

## RESEARCH ARTICLE OPEN ACCESS

# Incorporating Sustainability in Defense Projects: Evidence From Norway

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## ABSTRACT

This study examines how sustainability is incorporated into major defense projects in Norway—a sector that significantly contributes to public spending, resource use, and emissions. Stakeholder theory is applied to analyze sustainable project management (SPM) and its relationship to the UN Sustainable Development Goals (SDGs). Semi-structured interviews with 24 key project personnel indicate that the sector is in the early stages of adopting sustainable practices. Although respondents expressed commitment to sustainability, few concrete practices were reported. Findings suggest that SPM can help project managers identify innovative ways to balance operational and environmental goals in the military context, benefiting internal and external stakeholders. This study contributes theoretically by highlighting the inadequate engagement of broader societal stakeholders in early SPM efforts within a rigid institutional setting. It also reveals potential trade-offs around interactions with SDGs, especially between military operational capacity and biosphere-related goals, underscoring the need for strong governance to address issues holistically.

## 1 | Introduction

Over the past decade, Norway has made significant strides in green growth, investing heavily in technological innovation to support its transition to environmental sustainability. The country has set ambitious national targets across various sectors, including the goal of achieving climate neutrality by 2030 (Organization for Economic Co-Operation and Development 2022). At the same time, defense projects now represent a substantial and growing share of public spending, driven by recent changes in international policy (Forsvarsdepartementet/Norwegian Ministry of Defense [MoD] 2024).

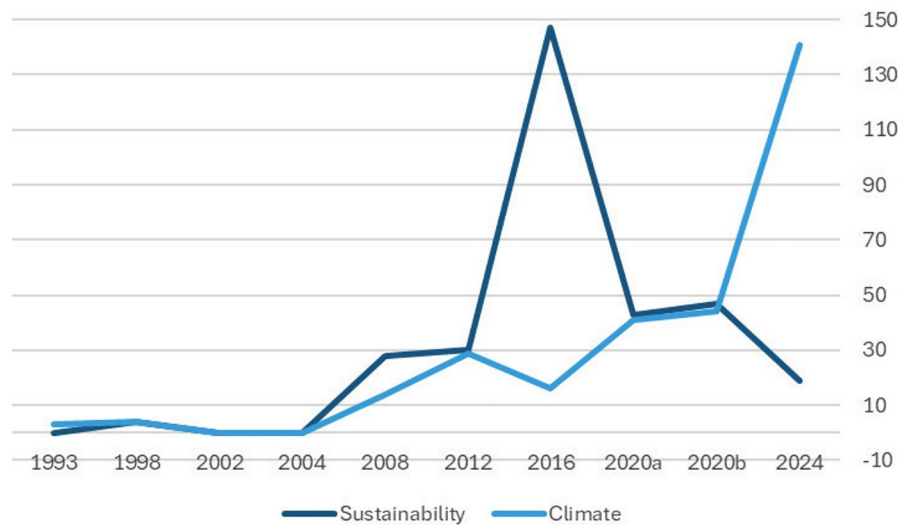
A country's defense capacity increasingly depends on projects that deliver new materiel or infrastructure to support armed

forces operations. In today's context, major public projects are expected not only to provide value for money but also to demonstrate broader societal value—beyond purely financial or quantifiable measures (Carvalho and Rabechini 2017; Martens and Carvalho 2016; Samset and Volden 2014; Volden 2019).

Stakeholder theory has become a common framework in studies of SPM (Sabini and Vuorinen 2024). As Silvius and Schipper (2014a, 2014b, 70) note, “Sustainability is about stakeholder participation.” However, in defense projects, engagement with broader societal stakeholders can be limited. These projects are generally focused on preparedness and deterrence, with operational performance typically assessed only in specific, non-peacetime circumstances (Atlantic Council 2024; Sandler and Hartley 2007).

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**FIGURE 1** | Frequency of “sustainability” and “climate” in Norway’s “Long-Term Defense Plan” (1993–2024). (Source: Norwegian Defense Research Establishment (FFI)).

The empirical literature on sustainable project management (SPM) primarily draws on data from sectors like construction and infrastructure (Haavaldsen et al. 2014; Kivilä et al. 2017; Nerland et al. 2023). The defense sector is often overlooked, although it is a major consumer of fossil fuels and raw materials that result in a significant carbon footprint (Arnfinnsson and Kirkhorn 2021; Sparrevik and Utstøl 2020).

Defense sectors worldwide have been criticized for their environmental impact, particularly due to excessive energy use and greenhouse gas emissions. For instance, the US Department of Defense accounts for as much as 80% of the US government’s emissions, whereas the Canadian and UK Departments of Defense are responsible for approximately 50% of their respective governments’ emissions (Bowcott et al. 2021). In response, several countries have begun incorporating environmental practices and tools into their defense sector structures and processes, aligning with the goals of the European Green Deal (Hueskes et al. 2017; Myhre et al. 2013; Da Tavares Costa et al. 2023).

In the Norwegian context, Figure 1 illustrates how terms such as “sustainability” and “climate” have received increased attention in the Norwegian Armed Forces’ *Long-Term Defense Plan*: the primary strategic document for the defense sector, published every four years.

Although sustainability is increasingly recognized as integral to long-term strategic success (Moschetti et al. 2019; Sparrevik and Utstøl 2020), the defense sector has traditionally prioritized operational capacity over sustainability (Berg et al. 2019; Berteau et al. 2011; Presterud and Øhrn 2015; Presterud et al. 2016). This qualitative study addresses the knowledge gap around integrating sustainability into defense projects, guided by two research questions:

1. How is sustainability incorporated into major public projects within the defense sector?

2. What opportunities and challenges exist in incorporating sustainability into the management of major public projects within the defense sector?

The study also advances understanding of stakeholder theory within SPM by exploring how managers balance interacting and potentially conflicting goals concerning different SDG targets (Nerland et al. 2023; Nilsson et al. 2016).

This article is structured as follows: The next section contains the literature review and theoretical background. Section 3 outlines the methodology, whereas Sections 4 and 5 present the results and discussion, respectively. Section 6 addresses the limitations of the study, and Section 7 provides key conclusions and suggestions for future research.

## 2 | Literature Review and Theoretical Background

### 2.1 | Sustainable Project Management

Although the integration of sustainability principles into project management is still developing, a key acceleration point can be traced to the 2008 keynote address at the World Congress of the International Project Management Association, where the profession was urged to “take responsibility for sustainability” (McKinlay 2008). Although there is no univocal definition of “sustainability” in the project context (Aarseth et al. 2017). The formal definition of “sustainable development” dates back to Brundtland’s (1987) report: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (p. 43). However, this definition cannot be directly used for management purposes.

