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Stakeholders' Influence in Shaping Sustainability Practices for Nordic Space SMEs

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Abstract

The sustainability of Earth and space is deeply interconnected, presenting both opportunities and pressing challenges in addressing global concerns. This study examines how small and medium-sized enterprises (SMEs) in the Nordic space sector are influenced by stakeholders to integrate sustainability into their operations and offerings. Grounded in stakeholder theory, the research focuses on SMEs operating across diverse market segments, with particular attention to the dual role of Earth Observation (EO) satellite constellations in supporting the United Nations' Sustainable Development Goals (SDGs) and safeguarding the long-term viability of Low Earth Orbit (LEO). Drawing on 10 interviews across seven case firms, the study contributes to stakeholder theory by showing how external pressures—such as regulatory constraints, societal expectations, and international collaboration—shape strategic decision-making and technological innovation in the emerging space economy. The findings also offer actionable insights for practitioners in the New Space ecosystem. By applying the end-user-oriented framework proposed here, firms can more effectively conceptualize and implement next-generation space initiatives that align with the SDGs while responding to the complexities of global market dynamics.

Keywords: space sustainability; space debris; stakeholder theory

JEL: O31, M5, P4

1. Introduction

In recent years, space has become an increasingly vital domain for addressing some of the most pressing global challenges, including climate change, resource management, and disaster response (Valente et al., 2025; Rolla et al., 2025). This growing reliance on satellite data and space-based technologies has transformed the space economy into a strategic sector, not only for scientific advancement, but also for achieving the United Nations' 2030 Agenda and its Sustainable Development Goals (SDGs). Technology from space supports the SDGs by helping government agencies and other stakeholders monitor and measure progress based on SDG indicators (Wood, 2018). The emergence of the New Space economy (Davidian, 2021) characterized by private-sector participation, technological innovation, and international collaboration has redefined the dynamics of space activity and investment.

A key feature of this New Space economy is its multi-stakeholder nature, in which public institutions, private firms, civil society, and international organizations all play influential roles (Paravano et al., 2023). These stakeholders not only consume space-based data but also shape the direction of innovation and policy (Antoni et al., 2024). Earth Observation (EO) technologies are contributing and hold significant potential to advance SDGs further by supporting environmental monitoring, sustainable land use, disaster response, and urban planning (Kavvada et al., 2020). However, despite these technologies' promise, the sec-

tor also faces growing challenges, including the proliferation of space debris and unsustainable orbital practices that threaten the long-term viability of Low Earth Orbit (LEO) (Wilson and Vasile, 2023).

Extant studies largely have focused on space development's technical and economic aspects (Punnala et al., 2024; Punnala et al., 2025), with limited attention paid to how stakeholders influence (Antoni et al., 2024; Rausser et al., 2023) space firms' sustainability practices, particularly small and medium-sized enterprises (SMEs) (Wilson and Vasile, 2023). While some extant research has acknowledged space technologies' role in supporting SDGs (Wood, 2018), empirical insight remains lacking as to how space SMEs respond to diverse stakeholder demands and how these relationships influence business models, product development, and sustainability-oriented decisions (Nardon, 2017). Moreover, only a few extant studies (see e.g., Gonzalez, 2023) have examined how value is cocreated between space firms and stakeholders, particularly in regional contexts, particularly in the Nordic countries, where space innovation is accelerating but remains underrepresented in the literature.

This study addresses these literature gaps by examining how stakeholders' influence leads to space SMEs integrating sustainability into their business models, particularly in the context of the LEO segment in EO. By focusing on Nordic space firms, this study examines the dual pressures and opportunities that SMEs face in aligning with



both stakeholder expectations and sustainability imperatives. The study also highlights cross-sector partnerships' growing importance and the need to address space debris through practices such as Post-Mission Disposal (PMD) to ensure space activities' longevity. To guide this inquiry, we pose the following research question: How do stakeholders influence space SMEs' sustainability practices?

To answer this question, we adopted a qualitative case study approach, drawing on 10 interviews across seven Nordic space SMEs. This study aims to contribute to stakeholder theory (Freeman, 1984; Donaldson and Preston, 1995), which provides a conceptual framework for examining how firms respond to stakeholder needs while navigating broader sustainability challenges. This research offers valuable insights into SMEs' evolving role in the space sector and their potential to contribute to a more sustainable and inclusive space economy.

