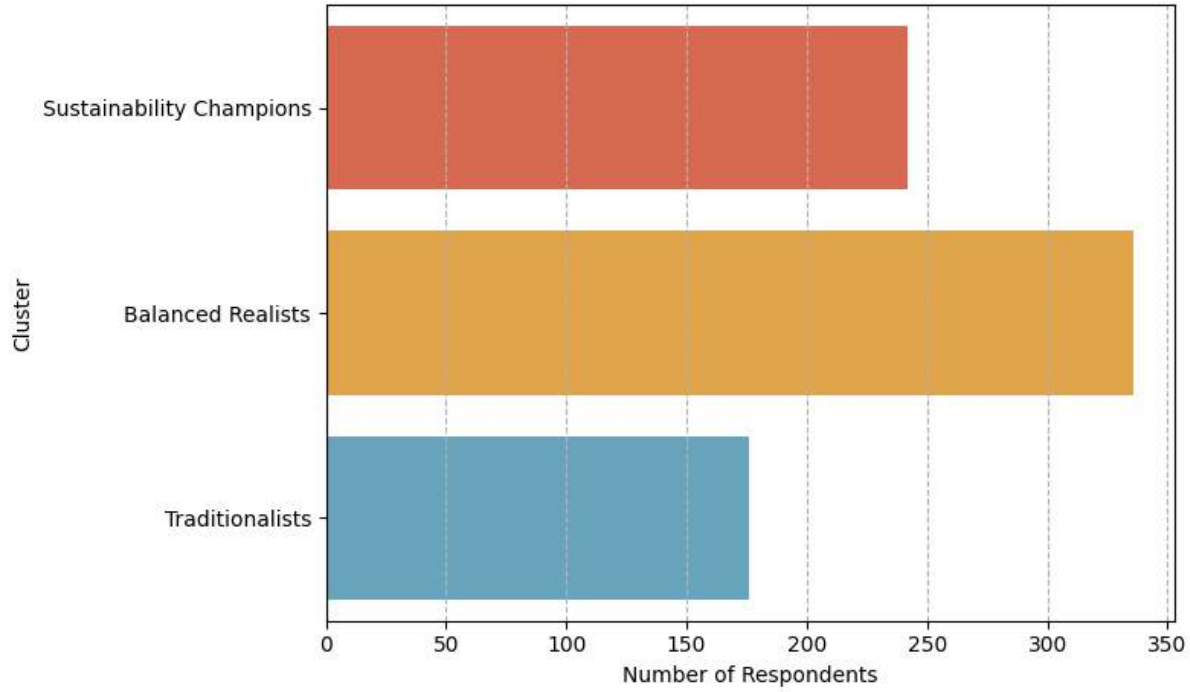
Competency development programs should be **tailored to these respondent profiles**, e.g.,:

- **Champions**: Advanced leadership, metrics, and ESG integration.
- **Realists**: Practical tools, stakeholder engagement, and planning techniques.
- **Traditionalists**: Introductory sustainability awareness and change mindset.

Respondent Distribution by Cluster

The distribution of respondents across the three clusters is shown in Figure X. The **Balanced Realists** form the largest segment (n = 336), followed by **Sustainability Champions** (n = 242), and **Traditionalists** (n = 176). This segmentation illustrates that while enthusiasm for sustainability is significant, a substantial portion of respondents remain moderate or reserved in their ratings, underlining the need for differentiated outreach and training strategies.

Figure 69 Cluster Analysis of Respondent Profiles



6.5 VISUALIZING ROLE-BASED TRAINING PREFERENCES

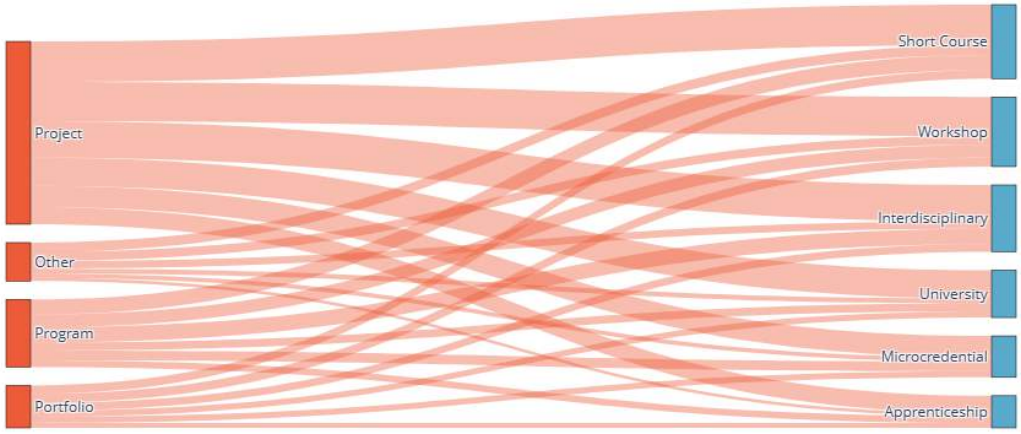
To better understand how professional roles influence preferences for SPM² training, a Sankey diagram was generated. It illustrates the flow of respondents from their current organizational role (e.g., project-level, program-level, portfolio-level) to their most preferred educational formats (e.g., short courses, interdisciplinary programs, university programs).

The visualization shows strong flows from **project-level professionals to short certification courses and employer-led workshops**, suggesting a preference for **flexible, practical formats**. Meanwhile, **program-level professionals showed a higher relative preference for interdisciplinary programs**, and **portfolio-level roles leaned modestly toward university programs**.

This visualization can help education providers and policy makers design **tiered training offers** tailored to distinct professional audiences.