Sustainability in project management requires the navigation of a complex landscape of different stakeholders and possible conflicts of interest and objectives (DesJardins 2016; Nilsson et al. 2016; Shaukat et al. 2022). This reflects a paradigm shift,

driven by a growing recognition that decisions made today will have far-reaching consequences for future generations, the environment, and society at large (Haavaldsen et al. 2014; Sabini et al. 2019).

Silvius and Schipper (2014a) define SPM using the concept of the triple bottom line, emphasizing the social, environmental, and economic dimensions of impact. Their work also draws attention to the importance of sustainability within project processes and practices—not just in outcomes. However, despite these conceptual developments, research shows that project managers often continue to prioritize traditional success criteria (such as time, budget, and quality) over the triple bottom line (Haavaldsen et al. 2014; Silvius et al. 2017).

The understanding of sustainability in a project context continues to evolve (Armenia et al. 2019; Huemann and Silvius 2017; Silvius 2017). Organizations with a more holistic view of sustainability and corporate governance tend to address sustainability issues more comprehensively (Aras and Crowther 2008; Shaukat et al. 2022). A useful conceptual distinction in this field is between “sustainability by the project” (the sustainable outcomes delivered) and “sustainability of the project” (the sustainability of the processes and methods used) (Gareis et al. 2013; Huemann and Silvius 2017). The latter—sustainability of the project—also aligns with the more holistic view of SPM that incorporates all aspects, from planning to the delivery of benefits to stakeholders. As Silvius and Schipper (2014a, 80) emphasize, “Considering sustainability impacts all processes and practices of project management.”

Several recurring themes emerge in the SPM literature, including project life cycle considerations (Hoxha et al. 2020; Sparrevik and Utstøl 2020; Wang et al. 2014), redefined notions of project success (Carvalho and Rabechini 2017; Ika and Pinto 2022; Martens and Carvalho 2016), technological competency, the use of green products, materials (Hwang and Tan 2012; Wei et al. 2024), and stakeholder engagement (Eslerod and Huemann 2013; Goodman et al. 2017). While SPM is now a well-established and evolving field of research, empirical studies focusing on defense sector projects remain scarce; as Sabini et al. (2019) conclude in their review of SPM literature, such studies are widely distributed across sectors and countries, but are notably absent in the defense sector.

## 2.2 | Stakeholder Theory in Sustainable Project Management

Stakeholder theory, as articulated by Freeman and colleagues (e.g., Freeman 1984; Parmar et al. 2010), posits that the primary goal of businesses is to create value for all stakeholders. The latter are defined as “those groups and individuals who can affect or be affected” by the business (Freeman 1984, 25). Although originally developed for business contexts, stakeholder theory has been widely applied to project management (Bourne 2008; Shaukat et al. 2022). Research highlights stakeholder engagement as a critical element in managing projects sustainably (Eslerod and Huemann 2013; Eslerod and Huemann 2024). This view aligns with managing projects for the interest of stakeholders rather than considering stakeholders as instruments

to serve the aims of the project (management of stakeholders) (Eslerod and Huemann 2013).

Applying stakeholder theory, Shaukat et al. (2022) examined the relationship between SPM and project success. Their findings emphasize that stakeholder engagement, team-building, and delivering value to each stakeholder group are essential to achieving success. Similarly, Weninger et al. (n.d.), in a case study from Brazil, explored how stakeholder management practices align with sustainable development principles. Their results suggest that integrating economic, ecological, and social interests across stakeholder groups can promote shared value and support sustainability in projects. The authors also highlight the importance of extending the project time horizon to include future stakeholders as part of a sustainability-oriented approach.

Shaukat et al. (2022) further stress the importance of addressing stakeholder needs at multiple levels: the individual (e.g., project managers), organizational (e.g., top management, project sponsors, shareholders), and societal (e.g., consumer groups and communities). In line with SPM principles, all of these levels should be taken into consideration to ensure a holistic view (Eslerod and Huemann 2024). However, in the context of defense projects, engagement with broader societal stakeholders is often limited. Defense materiel function primarily as a form of insurance, with a focus on preparedness and deterrence rather than real-time performance, which is typically not tested during peacetime (Atlantic Council 2024; Sandler and Hartley 2007). As a result, meaningful engagement with the global societal stakeholders tends to be constrained.

## 2.3 | Defense Projects and Interactions With the Sustainable Development Goals

Research on defense project management has primarily focused on traditional performance criteria such as schedule, cost, and client benefit (Berg and Nyhus 2024; Berg and Ritschel 2023; Berteau et al. 2011; Callaway et al. 2018; Dubos et al. 2007; Goljan et al. 2021; Katz et al. 2015; Tishler et al. 1996). Historically, the defense sector has often been viewed as exempt from incorporating sustainability into acquisition project management due to unique market conditions and national security constraints (Berg and Prebensen 2023; Sparrevik and Utstøl 2020).

In Norway, however, sustainability has increasingly become part of defense sector policy. The UN's SDGs were operationalized nationally through the Official Report *Meld. St. 20 (2020–2021)*—Norway's action plan for achieving the SDGs by 2030—which provides a framework and guidelines that the Norwegian Defense Sector must take into account (Norwegian Government 2020). Other countries have also incorporated sustainability into their defense sectors, one example being Australia's Environmental Strategy (Australian Government 2016).

The term “sustainability” is also used in the Norwegian Defense Sector's joint climate and environmental strategy,

further reinforcing this shift by outlining concrete commitments across defense agencies in the sector (Forsvaret 2023). These include supporting national emission-reduction goals in line with the 1.5° target, reducing the overall climate footprint and negative environmental impact, and contributing to a more sustainable society. These developments have clear implications for how projects are managed within the Norwegian Defense Sector.

The SDGs offer a roadmap for policymakers and project managers to design initiatives that advance sustainability goals, including through project-level interventions (Ofori 2023; Opoku, Kapogiannis, et al. 2024; Opoku, Saddul, et al. 2024). Several studies have shown how the SDGs can serve as a framework for setting project-specific sustainability targets, monitoring progress, and aligning outcomes with global goals (Hanson 2018; Nerland et al. 2023). However, there is currently no consensus on what constitutes an integrated approach to applying the SDGs, nor on how science can best inform SDG interactions in ways that are actionable for policymakers (Bennich et al. 2020). Moreover, to the authors' knowledge, no studies have examined SPM while considering interactions with SDG targets in the military context.