2. Literature Review

2.1 *The New Space Economy and the Sustainable Development Goals*

The New Space era, defined by continuous technological advancements and the rise of new commercial players, represents a fundamental shift from governments and other large organizations' historical dominance in the space sector (Hall and Page, 2014). In recent years, venture capital investment in the space sector has seen significant growth, with private funding worldwide reaching \$9 billion in 2022 (ESA, 2023). This emerging paradigm expands access to space and its applications to smaller firms, greatly influencing the potential for space-focused firms (Davidian, 2021). The New Space era has made space applications more accessible to end users, underpinning technologies that support everyday services. For example, widely used platforms—such as Uber, Foodora, and Wolt, which rely heavily on Global Navigation Satellite Systems (GNSS) would be unable to function without critical support from satellite data (Paravano et al., 2023). As such, the New Space environment not only accelerates firms' growth within the sector but also illustrates the broader relevance of growth in digital and space-driven ecosystems.

The United Nations (UN), through its SDGs, as articulated in the Paris Agreement on climate change has emphasized the potential for global engagement in addressing environmental sustainability (Assembly, 2015). According to the Organization for Economic Cooperation and Development (OECD, 2019), the SDGs represent a holistic framework that balances economic, environmental, and social dimensions. These goals are interconnected across various industries, making collaboration between various stakeholders essential. A range of SDGs can be realized through deployment of LEO, generally is defined as an orbit with an altitude of 2000 km or less (Virgili-Llop et al., 2014) satellite technologies, which are adept at delivering geospatial information for environmental monitoring and ecosystem man-

agement (Clegg et al., 2024). Moreover, the advent of LEO satellites has enabled not only data collection, but also extension of data accessibility beyond traditional boundaries (Rejeb et al., 2022; George and Schillebeeckx, 2021). A key aspect of this transformation is the convergence of five technological spheres in the New Space economy: access to space habitats; satellite data; remote sensing technology; LEO; and space stations (Weinzierl et al., 2022).

New Space technologies now enable humanity to observe and predict climate change and other significant global phenomena. For example, the International Space Station (ISS) employs automated EO platforms to monitor weather patterns, environmental changes, and natural disasters (Uhran, 2010), i.e., data from New Space technologies contributes substantially to the SDGs, offering critical insights into demographic, statistical, and ecological indicators needed to track progress toward these objectives (Kojima et al., 2018). However, increasing reliance on space-based assets to support global development also emphasizes the urgent need to address challenges threatening the sustainability of space itself, most notably the growing issue of space debris (Valente et al., 2025).

2.2 *Space Sustainability and Space Debris*

In the space sustainability context, space debris creates a significant threat to the safe operation of small satellites and various spacecraft, as well as astronauts' safety (Mejía-Kaiser, 2010; Punnala et al., 2024). The continual growth of space debris in Earth's orbit increases the risk of collisions, even in the absence of new launches, a phenomenon known as the "Kessler syndrome" (Kessler and Cour-Palais, 1978; Liou and Johnson, 2009), which could render LEO unusable. Unlike Earth's environment, the space environment does not allow for natural cleanup of debris. Instead, debris must be dragged down by the Earth's atmosphere, requiring additional altitude to facilitate this process (Popova and Schaus, 2018). Although the exact amount of space debris is difficult to measure, approximately 5000 tons currently orbit the Earth (Liou and Johnson, 2009). With the introduction of the New Space economy and the emergence of commercial organizations such as SpaceX and OneWeb, LEO satellite launches are increasing. For example, SpaceX plans to launch 4000 satellites at various altitudes, while OneWeb intends to deploy 600 (Olivieri and Francesconi, 2020). All of these activities generate a considerable amount of space debris.