Figure 70 Preferred Training Formats by Role (Sankey Diagram)

Respondent Roles vs. Preferred Training Formats



7. Recommendations & Implications

7.1. FOR PROJECT MANAGEMENT PROFESSIONALS: KEY TAKEAWAYS FOR CAREER DEVELOPMENT

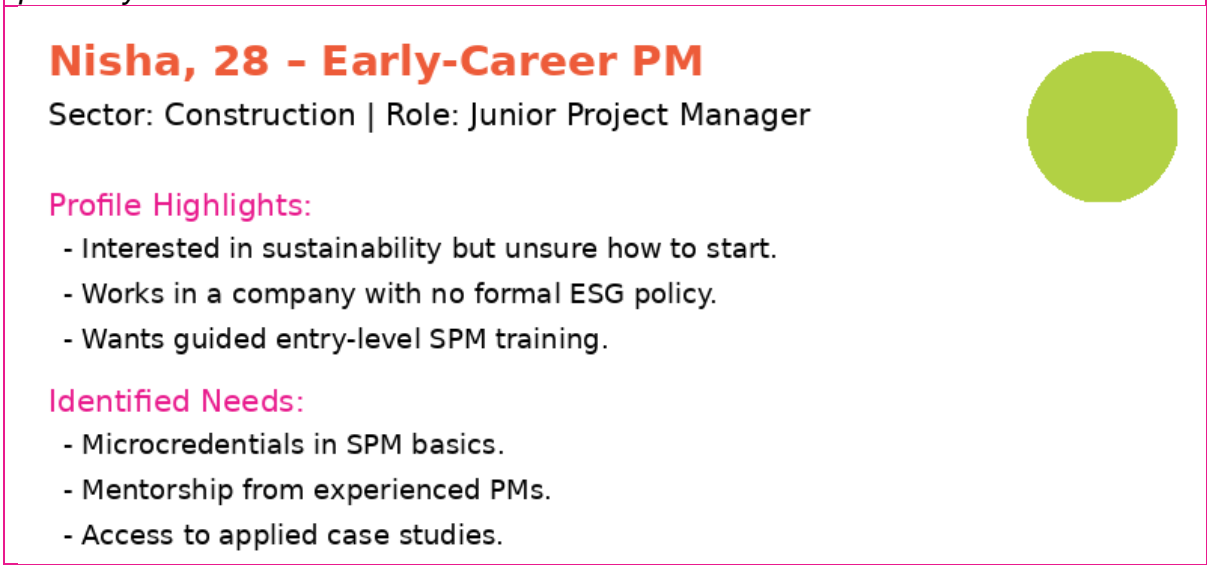
Sustainability-aware project professionals are essential catalysts for embedding ESG principles into project practice. However, as the results show, many professionals recognize the **importance** of sustainability competencies but **lack confidence in applying them effectively**.

Recommendations:

- **Engage in targeted upskilling**: Professionals should pursue focused training in ESG integration, such as short courses, certifications, or micro-credentials in sustainable project management. These formats were ranked highest in effectiveness by survey respondents.
- **Adopt a lifecycle sustainability perspective**: Incorporate sustainability thinking not only at initiation or closing, but across all project phases—especially in planning and execution, where competency gaps were most pronounced.
- **Champion sustainability within projects**: Proactively raise sustainability considerations in project charters, stakeholder discussions, and risk registers. Even in organizations without formal SPM roles, individuals can act as change agents.
- **Collaborate across disciplines**: Leverage partnerships with environmental experts, social scientists, and community stakeholders to design more holistic, resilient project outcomes.
- **Contribute to professional networks**: Join sustainability-focused working groups or professional bodies (e.g., PM² Alliance, GPM Global) to exchange good practices and advocate for stronger ESG standards in project management.

Figure 71 Persona Profile Cards – Early-Career PM

Nisha is a young project manager eager to embrace sustainable project practices but lacks access to formal guidance and training. Her story reflects the barriers that early-career professionals face when entering the field without dedicated SPM pathways.



7.2. FOR ORGANIZATIONS: STRATEGIES TO ENHANCE SPM INTEGRATION

Organizational support is crucial for enabling project teams to act on sustainability intentions. The study shows that while some organizations lead with mature SPM integration, others lag behind—particularly in the **governance** dimension and in enabling sustainable project delivery.

Recommendations:

- **Create formal SPM roles or responsibilities**: Assign sustainability accountability within project teams, even if as a shared or rotating responsibility. Organizations with dedicated SPM roles showed better alignment of objectives with sustainability.
- **Provide internal training and mentorship**: Invest in upskilling project managers through in-house workshops or by bringing in external trainers. Address the frequently reported barrier of *lack of qualified instructors* through partnerships with academia or consultancies.
- **Embed sustainability into governance frameworks**: Ensure that project governance structures (e.g., steering committees, approval gates) explicitly consider ESG criteria when making decisions.
- **Incentivize sustainability performance**: Incorporate sustainability KPIs into project manager appraisals and recognize teams that achieve measurable ESG impacts.

- **Foster a culture of sustainability**: Encourage sustainability-focused innovation, experimentation, and learning. This includes setting expectations that sustainability is a shared value—not a cost or compliance burden.

Figure 72 Persona Profile Cards – IT Sector

Paul brings the perspective of a seasoned portfolio manager working in a large, process-driven organization. His focus on governance and compliance reveals the need for high-level alignment of sustainability objectives with organizational performance systems.

7.3. FOR EDUCATORS AND TRAINERS: CURRICULUM DEVELOPMENT RECOMMENDATIONS

The study shows strong consensus among respondents that **universities and training providers should prioritize sustainability education** in project management programs. However, key barriers remain—such as lack of faculty expertise and insufficient interdisciplinary offerings.

Recommendations:

- **Update curricula to reflect SPM competencies**: Integrate practical sustainability modules into core project management courses, drawing on frameworks like PM², PRiSM, and the GPM P5 Standard. Ensure coverage of topics such as ESG risk assessment, stakeholder engagement, circular economy, and ethical governance.
- **Offer flexible and applied learning formats**: Design **short courses, micro-credentials, and interdisciplinary modules** that align with the preferred learning formats identified in the survey. Partner with industry for project-based learning, internships, or case competitions.

- **Train the trainers**: Invest in developing faculty capacity for teaching SPM, including through train-the-trainer programs or collaborations with sustainability-focused experts and institutions.
- **Develop interdisciplinary programs**: Encourage integration of project management with environmental science, ethics, public policy, and business strategy, reflecting the cross-cutting nature of sustainability challenges.
- **Use real-world case studies**: Incorporate best-practice SPM case studies (e.g., London 2012 Olympics, Bosco Verticale, IKEA Expansion) to ground theoretical learning in real-world applications.
- **Establish academic-industry dialogue**: Collaborate with employers and professional bodies to ensure that academic programs address evolving SPM competency requirements and workplace realities.

Figure 73 Persona Profile Card – Education Sector

Gabriela represents a new generation of project professionals who deeply value sustainability but often lack institutional frameworks to act on it. Her experience underscores the urgent need for structured educational offerings and peer learning to empower grassroots sustainability leadership.

Gabriela, 35 – Green Advocate

Sector: Education | Role: Mid-level Project Manager

Profile Highlights:

- Strong values in sustainability, but lacks organizational support.
- Actively seeks tools and peer learning opportunities.
- Sees the need for better integration in project design phase.