### 3 | Methods

Due to the exploratory nature of the research questions, this study applied a qualitative approach within an interpretive research paradigm (Denzin and Lincoln 2011; Saunders et al. 2019). An inductive research approach was selected to allow for a deep and exploratory understanding of sustainability in the defense sector (Patton 2002; Saunders et al. 2019). This approach also followed the recommendations of Huemann and Silvius (2017) to capture variations in the concept of sustainability. The overall research design and the steps of the study are illustrated in Figure 2.

#### 3.1 | Research Context

The context of this research is the Norwegian Defense Sector, which operates in several areas (nationally and internationally), and can thus promote sustainability through various channels. The sector manages large areas and building stock and has a direct impact on climate and the environment via buildings, emissions from vehicles, aircraft, and vessels, and materiel procurement (Arnfinnsson and Kirkhorn 2021). The Norwegian MoD is the formal owner of all major projects, which have an estimated budget over 1 billion NOK—hence the focus of this study.

Figure 3 illustrates the governance structure and process for major defense projects in Norway. The MoD is the formal project owner and oversees the process in collaboration with the Defense Staff. Once a project is approved, it is transferred to either the Norwegian Defense Materiel Agency or the Norwegian Defense Estates Agency for implementation. Following delivery, the Armed Forces are responsible for operating and maintaining the materiel or facilities. Throughout all stages, subject matter experts from industry or researchers from the Norwegian Defense Research Establishment may be involved as needed.

#### 3.2 | Data Collection

The data were collected via semi-structured interviews (Patton 2002); this approach enabled the exploration of pre-defined topics while uncovering unexpected insights on sustainability. Most of the interviews were conducted as group interviews with two or three participants. Including multiple participants per interview allowed interviewees to interact with one another, which fostered discussion. This format also made it easier to address difficult topics through the reassurance of safety in numbers (Blumberg et al. 2014).

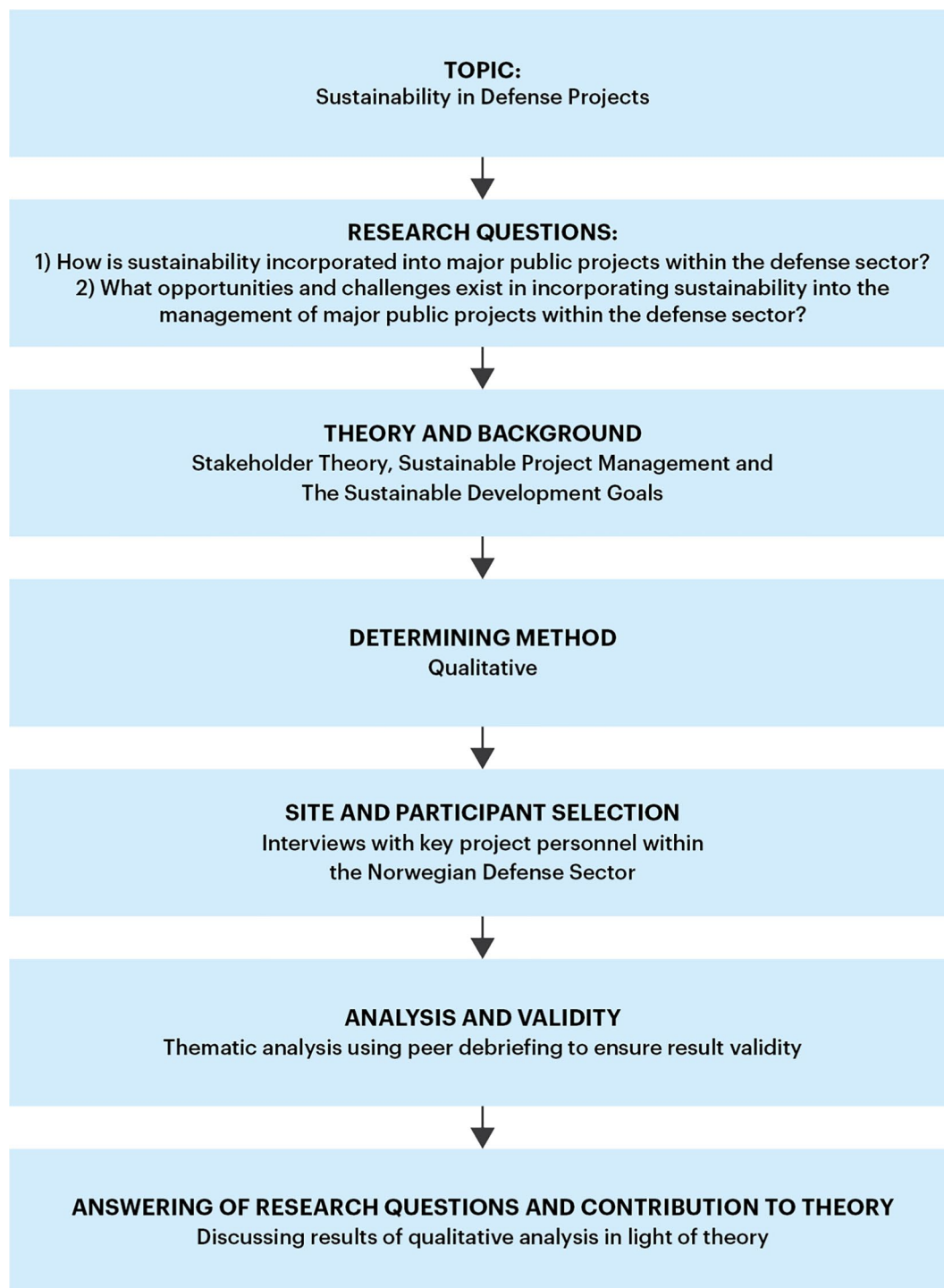
The defense projects in question were typically major acquisitions of materiel or facilities with a budget equivalent to EUR 50 million and above. As the topic of sustainability is not well-established in the defense context, purposive sampling to get “information-rich” interviews (Creswell and Plano Clark 2011; Patton 2002) was needed. The interviewees were (a) project managers for projects where sustainability was a specific performance target and/or (b) project personnel assigned roles such as “sustainability coordinator” or “director of sustainability.” Similarly, interviewees with positions in the defense industry also occupied the roles of “sustainability coordinator” or “director of sustainability.”

To answer the research questions, empirical data from 12 semi-structured interviews with 24 interviewees were gathered. The interviewees represented all domains within the Armed Forces, as well as procurement agencies, the private defense industry, and research advisors (see Table 1). Representing the defense sector in this broad manner helped us reach saturation, where collecting additional data via more interviews would not contribute new insights regarding the research questions (Saunders et al. 2019).