In the space age's early stages, concerns about space debris and space sustainability largely were overshadowed by other pressing challenges. However, as space activities have expanded, these issues have gained increasing attention. The concept of space sustainability began to take shape with the development of hardware-intensive space projects (Newman and Williamson, 2018). The emergence of long-lived space debris in the 1960s prompted growing awareness of the need for long-term sustainable practices in

space, as human-generated debris increasingly obstructed the potential benefits of space exploration and utilization for humanity (López, 2016). In response to the escalating problem of space debris, the UN's Committee on the Peaceful Uses of Outer Space (UNCOPUOS) developed a set of guidelines in 2007 aimed at mitigating the continued proliferation of space debris. However, despite substantial evidence and discussions regarding the harmful effects of space debris, stakeholders and policymakers have not yet prioritized developing policies to mitigate debris populations (Newman and Williamson, 2018).

To decrease space debris, PMD was developed to handle debris generated at the end of satellites and spacecrafts' operational lives (Liou and Johnson, 2009). PMD is a significant strategy in the supervision of space debris, aiming to mitigate risks by ensuring that expired satellites and rocket stages are removed responsibly from orbit at the end of their operational lives. Generally, PMD involves either moving the spacecraft to a designated graveyard orbit (for objects in geostationary orbits) or initiating a controlled re-entry to burn up in Earth's atmosphere, minimizing the chance of collisions and debris creation. Current standards include the 25-year rule, which recommends that objects in LEO should be designed to decay naturally within 25 years post-mission if they are not actively removed.

PMD policies impact various stakeholders, including space agencies, satellite operators, and regulatory bodies—by fostering collaboration on best practices and investing in sustainable satellite designs and disposal methods. For example, organizations such as the European Space Agency (ESA) and National Aeronautics and Space Administration (NASA) monitor PMD instruments, incentivizing operators to adopt these practices for long-term orbital stability (Stubbe, 2017). This arrangement among stakeholders supports the predominant goal of preserving space as a viable resource, emphasizing that responsible end-of-life management is a shared responsibility for sustaining the near-Earth space environment for future generations. PMD needs to be monitored carefully, as the rate of successful PMD is crucial for space sustainability and related stakeholders. Therefore, it can be said that a correlation exists between satellite constellations and space debris in space environments (Ren et al., 2021). The Inter-Agency Space Debris Coordination Committee (IADC) outlined mitigation strategies for space debris in 2000 to reduce debris volume in the long run (Yakovlev, 2005). While PMD policies highlight space sustainability's technical and collaborative aspects (Stubbe, 2017), understanding the broader network of actors involved is equally essential. Stakeholder theory (Freeman et al., 2010) provides a valuable lens through which to examine how diverse and interdependent interests influence and are influenced by any evolving industry's dynamics.

2.3 Stakeholder Theory and the Space Economy

As Sady (2023) argued, the stakeholder concept assumes that every firm, based on its specific industry or go-to-market strategy, has its own distinct group of stakeholders (Jones and Wicks, 1999). Organizations function as part of an intricate stakeholder network, managing relationships with specific stakeholder groups (Jamali, 2008). Stakeholder theory emphasizes the interests and benefits of all stakeholders within an organization (Freeman et al., 2010). A stakeholder, as Freeman (1984) defined it, is any person, organization, or institution connected to an organization that either influences its actions or goals or is impacted by it in some way. A single firm often has a diverse group of stakeholders, each with distinct interests and needs—all of which must be acknowledged and addressed in a balanced manner to ensure equitable treatment.

The New Space economy's development and concerns about sustainability allow many new stakeholders to engage in this industry (Paravano et al., 2024). The global space community includes a diverse range of stakeholders, such as government agencies, scientific institutions, private companies, commercial enterprises, and military organizations (Ehrenfreund et al., 2013). These stakeholders hold significant influence over individual firms' strategic planning and implementation processes, including prominent organizations such as NASA (Crawford, 2011; Cameron et al., 2011). All stakeholders related to the space economy must be aware of the benefits they are receiving. No single stakeholder stands to gain sufficiently to justify the high costs of space exploration alone, so the broader benefits to be distributed among stakeholders will be based on their individual priorities (Rebentisch et al., 2005).

Therefore, stakeholder theory is particularly relevant in the space industry, in which effective stakeholder relationship management enables firms to flourish within capitalist systems while also serving as a moral pursuit, as it involves addressing ethical considerations and choices that both impact and are also influenced by diverse groups of stakeholders and individuals. According to stakeholder theory, these stakeholders can be categorized as either primary or secondary (see Fig. 1). Primary stakeholders are those directly involved with the firm on a formal or contractual basis, while secondary stakeholders are those with which the firm does not have a formal or direct relationship (Clarkson, 1995).