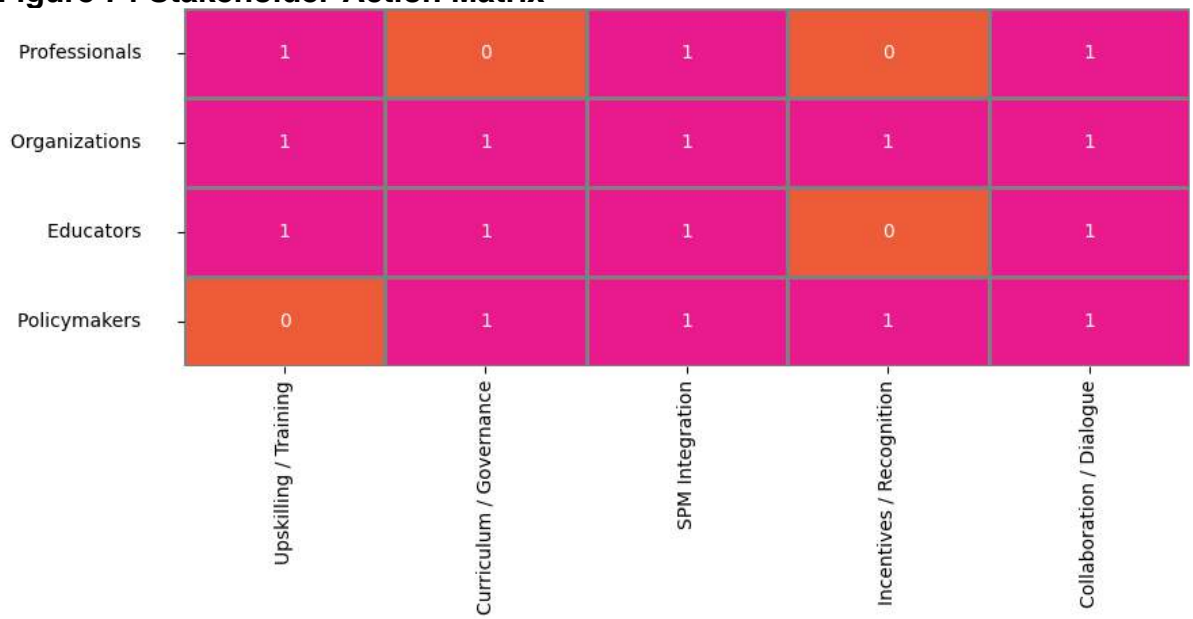
Identified Needs:

- Structured SPM curriculum.
- Communities of practice.
- Access to sustainability planning tools.

7.4. FOR POLICY MAKERS: IMPLICATIONS FOR STANDARDIZING SPM IN PROJECT MANAGEMENT

The survey confirms that the integration of sustainability into project management education and practice requires **systemic support from regulatory and policy-making institutions**. Respondents overwhelmingly favored the formal recognition of SPM competencies through **certification, accreditation, and policy incentives**.

Figure 74 Stakeholder-Action Matrix



Recommendations:

- **Support the development and recognition of SPM qualifications**: Endorse or co-develop standardized competency frameworks and **micro-credentials** for sustainable project management. These can be promoted via national qualification frameworks or EQF-aligned initiatives.
- **Incentivize university–industry collaboration**: Provide funding or regulatory support for cross-sector partnerships that co-develop SPM training content, facilitate work-based learning, and ensure alignment between academic and labor market needs.
- **Integrate sustainability criteria into accreditation processes**: Encourage national education quality agencies to require or reward inclusion of sustainability learning outcomes in accredited project management programs.
- **Promote research and innovation in SPM**: Allocate public funding to support applied research into sustainable project delivery methods, tools, and digital enablers (e.g., AI for ESG reporting, lifecycle impact modeling).
- **Raise awareness through national campaigns**: Coordinate with professional bodies and chambers of commerce to promote the benefits of SPM, targeting especially SMEs and sectors lagging in ESG adoption.
- **Support policy coherence and data infrastructure**: Encourage harmonization between national sustainability policies and project management standards. Invest in better data systems to track project-level ESG outcomes.