Following the exploratory nature of this study, the first three interviews were conducted as pilot interviews to evaluate and adjust the interview protocol (Malterud 2012). Pilot interviews were used to identify and exclude questions that did not generate useful information; however, only minor adjustments were required. Prior to the interviews, interviewees received written information to support informed consent, and permission to interview Armed Forces personnel was obtained from the Norwegian Defense Staff.

The interviews lasted from 60 to 90 min each and were conducted between May and October 2023, in person (7 interviews) or using Microsoft Teams (5 interviews). The use of Microsoft Teams facilitated the inclusion of a geographically diverse sample and the recruitment of a larger number of interviewees. At least two researchers were present at each interview, and all interviews were recorded and transcribed.

The main themes and questions were developed based on previous defense project research and recent sustainability studies in the Norwegian and international defense contexts (Arnfinnsson and Kirkhorn 2021; Berg and Prebensen 2023). Interviews began with an introduction to ensure a common understanding, emphasizing that the goal was to explore SPM practices, not to test formal sustainability knowledge (e.g., the UN's 17 SDGs or formal guidelines from the MoD). The first theme in the interview guide targeted interviewees' understanding of sustainability and current practices. Examples of questions encompassed



**FIGURE 2** | Research design and steps of the study. Broadly inspired by Creswell (2014).

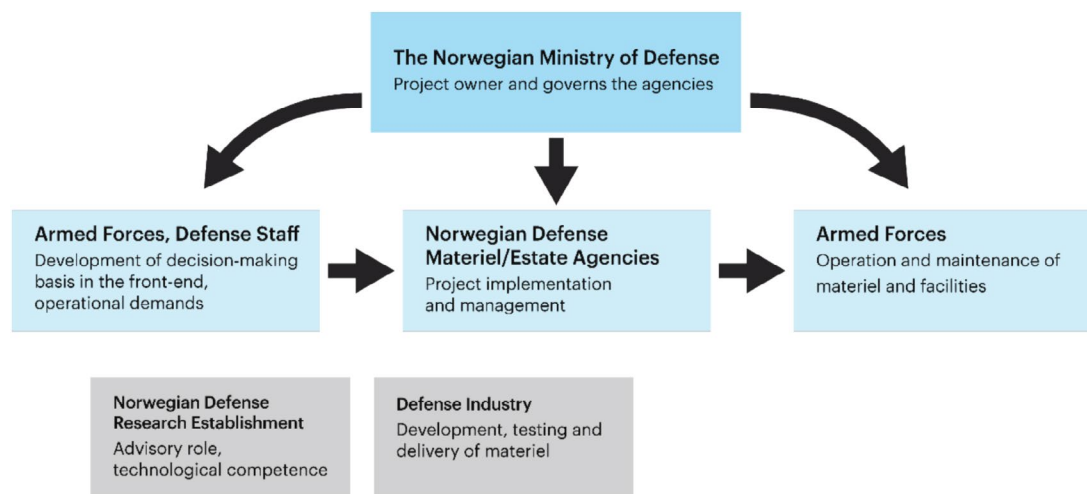
by this theme include “When did sustainability become relevant to your work in projects?” and “What kind of tools (data, documents, public guidelines, or other) do you use when you work with sustainability in projects?”

The second theme concerned the process of procurement and how sustainability plays a role in the choice of solution and/or supplier. Finally, interviewees were asked about their general views on how sustainability demands have altered project management and on the greatest challenges and opportunities in the defense sector. Table 1 gives an overview of the interviewees by

agency/organization, together with information on years of experience in the defense sector.

### 3.3 | Data Analysis

The data were analyzed using thematic analysis, drawing on the methodologies established by Braun and Clarke (2006) and Creswell (2014). The use of thematic analysis was aligned with the aim to explore and understand the interviewees' perceptions and assumptions about sustainability that shape their project



**FIGURE 3** | Responsibilities and processes for major defense projects in Norway. Norwegian Ministry of Defense (2019).

work (Braun and Clarke 2006; Malterud 2012). The thematic analysis was conducted via systematic text condensation, as described in Malterud (2012)—a qualitative analysis strategy that provides researchers with a structured, reflexive, and feasible approach, ensuring methodological rigor. The transcripts of the interviews were coded using NVivo (QSR International 1999–2022, NVivo Release 1.7). The total data material amounted to 83,000 words over 150 pages.

Three co-authors began coding individually, then compared and discussed findings. Detailed coding was done individually and in groups, with all co-authors contributing to discussions about themes and results. Table 2 presents an overview of the analytical steps, including themes and codes derived from the interview data analysis, accompanied by examples of transcription extracts for support.

## 4 | Results

### 4.1 | Balancing Output: Sustainability and the Purpose of Military Defense

Interviewees stated that the main purpose of defense projects must take precedence over all considerations, including sustainability—but this does not mean that other considerations can be ignored. Several interviewees also pointed out that the sector is unique, because no one else in Norway procures the same type of equipment. Such industry requirements therefore do not exist for the defense sector as they do for other large purchasers. One exception mentioned in the interviews is the Norwegian Defense Estates Agency, which is a military player operating in a civilian market. They have “one foot in each camp” and, according to several interviewees, have come further in their work on sustainability.

Compared to other parts of the defense sector, projects appear to face particular challenges in balancing core functions with sustainability considerations. Several interviewees expressed concern about the difficulty of weighing the fundamental purpose of defense against sustainability goals when procuring new materiel. Although sustainability is widely regarded within the

sector as important, it is sometimes viewed as a responsibility that falls outside the defense sector itself—something that “someone else must take care of.” In one interview, the phrase “free pass” was used:

And I would like to add that it is as if the Armed Forces, and especially the Navy, which I know best, have an attitude that no, we have a free pass. We are exempt. Because we have to create defense capability, so we can't engage in sustainability like that. That these are seen as contradictions. And that our sector has long thought that we don't need to worry about these goals and requirements because we are so special.

(Sea domain—Interviewee 5)

Several interviewees also noted that sustainability and defense capability are often perceived as contradictory goals. They highlighted the tension between the aim of increased operational activity and the objective of reducing greenhouse gas emissions. Despite this, many considered the incorporation of sustainability into defense projects to be important, while acknowledging that such efforts may be viewed by some as unusual or even inappropriate within the defense context. Interviewees also gave examples of initiatives implemented within the circular economy:

We've been focusing on this for many years (...) and we have also had a de-militarization department, so that we dismantle and recycle.