Space firms face growing expectations from stakeholders to prioritize environmental responsibility, particularly concerning management of space debris and use of space technology (UNOOSA, 2021; Citaristi, 2022) worldwide. As the presence of orbital debris increases due to intensified satellite activity, firms in the space sector are urged to adopt sustainable practices, such as PMD, to mitigate debris accumulation and prevent potential collisions due to stakeholders' influence (Lewis and Yazadzhayan, 2024). This alignment with environmental responsibility

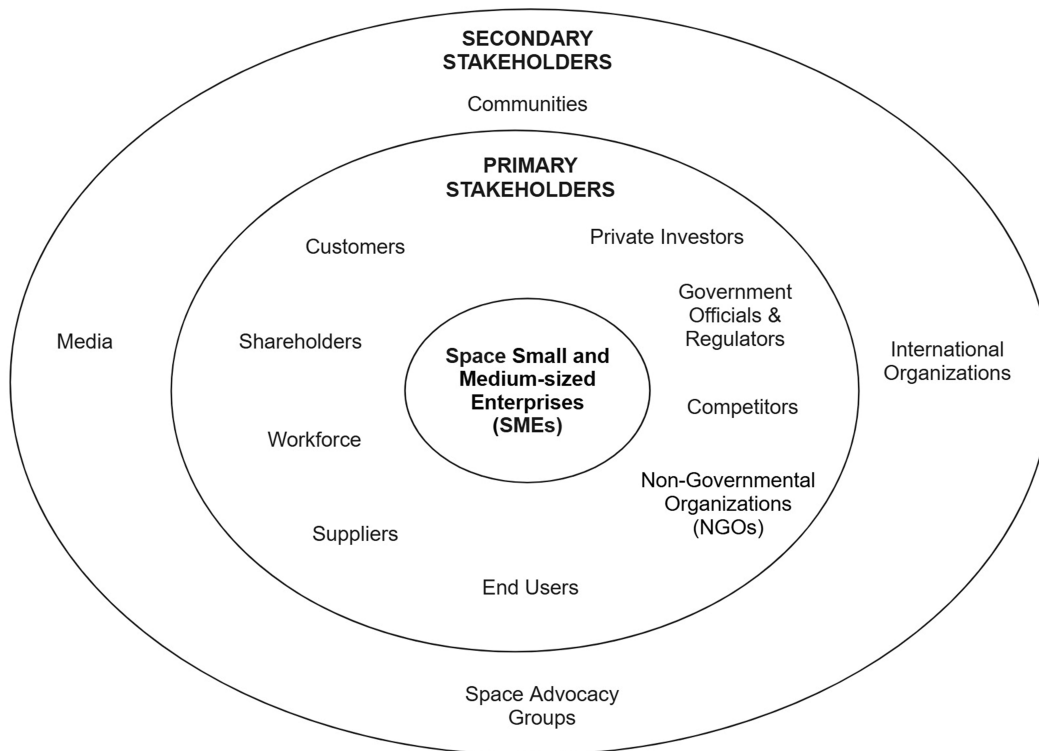


Fig. 1. Primary and secondary stakeholders of space firms.

is not only essential for orbits’ long-term usability, but also increasingly is viewed as part of space firms’ social obligations to society and the environment (Weeden and Chow, 2012; Liou and Johnson, 2009). Thus, the extant literature on sustainability within the space industry reveals several significant literature gaps that require further investigation. Most extant studies (see e.g., Tangem, 2024) have focused on environmental aspects of Earth and space, and how space applications can support sustainability endeavors. Few existing studies have examined stakeholders’ impact and influence on space SMEs, as well as their sustainability practices.

Satellite data aid in disaster management by providing real-time information on natural disasters, which is crucial for SDG 11 (Sustainable Cities and Communities). This capability allows stakeholders including governments, humanitarian organizations, and environmental groups to optimize response strategies and allocate resources more effectively (Song et al., 2024). By leveraging satellite technology, stakeholders can enhance their operational resilience and improve community safety. Furthermore, integration of satellite data with stakeholder initiatives fosters collaboration among various sectors, such as agriculture, urban planning, and environmental protection. This multi-sectoral approach not only promotes transparency and accountability, but also drives investment in sustainable practices, aligning economic growth with environmental stewardship (Salk and Salk, 2018).