Figure 75 Impact Focus by Stakeholder Group

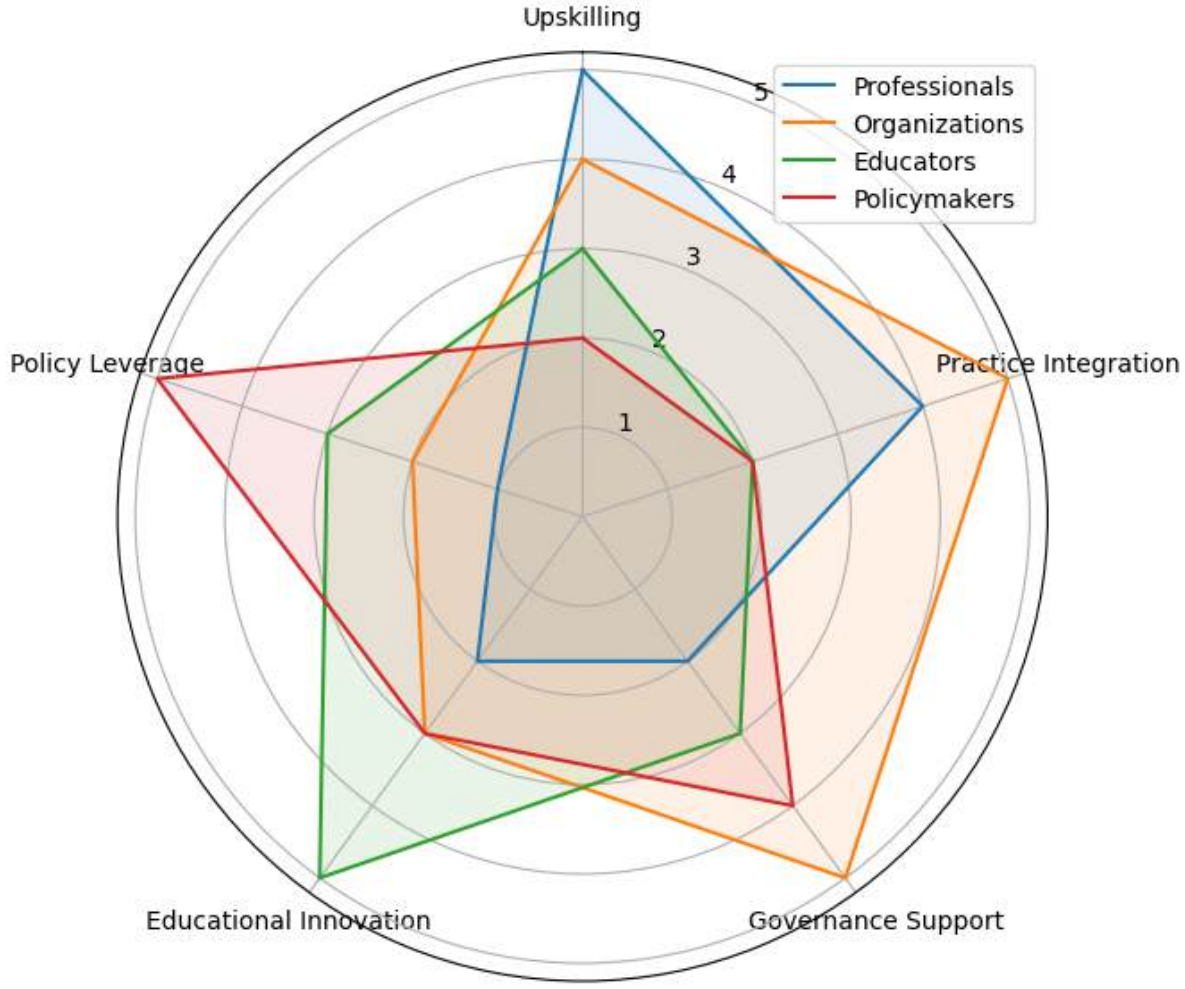


Table 32 Summary of Limitations and Recommended Research Directions

Stakeholder Group	Key Actions
Professionals	Upskill via short courses, integrate ESG in practice, join networks, act as change agents
Organizations	Assign SPM roles, train internally, reward ESG outcomes, embed ESG in governance
Educators	Update curricula, use flexible formats, build faculty expertise, integrate real-world cases
Policymakers	Fund SPM credentialing, align accreditation, promote SPM research and cross-sector collaboration

8. Limitations and Future Research

Limitations

While this study provides meaningful insights into sustainability competencies and training needs in the context of project management, several limitations should be acknowledged:

- **Sample Representation:** The respondent pool may not fully reflect the diversity of industries, regions, or roles within the global project management community. Certain sectors (e.g., education, IT) and regions may be over-represented, potentially influencing the generalizability of the findings.
- **Self-Reported Data:** All responses were self-reported and may be subject to biases such as social desirability or self-perception inaccuracies. Respondents may overstate their awareness or prioritize sustainability due to perceived normative expectations.
- **Survey Design Constraints:** The structured survey format limited deeper exploration of respondent reasoning and context. Some nuances, such as organizational constraints or sector-specific dynamics, may not have been fully captured.
- **Cross-Sectional Snapshot:** The study reflects a single point in time. It does not account for how sustainability practices or awareness might evolve longitudinally in response to market, regulatory, or organizational changes.

Future Research Directions

Building on the present study, future research could explore the following avenues:

- **Qualitative Deep-Dives:** Follow-up interviews or focus groups could enrich the interpretation of patterns observed in the quantitative data and provide deeper contextual understanding.
- **Longitudinal Studies:** Tracking changes in competency priorities, organizational performance, or training preferences over time would provide insight into the evolution of sustainability integration in project management.
- **Sector-Specific Comparative Analysis:** Future studies could disaggregate findings by industry or region, identifying unique needs and trends across different professional contexts.
- **Behavioral Assessment of Competencies:** Moving beyond self-reports, future research could assess actual practice, skill demonstration, or project outcomes aligned with sustainability indicators.
- **Validation of Competency Frameworks:** As the SPM² competency model evolves, experimental or mixed-method studies could test the effectiveness of targeted training aligned to specific clusters identified through factor and cluster analysis.

9. Conclusion

9.1 SUMMARY OF KEY FINDINGS

The research conducted in WP2 conclusively demonstrates that sustainability has become a critical consideration in project management, albeit one that is not yet fully integrated into practice. The survey findings show a clear **dichotomy between awareness and action**: professionals across sectors recognize the importance of incorporating ESG principles into project management, but systemic adoption remains inconsistent. We found that *environmental* and *social* dimensions of sustainability are gaining traction in projects (with many respondents reporting initiatives in areas like green technology implementation and social impact measures), whereas the *governance* dimension – ensuring ethical, transparent, and accountable project governance – is comparatively underdeveloped. This imbalance suggests that while project teams may be implementing eco-friendly practices or community engagement on the ground, the higher-level frameworks and policies (the governance structures) have not caught up to embed sustainability uniformly across all projects.

Another key insight is the **universal nature of competency gaps** related to SPM. The survey asked practitioners to rate the importance of various sustainability-oriented competencies and their organization's performance in each. Consistently, every critical sustainability competency (spanning project initiation through closing) was rated **high in importance but moderate in performance**, revealing a gap that persists regardless of industry, organization size, or respondent seniority. For instance, competencies in the execution phase – such as *implementing sustainability-focused solutions, ensuring compliance with sustainability standards, and addressing sustainability risks* – are seen as essential in theory but were among the areas with the largest shortfall in practice. Notably, statistical analysis confirmed that these gaps are **not confined to particular types of organizations**: even companies with different scales (small startups to large enterprises) or varying project management maturity experience similar challenges in delivering sustainable outcomes. This pervasive pattern reinforces a central conclusion: *the need for better tools, training, and organizational commitment to sustainability in project management is broad-based and urgent*. It is not just isolated to a few sectors – it is a field-wide call to action.

9.2 THE FUTURE OF SPM IN PROJECT MANAGEMENT

The above findings underscore the strategic importance of the SPM² initiative for both education and professional practice. As organizations worldwide grapple with climate change, social responsibility, and ethical governance pressures, project management is increasingly seen as a vehicle to drive sustainability goals. The SPM² project is timely in addressing this need by fostering a structured approach to Sustainable Project Management. By developing a standardized competency profile for SPM professionals and integrating those competencies into curricula, certifications, and methodologies, SPM² will fill a critical gap in the current landscape. The strong support

recorded among respondents for formalizing SPM education (over 70% call for prioritizing sustainability in project management degrees and training) and for recognizing SPM skills through certification provides a clear mandate: **academic institutions, professional bodies, and employers must collaborate to integrate sustainability into the fabric of project management training and standards**. In essence, what emerges is a vision of the *"sustainable project manager"* as a new standard in the profession – a project manager who is not only adept at scope, time, and cost management, but also skilled in stakeholder engagement, environmental stewardship, social impact evaluation, and ethical governance. Advancing this vision is strategically important because it aligns project management with the broader transformation of businesses and public organizations towards sustainability. Industry experts anticipate that the future of project delivery will blend traditional project management with agile, adaptive practices, all underpinned by sustainability considerations. By being proactive now, the SPM² consortium and its academic partners are positioning project management education at the forefront of this transformation, ensuring that graduates and practitioners are prepared for the evolving demands of the project economy.