(Defense industry—Interviewee 21)

In response to questions about practices to incorporate sustainability in projects, interviewees generally described their efforts as being at a “starting point.” Terms such as “mapping,” “creating interest,” and “understanding the starting point and baseline” were commonly used to characterize current approaches. At the same time, interviewees from the Armed Forces noted that sustainability had been relevant to their project work for some time, but that it had been branded differently. Examples included practices during the operational phase of acquired

**TABLE 1** | Overview of interviewees and their role and number of years' experience in the defense sector.

Interviewee	Role in defense sector	Number of years' experience in defense sector
1	Norwegian Defense Estates Agency	30 years+
2	Armed Forces, Land domain	30 years+
3	Armed Forces, Sea domain	30 years+
4	Armed Forces, Sea domain	10 years
5	Armed Forces, Sea domain	30 years+
6	Ministry of Defense	15–20 years
7	Ministry of Defense	10 years
8	Ministry of Defense	3 years
9	Researcher, advisor	30 years
10	Researcher, advisor	30 years
11	Norwegian defense procurement agency, land domain	30 years+
12	Norwegian defense procurement agency, land domain	7 years
13	Norwegian defense procurement agency, administration	1.5 years
14	Norwegian defense procurement agency, administration	4 years
15	Armed Forces, the Defense Staff	2.5 years
16	Defense industry	1.5 years
17	Defense industry	30 years
18	Defense industry	3 years
19	Armed Forces, air domain	30 years+
20	Armed Forces, air domain	40 years+
21	Defense industry	20 years+
22	Defense industry	20 years+
23	Defense industry	20 years+
24	Defense industry	½ year

defense materiel, such as the careful removal of ammunition from shooting ranges and care for forests and nature during and after military exercises.

Sustainability as a consideration in acquisition projects, however, was perceived to be a more recent topic—one with which they had less experience. Interviewees within the Defense Materiel Procurement Agency expressed a sense of being several years behind current aims and demands for sustainability in their projects, but felt that their competence and knowledge in this area would increase in the coming years. Overall, it emerged that sustainability in defense projects is diverse and largely characterized by individual and random initiatives, rather than a general practice that is known and shared by all stakeholders.

## 4.2 | Distribution of Resources and Funding for Sustainability in Projects

Funding and the costs of implementing sustainability measures in projects emerged as major themes in the interviews. There was overall agreement among the interviewees that sustainability measures were costly and must compete with the project's main deliverables and goals. Specific examples included projects where measures like solar cellar panels and heat recycling were part of the initial acquisition but were often the first to be cut.

Interviewees highlighted the limited opportunities to take financial risks within the project's budget, particularly as experiments with new sustainable inventions were not always successful. One interviewee, citing an example from the defense sector in another country, described this risk as substantial but necessary to find good solutions:

They were running with tens of millions of dollars a year, which they only gave out to projects that were promising. And most of it went to new technology, groundbreaking things that were lying under the surface, just waiting for enough capital to flourish. A lot of it was about the environment and sustainability, including synthetic fuels. Most of it didn't come to anything, which was fine. But then there was 20% that was really good that got a kickstart and that the defense could use.

(Air domain—Interviewee 19)

As the following quote illustrates, if decision makers expected this risk to be taken despite an already limited project budget, such innovative measures would inevitably be deprioritized and most likely not materialize:

Then you will see that if you are a commercial player, there are quite a lot of support schemes,

**TABLE 2** | Overview of analytical steps, with themes, codes, and supporting transcription extracts.

Themes	Example of transcription extract	Code	Occurrence in the number of interviews	Total occurrence
Balancing output: Sustainability and the purpose of military defense	"We are exempt from that. Because we have to create a defense capability, so we can't engage in sustainability like that. That they are seen as opposites." (Ministry of Defense, Interviewee 7)	Purpose of the Armed Forces Operational demands Front-end phase Weighting demands	8 12 11 11	17 62 23 55
Distribution of resources and funding	"My impression is that you are afraid to take risks in the investment, and choose the safe option as you have always done, that's certainly my impression (...) I feel that it's a strong thing in the defense sector, you are afraid of making mistakes." (Materiel Procurement Agency, Interviewee 14)	Balancing risk Willingness and ability to take risk	8 9	13 29
Top-down involvement in projects	"For me, it's zero. I get zero measurement of my ability in this area. I'm measured solely on whether we get projects through. That's what you care about." (Ministry of Defense, Interviewee 6)	Formal guidelines Cooperation Organization	11 7 12	96 11 53
Informal incentives, culture, and values in project work	"(...) chooses the safe option, (...) I feel that it is particularly strong within the defense sector; one is afraid of making mistakes." (Norwegian Defense procurement agency, administration, Interviewee 14)	Definition of terms Culture and attitude Knowledge	11 11 11	55 35 44
Life-cycle perspective in projects	"After the design choice has to be made then you may have 10, 15, 20 years before things are actually produced and delivered (...) you have to have an active relationship with and an understanding of the cost it actually has for the climate and the environment. Then you have to work together, jointly, to find out how to mitigate or manage the cost it has." (Defense industry, Interviewee 18)	Knowledge transfer Life-cycle perspective Circularity	9 12 6	26 49 10

and there are quite a lot of incentives to invest in environmental solutions as well. But none for the state/public sector. Well, then the public sector has to create its own.

(Sea domain—Interviewee 3)

Another topic that emerged in the interviews centered on differences between funding arrangements for the public sector versus the private industry. Where the private industry could apply for various grants to support investment in environmental measures, interviewees noted that comparable grants or funding arrangements were lacking for projects in the public sector.

So, it might have been as [Interviewee 19] says, a pot that could have been given to many for both sustainable and technically good solutions. So, I think you have to do something about the regime and how the regulations really are because it inhibits the sustainability part because it is actually expensive.

(Air domain—Interviewee 20)

Interviewees from the private sector perceived that public buyers often viewed sustainable solutions as something that “happened on its own,” without sufficient involvement, clearly defined requirements, or adequate funding. At the same time, neither public nor private actors claimed to have definitive answers regarding how to incorporate sustainability into projects—underscoring the need for closer collaboration within the constraints of open competition.

### 4.3 | Top-Down Involvement in Projects

The analysis of the interview data revealed an unexpectedly strong demand for clearer top-down involvement in project management. This could take the form of formal guidelines or legislation, clearer definitions of scope and mandate during the front-end phase, or specific directives and frameworks for the defense industry. Interviewees also highlighted the importance of governance, particularly regarding organization and cooperation within projects—both vertically (top-down) and horizontally (among stakeholders across the two procurement agencies, facilities and materiel units, and the user-end within the Armed Forces). When asked what should be prioritized to help ensure that sustainability measures are incorporated into defense projects, many interviewees emphasized the need for a more proactive approach: specifically, stronger governance and financial incentives. This is illustrated in the following quote:

Changed financial funding model and stronger governance. In other words, operative requirements, governance. Again, it's the changed financial funding model for both investment and operation, and the setting of operative requirements. This will be included in laws and regulations quickly, so it's just as

well to be ahead of the game. In other words, to move from a minimalist approach to a proactive position in practice.