Balancing diverse stakeholders’ interests is critical for firms, particularly in complex sectors such as the space industry, in which stakeholders may have conflicting priorities. The literature highlights how managing stakeholder interests requires understanding the unique power, legitimacy, and urgency of each group’s claims (Mitchell et al., 1997). For example, in the space industry, government agencies often prioritize regulatory compliance and national security, which may lead to restrictions on technology sharing or launch activities (Gholz and Sapolsky, 1999). However, financial returns are what primarily motivate private investors, who may press for accelerated project timeliness or cost efficiencies (Freeman, 1984). Environmental groups, whose influence has grown with increased awareness of sustainability, emphasize reducing space debris and mitigating environmental impacts (Williamson, 2006). Therefore, space firms’ challenge is to navigate these demands in a balanced manner that avoids disproportionately prioritizing one group’s interests over others, which is essential for building long-term resilience and legitimacy (Freeman et al., 2007).

This balance also poses ethical implications. Firms that neglect or marginalize certain stakeholder groups may face reputational risks and diminished trust, which can undermine their long-term viability. Conversely, those that engage transparently with all stakeholders and consider their diverse perspectives are more likely to achieve not only economic success, but also social legitimacy (Mitchell

et al., 1997). Therefore, fostering an inclusive and equitable approach to stakeholder management is crucial for a firm's overall sustainability and ethical responsibility.

2.4 Literature Review Summary

The existing literature on the New Space economy highlights the transformative role of private actors, technological innovation, and increased accessibility to space applications. However, a significant literature gap persists regarding diverse stakeholders' influence on SMEs' sustainability practices. While numerous studies (Clegg et al., 2024; Uribe et al., 2018) have addressed satellite data's environmental benefits and space technologies' role in advancing the SDG's, limited attention has been paid to how stakeholder dynamics shape sustainability behavior, particularly within the emerging New Space ecosystem.

This study seeks to bridge this literature gap by investigating stakeholder influence's role in shaping space SMEs' sustainability strategies. As commercialization of space accelerates, understanding the interplay between stakeholder expectations, sustainability commitments, and organizational practices becomes crucial for ensuring business viability and protecting the space environment. By applying stakeholder theory within the New Space economy's context, this research helps develop more inclusive, responsible, and resilient approaches to sustainability in one of the world's most rapidly evolving sectors.

3. Methodology

This study employed qualitative research methods focused on collecting, analysing, and interpreting non-numerical data. That is, aim of the qualitative approach is to develop an in-depth understanding of the phenomenon rather than to measure it (Creswell, 2014). By applying this method, we explore how stakeholders' needs impact space SMEs' sustainability practices. Space SMEs operate in a complex ecosystem with many other non-space firms (Davidian, 2021); therefore, to understand the complex social phenomena in a dynamic environment (Su, 2018), the qualitative methodological approach was deemed appropriate, as it offers a comprehensive and detailed account within real-world contexts, in which the researcher has minimal or no control over the observed environment.

A qualitative multiple-case study design, as recommended by Yin (2009), was chosen, as it not only enhances the findings' robustness and credibility but also facilitates a deeper understanding and comprehensive explanation of the phenomenon under investigation. This methodological choice enhances data reliability by mitigating potential biases, as inclusion of multiple cases affords a more comprehensive perspective (Baxter and Jack, 2008) and facilitates identification of deeper connections within the data (Yin, 2017). Fig. 2 illustrates the phases of our research methodology (Latino et al., 2024).