9.3 NEXT STEPS FOR THE SPM RESEARCH INITIATIVE

Building on the insights gained, the next steps involve translating these findings into concrete tools and actions for educational and professional development. A top priority will be to **finalize the SPM² Guide and the standardized competency framework** for sustainable project management practitioners. The guide will encapsulate the essential competencies identified by the survey – for example, integrating sustainability criteria into project charters, lifecycle assessment in planning, adaptive sustainability metrics in monitoring, and post-project sustainability evaluations – thus providing a reference model for curriculum designers and industry trainers. The competency framework can be used by universities to update project management courses, ensuring that topics like ESG risk management, green procurement, and stakeholder inclusivity are formally taught. It will also support professional associations in updating certification schemes or developing new micro-credentials aligned with SPM (as respondents indicated considerable interest in modular certifications focusing on ESG skills).

Additionally, the project should engage in **broad dissemination and collaboration efforts**. Academic institutions in the consortium (and beyond) will be encouraged to pilot the integration of SPM competencies into their programs – for instance, by creating interdisciplinary course modules or case study competitions on sustainable projects – and share the outcomes. In parallel, outreach to industry and professional bodies is crucial: the findings equip us with evidence to advocate for organizational policy changes, such as incorporating sustainability performance criteria in project manager job descriptions or performance reviews. Professional associations and the

PM² Alliance can use these results to argue for updating the *body of knowledge* in project management to include sustainability, influencing guidelines like PM² and even the PMBOK to put greater emphasis on sustainable practices. **Policy makers** and accreditation agencies are also a key audience for next steps. The clear demand for sustainability-skilled project managers suggests that government and industry partnerships could be formed to fund training programs or incentives for companies that develop their project staff in this area. By presenting this report's data to policy forums (for example, those focused on educational innovation or workforce development), the SPM² project can help shape policies that encourage universities to embed ESG topics in STEM and management curricula and that perhaps recognize organizations leading in sustainable project delivery.

Finally, ongoing **stakeholder engagement and research** will ensure the momentum continues. The consortium should consider follow-up qualitative research (such as interviews or focus groups with select survey respondents) to delve deeper into some of the nuanced findings – for instance, understanding why some sectors report fewer competency gaps, or what specific support project managers need from leadership to champion sustainability. Measuring progress is another next step: as the SPM² initiatives (guide, trainings, etc.) roll out, establishing metrics and conducting future surveys will be important to track improvements in the integration of sustainability into project management practice. In conclusion, the work of WP2 provides a strong foundation and direction. It highlights both **the necessity and the opportunity** of SPM: necessity, because integrating sustainability is vital for project management to remain relevant and responsible in the modern era; and opportunity, because there is enthusiastic support from the community to make this change. With a strategic, collaborative effort bridging academia, industry, and policy, SPM² can significantly contribute to shaping a more sustainable future for the project management profession.

9. Appendices

9.1 SURVEY QUESTIONNAIRE.

Online survey FORM

INTRODUCTION

We invite you to participate in a survey on Sustainable Project Management (SPM), including its integration of Environmental, Social, and Governance (ESG) dimensions. This survey will provide insights into:

- Essential competencies required for effective SPM and ESG-focused project management.

Your input will shape a standardized competency framework for SPM and ESG-focused project management practitioners, supporting education, certification, and professional development.

Survey Information:

- Time: Approximately 40 minutes.
- Confidentiality: Responses are anonymized and GDPR-compliant.
- Survey Link: [Insert Link]

Your expertise is vital to shaping strategies for sustainable project management. Thank you for your time and input!

Your participation in this survey is voluntary, and your responses will be anonymized and used solely for project The ESG Imperative for the Project Management World: Alliance for Developing and Empowering Changemakers (ESG4PMChange) (Project reference number: 10118737) purposes. By continuing, you agree to the collection and processing of your data in compliance with the applicable EU, international and national law on data protection (in particular, Regulation 2016/679, Directive 95/46/EC ("GDPR")).

PART 1. RESPONDENT BACKGROUND QUESTIONS

Instructions:

This section collects general information about your professional background. Please answer each question as accurately as possible. Open-ended responses should be concise but detailed.

1. What sex were you assigned at birth?
    - Male
    - Female
    - Prefer not to say
1. What is your age group?
    - 18–24
    - 25–34
    - 35–44
    - 45–54
    - 55–64

- **65+**

2. What is the highest level of education you have completed?
   - High School Diploma or Equivalent
   - Associate Degree
   - Bachelor's Degree
   - Master's Degree
   - Doctoral Degree or Higher
   - Other (Please specify):
3. Do you hold a Project Management Certificate?
   - No
   - Yes (Please specify):
4. What is the predominant country of your work location?
   - Add all world countries
5. What is your professional seniority level?
   - Entry-level specialist
   - Mid-level professional
   - Senior professional
   - Manager/Director
   - Executive/C-level expert
6. How many years of experience do you have working in project-oriented environments?
   - Less than 1 year
   - 1–3 years
   - 4–7 years
   - 8–15 years
   - More than 15 years
7. Which of the following best describes your current role in the organization?
   - Project-level role (e.g., Project Manager, Team Leader, Project Team Member)
   - Program-level role (e.g., Program Manager, Program Coordinator)
   - Portfolio-level role (e.g., Portfolio Manager, Portfolio Analyst)
   - Other (please specify):
8. Please provide the title of your current position:
   - (Open-ended question)
9. Primary functional role: Specify your main functional area in your organization (e.g., Operations, Finance, HR, Strategy, IT).
   - (Open-ended question)
10. What is your current work environment?
    - Traditional office setting
    - Fully remote (work from home)
    - Hybrid (mix of office and remote)
    - On-site fieldwork (e.g., construction, site visits)
    - Client-based (working at client locations)

- Co-working space

Other (please specify):

- (Open-ended question)

PART 2. ORGANIZATION BACKGROUND QUESTIONS

Instructions:
This section seeks to understand the organizational context in which you work. Your responses will help us analyze variations in competencies and performance based on organizational characteristics.