(Defense facilities—Interviewee 1)

Interviewees also noted that, since concrete emission requirements are important, they also require clearer top-down involvement. Such requirements are already in place in other sectors, so why should the defense sector be an exception? This would make it easier to measure the impact of different solutions early in the project. Interviewees saw these emission requirements as political and felt that they should therefore be established by the MoD—as the Armed Forces and procurement agencies are unlikely to impose such requirements independently.

Clear top-down involvement was viewed as crucial for prioritizing sustainability alongside other demands such as schedule, budget, and operational performance. Interviewees from both the public sector and the private industry emphasized that costs are prioritized above all. Costs are thus the most important management parameter, regardless of other priorities and cut lists. Industry interviewees in particular highlighted these mixed signals as challenging. Although they might receive instructions indicating that a project should prioritize sustainability or operative performance and adjust their proposals accordingly, they often lose contracts because price is ultimately the decisive factor. This also sends a signal to the industry that there is no point in spending money on innovation, as the sector is ultimately unwilling to pay for it.

### 4.4 | Informal Incentives, Culture, and Values in Project Work

A substantial proportion of the interviewees were trained professional military personnel with extensive careers in the Armed Forces (Grigorov and Spirdonov 2018). They held roles such as “sustainability coordinator” for projects and, although they acknowledged this as an unconventional career path, they expressed genuine interest in and motivation for change. At the same time, they noted that sustainability held particular importance for the younger generation. Discussions frequently touched on “reputation” and “recruitment,” highlighting how vital it was for younger people to perceive the Armed Forces as taking sustainability seriously. Interviewees from the project ownership side also emphasized the importance of a strong sustainability profile for attracting talent. The younger generation of project professionals—both military and civilian—preferred employers that demonstrated societal responsibility and were at the forefront of climate and technological advancement:

There's a new generation coming up, you could say. Who are also very concerned about climate and the environment, and that in a way we don't... In order to be an attractive workplace, it will be important to take a little more consideration, you could say.

(Ministry of Defense—Interviewee 7)

Interviewees identified the defense sector's cultural preference for safe options and its low tolerance for mistakes as another barrier to risk-taking. They linked this tendency to the sector's career progression system, which discourages experimentation and innovation. Interviewees noted that "standing out" or being demanding—such as advocating for change or criticizing existing practices—could negatively impact one's career trajectory. If sustainability measures are seen as innovative, new, and risky, opting for the safer, more conventional choice may become the preferred path.

#### 4.5 | Life-Cycle Perspective in Projects

Although interviewees viewed sustainability measures as costly during the execution phase, they also highlighted the potential long-term benefits from a life-cycle perspective such as reduced operating and maintenance costs. Their reflections often focused on the trade-offs between the investment and operational phases of a project. Several interviewees noted that financial constraints frequently prevent the selection of alternatives with slightly higher upfront costs, even when these promise lower life-cycle expenses. They identified limited budgets and competing priorities as major barriers. Additionally, calculating life-cycle costs (LCCs) in the defense sector was described as particularly challenging due to low standardization and insufficient historical data, making such analyses time-consuming and potentially unreliable.

Interviewees pointed to the difficulty of using "long-term profitability" as an argument for spending extra funds in the investment phase of a project. They mentioned differences in incentives and responsibility between the procurer in the Defense Materiel Agency (responsible for the investment phase) and the Armed Forces operating the materiel or facilities over their lifespan. One of the interviewees noted that it is the project's job to ensure that it is possible to reap benefits in the operational phase such as a lower climate footprint, lower operating costs, or safer use of the equipment:

I think that our role in the project will probably be to make it so that they can reap some benefits in the operational phase, but as of now, there is no plan for what they think about that harvesting in a way (...). There's no point in spending money in a project or a procurement phase to facilitate something that won't be used later, right? That's... not a good use of the money.

(Materiel Procurement Agency—Interviewee 12)

According to interviewees from both the Defense Sector and the defense industry, thinking from a life-cycle perspective is also important in terms of security of supply: for example, in the form of alternative energy sources over a project's life cycle.

## 5 | Discussion

This section discusses the study's findings on SPM and examines them in relation to the SDGs to deepen understanding around how sustainability can be incorporated into defense projects.

An overview of results and interactions with SDG targets can be found in Table 3.

### 5.1 | The Emerging Role of Sustainability in Defense Project Management

To answer the first research question, the study examined how sustainability is incorporated into major public projects within the defense sector. Several interviewees asserted that they were still in the early stages of this integration. The themes that emerged often revolved around general or foundational questions such as: "How can output be balanced with sustainability?" "What is the purpose of the military?" and "How should sustainability measures be financed?" While there was clear recognition of sustainability's importance, the limited number of concrete practices raises the question as to whether defense projects continue to be managed according to the traditional triple constraints of time, cost, and quality/technical deliveries (Berg et al. 2019; Pollack et al. 2018), rather than taking into account the triple bottom line (Elkington 1997).

Research by Silvius et al. (2017) suggests that project managers tend to prioritize these traditional constraints: a pattern echoed in the present study. Although interviewees expressed commitment to sustainability, the lack of concrete practices and common understanding of sustainability in the military context appears to be hindering progress. A similar issue was noted by Barendsen et al. (2021) in the infrastructure sector, where a lack of consistent definitions and clear overviews reduced the ability of project teams to address sustainability effectively—posing a further barrier to change.

As long as sustainability remains loosely defined and is not established as a formal criterion by project owners to evaluate project outcomes, it is unsurprising that the few existing sustainability initiatives in defense projects remain arbitrary and bottom-up—driven largely by individual project managers' motivation (Goedknecht 2012). The continued reliance on traditional project management approaches may also stem from a reported lack of competence among project managers to effectively incorporate sustainability: a theme supported by previous research (Hwang and Tan 2012; Silvius and Schipper 2014b). This skills gap may help explain the limited number of concrete practices identified, as several studies have emphasized that enhancing project management competence is essential for realizing sustainability goals in projects (Marcelino-Sádaba et al. 2015; Silvius and Schipper 2014b; Silvius 2017).

Furthermore, while project managers are already familiar with balancing trade-offs between time, cost, and quality, sustainability introduces a shift in focus rather than a new concept (Sabini et al. 2019). As Martek et al. (2018) note, incorporating sustainability does not remove trade-offs but reframes them around environmental protection, economic growth, and social equality.