3.1 The Context of the Empirical Study

For this study, we collected data from the Nordic countries, which consistently rank among the global leaders in implementing the SDGs (Sachs et al., 2023). The Nordic countries often share several similarities that contribute to common geopolitical and cultural characteristics, and they have historically been recognized as global leaders in corporate sustainability performance. Since the launch of the Global 100 Most Sustainable Corporations, between 2005 and 2024, Nordic firms secured one of the top three positions in 32% of all annual rankings, whereas compared to other regions such as North America, firms from this region achieved this distinction only 18% of the time (Corporate Knights, 2024; Strand, 2024). When we adjust for population and economic scale, Nordic firms have been approximately 20 times more likely to appear in the top three compared to firms from other regions, even though the Nordic countries are relatively small in terms of Gross Domestic Product (GDP) and population size (Corporate Knights, 2024; Strand, 2024). This highlights the deep-rooted institutional, cultural, and strategic emphasis on sustainability within the Nordic corporate model.

We purposefully selected seven space SMEs operating within the Nordic countries with less than 250 employees each and less than €50 million or €43 million euros on their balance sheets (Lagüera González et al., 2024). These space SMEs are contributing actively to the achievement of the SDGs by engaging with a diverse range of stakeholders, including customers and government entities. An overview of the case firms is provided in Table 1. All selected firms are currently in a growth phase, scaling their operations and expanding their environmental and societal impact. Importantly, the sample includes firms from diverse market segments within the space industry to strengthen the empirical foundation of the study. Interviewing firms across upstream, downstream, and service-based segments allowed for the triangulation of insights and a more nuanced view of industry wide sustainability practices and stakeholder influence insights. In addition to meeting general criteria such as SDG alignment and stakeholder engagement, the selected space SMEs are market leaders within the Nordic space sector, having demonstrated consistently strong performance in innovation, market positioning, and sustainable operations. These firms were therefore prioritized over others in the region due to their proven leadership and sectoral relevance. For example, Firm C integrates both upstream (launch systems) and downstream (data services) capabilities, offering a holistic view of sustainability integration across the space value chain. Firm B, by contrast, showcases user-driven innovation through its hyperspectral monitoring solutions, making it a compelling case of service-oriented environmental intelligence. Including firms from Finland, Sweden, and Norway not only ensures geographic and regulatory diversity but also reflects variations in national innovation ecosystems and policy environ-

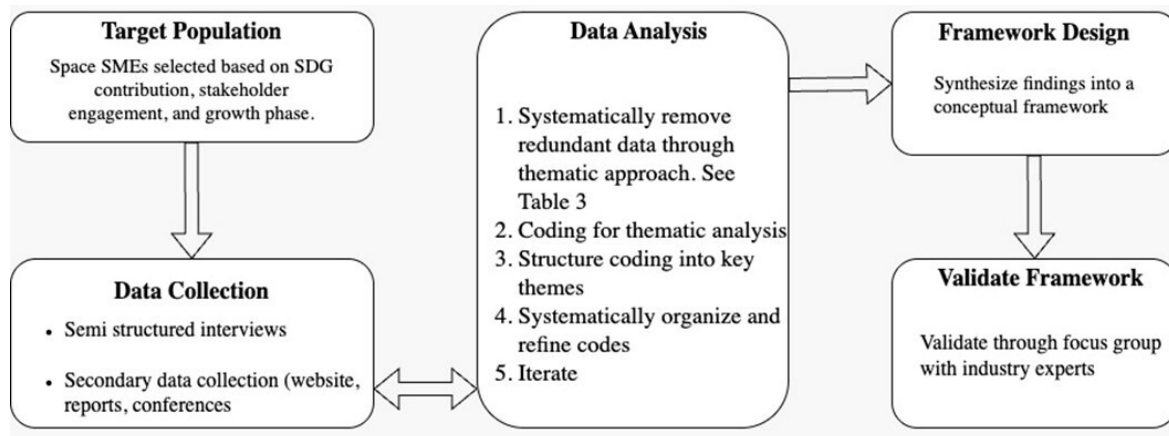


Fig. 2. Research methodology phases. SMEs, small and medium-sized enterprises; SDGs, Sustainable Development Goals.

ments. Collectively, this selection strategy enhances the analytical depth, explanatory range, and transferability of the study's findings within the dynamic New Space economy.

Table 1. Overview of the companies.