11. What is the primary industry of your organization?
    - Information Technology (IT): Companies primarily engaged in IT services, software development, data management, and related activities.
    - Technology (Non-IT): Companies focused on the development, production, and marketing of technology-based goods and services outside the traditional IT scope.
    - Engineering Services: Companies that provide expert engineering services across various domains.
    - Construction
    - Healthcare
    - Education
    - Manufacturing
    - Financial Services
    - Professional Services (Consulting, Legal, etc.)
    - Retail/Consumer Goods
    - Energy/Utilities
    - Transportation/Logistics
    - Hospitality/Tourism
    - Media/Entertainment
    - Non-Profit/NGO
    - Public Sector/Government
    - Real Estate
    - Agriculture/Food Production
    - Biotechnology/Pharmaceuticals
    - Environmental Services/Sustainability
    - Other (please specify):
12. How many years has your organization been operating?
    - Less than 5 years
    - 5–10 years
    - 11–20 years
    - More than 20 years
13. What is the staff headcount of your organization?
    - Micro (1–10 employees)
    - Small (1–50 employees)
    - Medium (51–250 employees)
    - Large (251+ employees)
14. Does your organization currently have Sustainability/ESG-specific roles or responsibilities?
    - Yes

- No
- I do not know
- If yes, please specify:

15. How long has your organization been actively integrating Sustainability/ESG principles into its operations?
    - Not yet integrated
    - Less than 1 year
    - 1–3 years
    - More than 3 years

16. How would you describe your organization's approach to Sustainability/ESG ESG integration? (Proactive, Reactive, Ad Hoc, Not Applicable)
    - Proactive
    - Reactive
    - Ad Hoc
    - Not Applicable

17. What types of Sustainability/ESG initiatives has your organization implemented? (Open-ended question)
    - Other (please specify):

18. What is the primary focus of your organization's Sustainability/ESG efforts?
    - Environmental (e.g., reducing carbon footprint, implementing green technologies)
    - Social (e.g., improving workplace diversity, community engagement)
    - Governance (e.g., ethical compliance, corporate governance improvements)
    - All of the above
    - Other (please specify):

19. How often do you personally interact with Sustainability/ESG-related topics in your role?
    - Daily
    - Weekly
    - Monthly
    - Rarely
    - Never

PART 3. COMPETENCIES FOR SUSTAINABLE PROJECT MANAGEMENT (SPM)

Instructions:

This section evaluates competencies aligned with the project lifecycle phases. For each competency:

- **How important do you think this competency is in your industry? (e.g., 1 = "Not relevant" to 5 = "Essential for most projects").**
- **Rate your organization's performance in applying the competency (1 = Very poor to 5 = Excellent).**
- **You may provide additional insights or competencies in the "Other" fields for each phase.**

SPM Competency Framework Aligned with Project Lifecycle Phases

Please rate the Importance of each competency for effective sustainable project management in your sector across project lifecycle phases:

Initiation Phase: Competency and Description:

Competency	Importance (1–5)	Performance (1–5)
Competency to define sustainability-focused project objectives: Demonstrates the ability to align project objectives with sustainability principles such as environmental protection, social equity, and governance compliance.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to assess and document sustainability impacts: Proficient in evaluating and justifying environmental, social, and governance impacts, risks, and opportunities in the Business Case.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency in stakeholder analysis and engagement: Skilled in identifying and engaging key stakeholders, including marginalized and underrepresented groups, to integrate sustainability priorities effectively.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to integrate sustainability into governance structures: Capable of establishing and communicating sustainability roles and responsibilities within the Project Charter.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to align sustainability goals with organizational strategies: Proficient in linking project objectives with broader organizational sustainability strategies, policies, or commitments.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to evaluate sustainability-driven project needs: Demonstrates the ability to assess project justification based on sustainability-driven needs, such as addressing environmental challenges or achieving social impact.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to embed preliminary sustainability metrics: Skilled in defining high-level sustainability indicators (e.g., GHG emissions reduction, resource savings) during project initiation.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to identify sustainability constraints and assumptions: Capable of recognizing and documenting regulatory, resource, or other constraints and assumptions relevant to sustainability.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Other (please specify):	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Planning Phase: Competency and Description:

Competency	Importance (1-5)	Performance (1-5)

Competency to define resource-efficient project plans: Demonstrates expertise in optimizing resource consumption to achieve sustainability goals effectively.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to establish sustainability KPIs: Proficient in developing measurable sustainability performance indicators, such as carbon footprint reduction or diversity targets.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to develop green procurement strategies: Skilled in prioritizing eco-friendly, ethical suppliers and materials in procurement processes.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to embed circular economy principles: Capable of incorporating reuse, recycling, and regeneration strategies into project planning.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to manage sustainability risks: Proficient in identifying and mitigating sustainability risks, such as ESG non-compliance or social disruptions.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to integrate sustainability into quality management: Skilled in incorporating sustainability standards and compliance requirements into the Quality Management Plan.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to engage stakeholders in sustainability planning: Demonstrates the ability to actively involve stakeholders in co-creating sustainability goals and deliverables.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to align project scope with sustainability goals: Proficient in designing project scopes that deliver measurable sustainability outcomes, such as waste minimization or social equity.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to optimize cost and effort for sustainability: Skilled in balancing cost and effort estimates with sustainability objectives to ensure value-for-money outcomes.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to define governance accountability for sustainability: Capable of assigning clear sustainability roles within project governance structures.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Other (please specify):	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Executing Phase: Competency and Description

Competency	Importance (1-5)	Performance (1-5)
Competency to implement sustainability-focused solutions: Demonstrates expertise in applying sustainable methods, technologies, and practices to reduce environmental and social impacts.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to maintain stakeholder engagement for sustainability: Skilled in ensuring active communication with stakeholders to align with sustainability goals.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to align team efforts with sustainability objectives: Capable of guiding and motivating project teams to achieve sustainability KPIs.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to monitor efficient resource utilization: Demonstrates the ability to ensure optimal use of energy, materials, and costs to minimize waste.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to ensure compliance with sustainability standards: Skilled in adhering to ESG regulations and standards during project execution.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to track sustainability-related changes: Proficient in evaluating and addressing change requests for their impact on sustainability outcomes.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to maintain sustainability quality assurance: Capable of reviewing deliverables to ensure compliance with sustainability objectives and standards.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to promote eco-conscious behavior: Skilled in encouraging environmentally friendly and socially responsible practices among team members.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to address sustainability risks during execution: Proficient in monitoring and mitigating sustainability-related risks, such as pollution or resource overuse.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to deliver sustainable outputs: Demonstrates the ability to produce deliverables with long-term environmental and social benefits.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Other (please specify):	○ 1	○ 1