### 5.2 | Unlocking Opportunities: The Role of Stakeholders in Sustainable Project Management

In answer to the first research question, incorporating sustainability into major public projects within the defense sector

**TABLE 3** | Overview of SPM in defense projects and SDG interactions.

Themes	Findings—SPM in defense projects	Relevant SDG target (s)	Organizational level for implementation of sustainability policies
Balancing output: sustainability and the purpose of military defense	<p>Lack of industry requirements for sustainability, the Norwegian defense as the sole purchaser</p> <p>Possible contradictions between defense capacity and sustainability</p> <p>Lack of experience and competence in sustainability</p> <p>Few actual practices to incorporate sustainability in projects have been reported; initiatives are random and bottom-up</p>	<p>SDG 16. Peace, justice and strong institutions, 16.1.</p> <p>Possible conflicting targets: SDG 13. Climate action, 13.2.2, SDG 14. Life below water, 14.1, 14.2, and SDG 15. Life on land, 15.2, 15.4, 15.9.</p>	Project owner: Ministry of Defense and the Defense Staff
Distribution of resources and funding for sustainability in projects	<p>Lack of financial incentives to prioritize sustainability measures</p> <p>Understand that innovations come with risk</p> <p>Need for improved cooperation between stakeholders from private industry and the public project for new sustainable solutions</p>	<p>SDG 12. Responsible consumption and production, 12.1, 12.6, 12.7.</p> <p>SDG 9. Industry, innovation and infrastructure, 9.b.</p>	Project owner: Ministry of Defense and the Defense Staff
Top-down involvement and governance	<p>A need for more top-down involvement and stronger governance for sustainability in defense projects</p> <p>Concrete requirements for sustainability, also to facilitate evaluation after the project end</p> <p>Change in funding to create incentives to prioritize sustainability and for private industry to start innovations</p>		
Informal incentives, values, and military culture	<p>Sustainability is important for the reputation and recruitment of the younger generation</p> <p>Interest and motivation to make a change among military project professionals, although sustainability is “new”</p> <p>Positions working with sustainability in projects might not be the best career path (risky)</p>	SDG 8. Decent work and economic growth, 8.3.	Project owner: Ministry of Defense and Defense Staff, but also at the project level in the procurement agencies for materiel and facilities
Life-cycle perspective in projects	<p>Emphasis on the project's investment phase rather than the longer operational phase</p> <p>LCC analyses are challenging and time-consuming with poor access to data</p> <p>Lack of incentives to make the life-cycle perspective a decision parameter</p> <p>The importance of the security of supply and energy sources during the operational phase</p>	<p>SDG 7. Affordable and clean energy. SDG 16. Peace, justice and strong institutions. SDG 12. Responsible consumption and production, 12.4, 12.5, 12.6, 12.c.</p>	Practitioners at the project level

involves considering and managing the diverse needs of stakeholders by adopting a broader societal and environmental perspective (Eskerod and Huemann 2013; Goodman et al. 2017; Shaikat et al. 2022). This approach aligns with the SDGs and

can reveal innovative solutions for project managers. Eskerod and Huemann (2013) highlight the distinction between managing stakeholders *to* meet project needs and managing projects *for* stakeholders. In light of study findings, this distinction is

particularly relevant in the defense sector, where military culture can view sustainability and stakeholder engagement as obstacles to operational capacity—the primary mission of the Armed Forces. This mindset can inadvertently close off opportunities that sustainability introduces.

The distinction made in the literature on SPM between sustainability *by* the project and sustainability *of* the project is relevant to the present study's findings on the few reported practices *during* the project execution (Carvalho and Rabechini 2017; Gareis et al. 2013; Huemann and Silvius 2017). It seems that the defense project managers are primarily still figuring out how processes and practices within the project (sustainability *of* the project) can be sustainable, e.g., through stakeholder engagement. Overall, the results indicate that the perspective of global societal stakeholders (Shaukat et al. 2022) has not yet become an integral part of defense project practices. This points to a gap in SPM, as current practices do not fully ensure that defense projects create value for all (potentially) affected groups and individuals (Eslerod and Huemann 2024; Sabini and Vuorinen 2024), as defined by Freeman (1984).

Nonetheless, the analysis points to some emerging efforts to consider societal stakeholders beyond the defense sector. Interviewees highlighted that exploring alternative fuels could simultaneously enhance sustainability and strengthen operational capacity, benefiting global societal stakeholders. This aligns with sustainable developments reported in earlier studies of the Norwegian defense sector (Arnfinnsson and Kirkhorn 2021; Kirkhorn et al. 2023; Prebensen et al. 2024; Sparrevik et al. 2018).

Interviewees identified several challenges to incorporating stakeholders into SPM practices in defense projects. This finding is supported by previous research suggesting that project managers often lack the time and tools to translate conceptual models into practical instruments (Klaus-Rosińska and Iwko 2021; Silvius and Schipper 2022). On one hand, the findings highlight examples of bottom-up initiatives aimed at incorporating sustainability within what is typically seen as a rigid military structure (Smaliukienė and Survilas 2018). On the other hand, the limited number of such practices, coupled with respondents' emphasis on the need for clearer guidelines and increased top-down involvement, underscores the necessity of more comprehensive efforts to drive sustainable change. As shown in Table 3, most findings indicate the need for new policies initiated at the level of the public project owner (Larsen et al. 2021). Findings also reflect a lack of top-down involvement, few financial incentives, and an overall reluctance to take on the risks associated with sustainability initiatives.

Previous research highlights the central role of governance in integrating sustainability into projects (Aras and Crowther 2008; Hueskes et al. 2017; Unterhitzberger 2024). The present study's findings reinforce the importance of governance in projects to successfully incorporate SPM with a stronger stakeholder orientation. In Norwegian defense projects, the MoD acts as both funder and owner. Traditionally, project owners establish guidelines and priorities within the constraints of the iron triangle (Pollack et al. 2018; Berg et al. 2019). Prioritization is equally essential in SPM (Silvius and Schipper 2014a, 2014b), as

fundamental management questions and prioritization between targets are unlikely to be resolved at the project-level alone (Kemp et al. 2005).

A lack of clear communication regarding sustainability targets emerged in this study, echoing findings from Barendsen et al.'s (2021) Swedish case study, where project team members also perceived weak communication around sustainability. Interviewees across domains—including from the MoD—stressed the need for explicit, top-down guidance on how to incorporate sustainability. When sustainability is not prioritized at the ownership (i.e., top-down) level, the way project performance is measured must be reconsidered to ensure the inclusion of all relevant stakeholders in SPM, in line with findings by Unterhitzberger (2024).