Firm	Establishment year	Activities	Headquarters
Firm A	2020	Satellite Communication	Finland
Firm B	2017	Software as a Service	Finland
Firm C	2012	Building Satellites and Rockets	Finland
Firm D	2014	Earth Observation Data	Finland
Firm E	2002	Ground Stations	Norway
Firm F	2019	Satellite Manufacturing	Finland
Firm G	2011	Space Services	Sweden

3.2 Data Collection

Interviews were conducted with individuals holding key leadership and operational roles—including Chief Executive Officers (CEOs), Chief Operational Officers (COOs), regional directors, co-founders, presidents, and business development specialists—from the selected case firms (see Table 2). Although some scholars raised concerns regarding the validity of using a limited number of interviews per firm (Poulis K and Poulis E, 2013), in this instance, the selected interviewees possessed substantial strategic and operational insights, thereby justifying this approach. The interviews covered the following aspects: origin of the firm; what kind of products or services they provide; and how they fulfilled different stakeholders' demands on different sustainable goals (see the list of the interview questions in Appendix 1).

All interviews were conducted remotely using Internet-based communication platforms, a widely accepted approach in qualitative research that offers substantial flexibility, cost-efficiency, and environmental

benefits relative to traditional in-person interviews (Lobe et al., 2020; Lo Iacono et al., 2016). Given these advantages, Zoom and Microsoft Teams were selected as interview platforms to accommodate respondents' geographically dispersed locations. All the interviews were recorded and transcribed with the aid of transcription software. During each interview, comprehensive notes also were taken. The transcripts subsequently were sent to respondents for validation, thereby ensuring accuracy and minimizing the potential for misinterpretation.

In addition to primary data, secondary data sources were leveraged to enhance the study's data breadth and accessibility. These sources categorized into documentary, survey-based, and multisource data (Saunders et al., 2009) include historical data critical for contextual understanding. The sources also are integral to building a comprehensive understanding of the field and grounding the study's findings within existing studies. In this study, secondary data were gathered from case firms' websites, brochures, newspapers, and magazines. Comparisons of secondary information with primary interview data facilitated validation of findings and enabled methodological triangulation, as Elliott (2018) recommended.

3.3 Data Analysis

Because data collection was conducted in a single stage, formal data analysis began only after all data had been collected. Therefore, iterative saturation was not assessed during the process. Instead, following an initial analysis, redundant data were systematically removed using the thematic coding approach by Miles et al.'s (2013), as outlined in Table 3, which was applied to the interview transcripts. Following data reduction, coding was used to facilitate thematic analysis (Miles et al., 2013; Karami et al., 2022). The coding process was structured around key themes, such as stakeholder benefits, environmental sustainability, and space sustainability. The identified codes then were organized systematically into distinct concepts, which subsequently were refined into higher-level axial cat-

Table 2. Information on the firms and interviewees.

Firm	Date	Interviewee title	Interview duration
Firm A	August 22, 2024	Business Development Specialist	45 minutes
Firm B	March 18, 2023	Chief Executive Officers	1 hour
	September 23, 2024	Chief Executive Officers	1 hour
	April 4, 2024	Chief Executive Officers	45 minutes
Firm C	May 8, 2023	Chief Strategy Officer and Co-founder	1 hour 45 minutes
	April 21, 2023	Regional Officer	1 hour
Firm D	December 12, 2023	Chief System Officer	55 minutes
Firm E	January 15, 2024	Head of Business Development	1 hour
Firm F	November 20, 2023	Chief Executive Officer	1 hour 45 minutes
Firm G	January 10, 2024	Head of Innovation	1 hour

egories, in accordance with the grounded theory methodology (Corbin and Strauss, 1990). This process involved the application of increasing analytical rigor to synthesize and categorize the emerging concepts into broader thematic categories, thereby fostering a deeper and more comprehensive understanding of the data, all of which were derived from the interview transcripts. No new themes emerged during later stages of analysis, indicating that thematic saturation was achieved retrospectively.

4. Findings

This section integrates the empirical findings from the interviewed Nordic space SMEs and examines how stakeholders influence their sustainability practices. The findings were organized into two thematic categories: (1) types of stakeholder influence, and (2) adopted sustainability practices.