	○ 2 ○ 3 ○ 4 ○ 5	○ 2 ○ 3 ○ 4 ○ 5

Monitoring and Control: Competency and Description

Competency	Importance (1–5)	Performance (1–5)
Competency to track sustainability performance metrics: Demonstrates proficiency in monitoring and reporting on sustainability KPIs, such as energy efficiency, waste reduction, and social equity.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to ensure compliance with sustainability standards: Skilled in validating that deliverables and processes adhere to ESG regulations and frameworks (e.g., GRI, TCFD).	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to monitor sustainability-related risks: Capable of actively tracking and mitigating risks, including pollution, non-compliance, and social impacts.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to conduct iterative improvements: Proficient in identifying gaps through ongoing project reviews and implementing improvements to achieve sustainability goals.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to manage changes for sustainability outcomes: Skilled in analyzing change requests for their impact on sustainability objectives and KPIs.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to verify sustainability quality assurance: Demonstrates the ability to validate that deliverables meet established sustainability criteria and standards.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to document and report sustainability progress: Capable of effectively communicating sustainability performance to stakeholders through status reports.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to sustain resource optimization: Proficient in continuously monitoring and optimizing resources, such as energy, materials, and costs, throughout the project lifecycle.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to maintain transparency in sustainability performance: Skilled in sharing performance metrics, risks, and outcomes transparently with stakeholders.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to align progress with sustainability goals: Demonstrates the ability to measure project progress against	○ 1 ○ 2	○ 1 ○ 2

initial sustainability objectives, ensuring accountability and alignment.	○ 3 ○ 4 ○ 5	○ 3 ○ 4 ○ 5
Other (please specify):	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Closing Phase: Competency and Description

Competency	Importance (1–5)	Performance (1–5)
Competency to capture sustainability lessons learned: Skilled in documenting successes, challenges, and lessons related to sustainability for use in future projects.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to evaluate success in meeting sustainability goals: Proficient in assessing project performance against defined sustainability KPIs and objectives.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to develop sustainability-focused final reports: Demonstrates the ability to include detailed sections on sustainability achievements, challenges, and outcomes in the Project-End Report.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to institutionalize sustainability knowledge: Capable of archiving processes, artifacts, and best practices to ensure they inform future projects.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to recognize and communicate sustainability achievements: Skilled in celebrating and sharing sustainability milestones and impacts with stakeholders.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to ensure long-term sustainability value of deliverables: Demonstrates expertise in designing project outputs to provide ongoing environmental, social, and governance benefits.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to transfer sustainability outcomes to operations: Capable of integrating project sustainability practices and results into organizational processes or systems.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to evaluate stakeholder satisfaction with sustainability: Skilled in gathering and analyzing feedback on the project's sustainability achievements and impacts.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Competency to review and close sustainability risks: Proficient in resolving sustainability risks or transitioning them to operational teams for continued management.	○ 1 ○ 2 ○ 3	○ 1 ○ 2 ○ 3

	○ 4 ○ 5	○ 4 ○ 5
Competency to identify opportunities for future sustainability improvements: Demonstrates the ability to propose enhancements for sustainability in future projects.	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Other (please specify):	○ 1 ○ 2 ○ 3 ○ 4 ○ 5	○ 1 ○ 2 ○ 3 ○ 4 ○ 5

PART 5. FUTURE EXPECTATIONS AND KEY CHALLENGES

Instructions:
This section aims to gather your views on the future needs for Sustainable-focused Project Management and ESG-focused Project Management and education and training.
Your input will help shape recommendations for formal education programs and professional development initiatives.

Future Industry Needs: How do you anticipate the demand for SPM and ESG PM-related skills will change in your industry over the next 5 years?

- ○ Increase significantly
- ○ Increase moderately
- ○ Stay the same
- ○ Decrease

Which of the following trends will most influence the importance of ESG PM and SPM competencies in your industry?(Select up to 3)

- ○ Regulatory changes and compliance requirements
- ○ Adoption of green technologies
- ○ Increased stakeholder pressure for transparency and accountability
- ○ Integration of sustainability into core business strategies
- ○ Globalization and the need for standardized practices
- ○ Increased focus on diversity, equity, and inclusion
- ○ Digital transformation and data-driven decision-making
- ○ Other:

Priorities for Education and Training: What type of educational programs or formats do you think would most effectively address ESG and SPM skill gaps? (Select all that apply)

- ○ Formal university programs (e.g., Bachelor's, Master's degrees)
- ○ Short certification courses (online or in-person)
- ○ Employer-led training and workshops
- ○ Interdisciplinary programs combining sustainability and project management
- ○ Micro-credentialing (focused, stackable learning modules)
- ○ Apprenticeship or work-based learning programs

Barriers to Education and Training: What are the most significant barriers to integrating SPM and ESG PM training into formal education or professional development programs? (Select up to 3)

- ○ Lack of qualified trainers or faculty
- ○ Limited availability of interdisciplinary programs
- ○ High costs of training programs
- ○ Insufficient employer support for ongoing education

- Lack of awareness about ESG and SPM importance
- Difficulty in translating theoretical knowledge into practical skills
- Other:

Certifications and Qualifications: Would you recommend the inclusion of SPM and ESG PM certifications in formal education or training programs to enhance employability?

- Yes, they should be mandatory for all graduates and professionals in project management.
- Yes, but they should be optional as an additional qualification.
- No, formal education programs are sufficient without certifications.

Which certification formats do you think are most valuable?

- Comprehensive, globally recognized certifications (e.g., PRINCE, PMI, PM²)
- Modular certifications focused on specific ESG PM or SPM skills
- Industry-specific certifications tailored to sectors like energy, construction, or IT

Closing questions:

Do you believe HEI programs and training initiatives should integrate cross-sectoral collaboration for ESG PM and SPM?

- Yes, it's essential for addressing complex sustainability challenges.
- No, individual sector-specific training is more effective.

Do you agree that formal education in project management should prioritize ESG and SPM as core components?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Closing Statement

Your responses will be used to:

1. Develop detailed recommendations for educational programs tailored to industry needs.
2. Shape training methodologies and course content to better equip future SPM and ESG PM practitioners.
3. Identify key trends, barriers, and opportunities for integrating sustainability into project management education.

Thank you for your time and valuable input.