Despite calls for greater attention to sustainability governance in project management research (Kivilä et al. 2017), and recognition that formal and informal governance mechanisms can together support sustainability outcomes (Hueskes et al. 2017), study findings reveal a persistent gap in governance within the sustainability agenda of defense projects.

The study's second research question addressed the opportunities and challenges of integrating sustainability into major public defense projects. Findings indicate that by adopting SPM, project managers can discover innovative approaches to balance operational performance with environmental goals, delivering value to both internal stakeholders and the broader global community (Eslerod 2020).

### 5.3 | Sustainability in Defense Projects and the SDG Framework

The analysis of how the findings interact with the holistic approach of the SDGs deepens understanding of potential trade-offs and conflicting targets in the context of sustainability within defense project management. As Table 3 illustrates, the results highlight the need to balance SDG 16, "Peace, justice, and strong institutions," with other targets. This balancing act requires the attention of both project managers and governance bodies, as it cannot be addressed at the project-level alone (Kemp et al. 2005).

Beyond SDG 16, most of the study's findings align with the economic and environmental SDG categories. The absence of themes related to social SDGs—such as working conditions in the defense industry—may reflect sector-specific characteristics, including classified information and restricted data flows. The majority of findings relate to economic goals, such as SDGs 8, 9, and 12, whereas SDG 16 stands out as the primary societal target. Although the SDGs are interdependent, research shows that their connections are often undefined and complex trade-offs may be overlooked (Nilsson et al. 2016). Our findings, along with the SDG interactions shown in Table 3, illustrate this dilemma that project managers may face.

In the defense context, policymakers must carefully balance competing interests and priorities during implementation (Voldhaug et al. 2024). Addressing targets in isolation risks

unintended consequences—for example, negative impacts on biosphere-related goals (SDGs 13, 14, 15) from an exclusive focus on increased operational capacity (SDG 16).

Ultimately, the findings reveal possible trade-offs and conflicting targets with regard to incorporating sustainability in defense projects. These include conflicts between biosphere and environmental protection (SDGs 13, 14, 15) and operational training that occurs in natural settings with materiel emissions (SDG 16). Similarly, there is a trade-off between sustainable consumption (SDG 12) and the need for rapid, affordable access to equipment during crises (SDG 16). For SPM, it is crucial to recognize and address these potentially conflicting and interacting targets. Such challenges require intervention at the governance level and integration into regular project control routines (Kivilä et al. 2017), as they are unlikely to be resolved at the project level.

## 6 | Limitations

The study's findings provide valuable insights into the practices and challenges of governance for SPM in major public projects. However, due to certain limitations, caution is advised when considering the generalizability of findings beyond the studied context. The main limitation relates to sample representativeness: the findings may not be generalizable beyond the specific context of the Norwegian Defense Sector. Additionally, confidentiality concerns may have prevented interviewees from disclosing comprehensive details about project management practices, potentially affecting the study's depth and accuracy. A further limitation concerns the interviewees' subjectivity and bias. Interviewees were selected based on their positions and experience working specifically with sustainability in projects; as a result, the findings may not be representative of general practices.

## 7 | Conclusions and Future Research

This study explores the integration of sustainability into major public projects within the Norwegian Defense Sector, using stakeholder theory as its framework. It enhances the understanding of SPM by examining how managers balance interactions and potential conflicts within the framework of the UN's SDGs.

### 7.1 | Conclusions

In response to the study's first research question, "How is sustainability incorporated into major public projects within the defense sector?" the analysis revealed that sustainability integration is still in its early stages. Interviewees demonstrated a basic understanding of sustainability but often struggled to balance it against traditional military objectives and financing sustainability measures. Despite recognizing its importance, concrete practices for integrating sustainability remain limited, indicating that defense projects are still largely managed by traditional constraints of time, cost, and quality, rather than the triple bottom line of social, environmental, and economic impacts (Elkington 1997). The lack of defined sustainability criteria from project owners and insufficient competence among project managers are

significant barriers; this finding aligns with previous research showing that project management competencies must evolve to realize sustainability in projects (Larsson and Larsson 2020; Opoku, Kapogiannis, et al. 2024; Silvius and Schipper 2014b).

In response to the second research question—"What are the opportunities and challenges of integrating sustainability into the management of major public projects within the defense sector?"—the findings indicate that incorporating SPM presents opportunities to address diverse stakeholder needs. This can be achieved by embracing a broader societal and environmental perspective, aligning with the SDGs, and fostering innovative solutions (Bennich et al. 2020; Delli Paoli and Addeo 2019; UN 2022). However, military culture often views sustainability and stakeholder engagement as obstacles to operational capacity, potentially limiting these opportunities.

Furthermore, study findings emphasize the need for governance bodies to prioritize sustainability, as project-level solutions alone are insufficient. Clear communication and formal guidelines are necessary to shift how project performance is measured and to incorporate sustainability into standard project control routines. Currently, the defense sector places greater emphasis on internal stakeholders than on broader societal interests. This limited focus—combined with the absence of governance structures, explicit guidelines, and sustainability requirements—makes it difficult to fully involve all stakeholders. The study contributes to theoretical discourse by highlighting the inadequate engagement of societal and global stakeholders in the initial adoption of SPM (Goodman et al. 2017; Huemann et al. 2013; Sabini and Vuorinen 2024), especially within rigid institutional contexts such as the military (Smaliukienė and Survilas 2018), where traditional project management practices still dominate.

Viewing the findings in light of interactions with the SDGs reveals potential trade-offs and conflicting targets, particularly between military operational capacity (SDG 16) and biosphere-related goals (SDGs 13, 14, and 15). Addressing these conflicts requires a holistic view and prioritization from stronger governance. The several interactions with SDG 16, specifically, underscore the need for strong governance to address potential conflicts between different sustainability objectives that are not likely to be solved at the project level.

### 7.2 | Further Research

The study's findings point to several possible topics for further research. As the defense sector is in the early stages of incorporating sustainability into defense projects, a greater understanding of the different types of effective governance is required. Sustainability expertise, competence, and the project personnel's definition and understanding of sustainability are other relevant themes. Research on sustainability in defense projects could benefit from considering variables like cultural orientation, as cultural dimensions may influence the integration of SPM. Additionally, examining factors such as bureaucracy, organizational formalization, staff training and motivation, organizational culture, task typology, and the specialization and roles of interviewees could provide deeper insights.

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## Conflicts of Interest

The authors declare no conflicts of interest.

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