9.2 DETAILED STATISTICAL TABLES

9.2.1 Identified Competency Gaps Across Project Phases (Ranking)

Phase	Competency	Mean Importance	Mean Performance	Competency Gap
Initiation Phase	Define sustainability-focused project objectives	3.86	3.28	0.580

Execution Phase	Deliver sustainable outputs	3.81	3.30	0.512
Planning Phase	Optimize cost and effort for sustainability	3.80	3.29	0.508
Planning Phase	Manage sustainability risks	3.70	3.20	0.502
Initiation Phase	Assess and document sustainability impacts	3.70	3.21	0.497
Execution Phase	Monitor efficient resource utilization	3.82	3.32	0.497
Closing Phase	Competency to capture sustainability lessons learned	3.80	3.30	0.497
Closing Phase	Competency to transfer sustainability outcomes to operations	3.74	3.25	0.497
Closing Phase	Competency to identify opportunities for future sustainability improvements	3.75	3.26	0.492
Initiation Phase	Embed preliminary sustainability metrics	3.62	3.13	0.490
Execution Phase	Implement sustainability-focused solutions	3.80	3.31	0.489
Closing Phase	Competency to review and close sustainability risks	3.68	3.19	0.488
Planning Phase	Embed circular economy principles	3.69	3.20	0.487
Closing Phase	Competency to ensure long-term sustainability value of deliverables	3.70	3.21	0.487
Initiation Phase	Identify sustainability constraints and assumptions	3.71	3.23	0.482
Initiation Phase	Evaluate sustainability-driven project needs	3.74	3.26	0.480
Monitoring & Control Phase	Competency to track sustainability performance metrics	3.78	3.29	0.480
Monitoring & Control Phase	Competency to sustain resource optimization	3.74	3.27	0.480
Planning Phase	Integrate sustainability into quality management	3.68	3.20	0.479
Execution Phase	Track sustainability-related changes	3.63	3.16	0.475
Planning Phase	Establish sustainability KPIs	3.74	3.27	0.473
Closing Phase	Competency to institutionalize sustainability knowledge	3.68	3.21	0.471
Monitoring & Control Phase	Competency to monitor sustainability-related risks	3.68	3.21	0.470
Monitoring & Control Phase	Competency to align progress with sustainability goals	3.73	3.26	0.470

Planning Phase	Engage stakeholders in sustainability planning	3.73	3.27	0.460
Initiation Phase	Integrate sustainability into governance structures	3.64	3.18	0.457
Initiation Phase	Align sustainability goals with organizational strategies	3.78	3.32	0.456
Execution Phase	Address sustainability risks during execution	3.70	3.25	0.456
Planning Phase	Develop green procurement strategies	3.65	3.20	0.450
Monitoring & Control Phase	Competency to conduct iterative improvements	3.65	3.19	0.450
Planning Phase	Define resource-efficient project plans	3.78	3.33	0.444
Planning Phase	Align project scope with sustainability goals	3.76	3.31	0.443
Execution Phase	Ensure compliance with sustainability standards	3.70	3.26	0.442
Monitoring & Control Phase	Competency to manage changes for sustainability outcomes	3.64	3.21	0.440
Initiation Phase	Stakeholder analysis and engagement	3.73	3.29	0.439
Planning Phase	Define governance accountability for sustainability	3.63	3.20	0.439
Execution Phase	Maintain sustainability quality assurance	3.68	3.25	0.436
Execution Phase	Promote eco-conscious behavior	3.77	3.34	0.435
Closing Phase	Competency to evaluate success in meeting sustainability goals	3.73	3.39	0.435
Execution Phase	Maintain stakeholder engagement for sustainability	3.72	3.29	0.430
Execution Phase	Align team efforts with sustainability objectives	3.71	3.28	0.430
Monitoring & Control Phase	Competency to verify sustainability quality assurance	3.66	3.23	0.430
Closing Phase	Competency to evaluate stakeholder satisfaction with sustainability	3.68	3.26	0.422
Monitoring & Control Phase	Competency to maintain transparency in sustainability performance	3.74	3.32	0.420
Monitoring & Control Phase	Competency to ensure compliance with sustainability standards	3.61	3.20	0.410
Closing Phase	Competency to develop sustainability-focused final reports	3.68	3.28	0.405

Closing Phase	Competency to recognize and communicate sustainability achievements	3.70	3.32	0.382
Monitoring & Control Phase	Competency to document and report sustainability progress	3.68	3.31	0.370
Initiation Phase	Define sustainability-focused project objectives	3.86	3.28	0.580

9.2.2 Rotated Component Loadings

Competency	Loading	Component	Component Label
SPM_Closing: Capture sustainability lessons learned	0.666	1	Monitoring & Closure
SPM_Closing: Institutionalize sustainability knowledge	0.679	1	Monitoring & Closure
SPM_Closing: Transfer sustainability outcomes to operations	0.683	1	Monitoring & Closure
SPM_Closing: Review and close sustainability risks	0.724	1	Monitoring & Closure
SPM_Closing: Identify future sustainability opportunities	0.727	1	Monitoring & Closure
SPM_Monitoring: Track sustainability metrics	0.565	1	Monitoring & Closure
SPM_Monitoring: Monitor sustainability-related risks	0.586	1	Monitoring & Closure
SPM_Monitoring: Document and report progress	0.592	1	Monitoring & Closure
SPM_Monitoring: Maintain transparency in sustainability performance	0.571	1	Monitoring & Closure
SPM_Monitoring: Align progress with sustainability goals	0.637	1	Monitoring & Closure
SPM_Executing: Implement sustainability solutions	0.567	2	Planning & Execution
SPM_Executing: Monitor resource efficiency	0.608	2	Planning & Execution
SPM_Executing: Ensure compliance with sustainability standards	0.598	2	Planning & Execution
SPM_Executing: Promote eco-conscious behavior	0.531	2	Planning & Execution
SPM_Executing: Track sustainability-related changes	0.500	2	Planning & Execution
SPM_Planning: Manage sustainability risks	0.540	2	Planning & Execution
SPM_Planning: Embed circular economy principles	0.665	2	Planning & Execution

SPM_Planning: Establish sustainability KPIs	0.608	2	Planning & Execution
SPM_Planning: Define governance accountability	0.564	2	Planning & Execution
SPM_Initiation: Define sustainability-focused project objectives	0.705	3	Strategic Initiation
SPM_Initiation: Assess and document sustainability impacts	0.700	3	Strategic Initiation
SPM_Initiation: Integrate sustainability into governance structures	0.668	3	Strategic Initiation
SPM_Initiation: Align sustainability goals with org strategy	0.710	3	Strategic Initiation
SPM_Initiation: Evaluate sustainability-driven needs	0.676	3	Strategic Initiation
SPM_Initiation: Embed preliminary sustainability metrics	0.668	3	Strategic Initiation

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