4.1 Types of Stakeholder Influence

Stakeholders exert significant influence over and shape the sustainability practices of Nordic space SMEs through three primary pressure mechanisms: regulatory; financial; and societal. Governments and regulators are the most influential stakeholders, acting as both financiers and enforcers of sustainability standards. For example, say Firm D collaborates with the ESA to align with global standards, such as debris guidelines from the UN Office For Outer Space Affairs (UNOOSA), illustrating regulatory influence: “We work with the European Space Agency to align with global standards” (Firm D). Financially, government contracts and venture capital drive firms to prioritize SDGs, as seen with Firm B: “Public funding and contracts influence our decision to select agriculture as vertical”.

In this industry, regulatory frameworks do more than setting constraints, they shape the way innovation is forested. For example, Nordic regulatory bodies are increasingly requiring sustainable de-orbit planning, this is pushing firms to adopt design-for-disposal strategies from the beginning of mission planning which creates new business models and opens new markets. A phenomenon par-

ticular to the Nordics industry and the European Union to a certain extent is that access to government grants and contracts is becoming increasingly conditional on demonstrating SDG relevance. One firm noted that aligning their data analytics with national agricultural sustainability targets was a funding prerequisite, not just a market choice.

4.2 Adopted Sustainability Practices

The SMEs adopt diverse sustainability practices in response to stakeholder influences, categorized into Earth-based and space-focused initiatives:

- Earth Observation (EO) for SDGs: Firms A, B, D, and E use EO satellite data to support environmental monitoring and disaster response, and for maritime monitoring, aligning with SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action).
- Space Debris Management: Firm D is particularly focused on space sustainability through debris mitigation and PMD: “The number of satellites in space are increasing every day; it’s very important for every operator to do their part” (Firm D).

A stakeholder interest and influence matrix has been developed to assess the relationship between level of interest and degree of impact that each stakeholder holds within these space firms (see Fig. 3).

Government, regulators, shareholders and customers appear in the high influence/high interest quadrant due to their direct impact on the firm’s strategic decisions for instance, regulators exert the most influence on how regulation can impact positively or negatively the firms and at the same time they have a high interest in ensuring that firms are compliant. Firm D, through the regulatory bodies in Finland, has filed for permission to access a frequency spectrum that would allow them to pivot their business and be more competitive, “Access to frequency bands requires a formal application to TRAFICOM, which reviews the request and, if approved, forwards it to the International Telecommunication Union (ITU) for allocation, a process that can be lengthy and complex”. Firm D. Firms uniformly cited these high influence/high interest stakeholders as cen-

Table 3. Selected quotations and examples underlying open coding, axial coding, and final coding.

Codes and examples	Open coding	Axial coding	Final coding
<p>“Our satellites are equipped with automated collision avoidance systems to minimize the risk of orbital debris.”</p> <p>“We always prioritize end-of-life planning for satellites, ensuring that safe and effective deorbiting procedures are implemented.”</p> <p>“We recently launched a space debris tracking app to enhance transparency and promote global awareness of orbital sustainability.”</p> <p>“With our deorbiting technology, we’ve already removed over 10 tons of orbital debris, and we’re just getting started.”</p>	Space debris management	Environmental sustainability	Space sustainability
<p>“With advanced imaging technology, we’re providing actionable data to track deforestation and biodiversity loss globally.”</p>	Contribution to disaster response	Environmental and stakeholder benefits	Space sustainability
<p>“Partnership with OneWeb for satellite services.”</p> <p>“Our partnership with emerging space tech startups is helping us reduce manufacturing costs while boosting efficiency.”</p>	Collaboration with stakeholders for tech implementation	Stakeholder benefits	Stakeholder engagement
<p>“Our satellite-based platforms help predict extreme weather events more accurately, saving lives and resources.”</p>	Climate change mitigation using space tech	Environmental sustainability	Earth sustainability
<p>“Increased cooperation between space firms and governments.”</p>	Government and corporate collaboration in space missions	Stakeholder benefits, regulatory challenges	Multi-stakeholder collaboration
<p>“Through partnerships, we’re deploying satellite constellations that bring affordable internet access to underserved regions.”</p>	Advancements in satellite technology	Technological innovation	Stakeholders’ benefits
<p>“Our goal is to ensure that every satellite has a deorbiting plan to prevent space debris.”</p>	Reducing satellite debris	Efforts to minimize environmental impact	Space sustainability
<p>“We work with the European Space Agency to align with global standards.”</p>	Partnerships with international agencies	Building collaborative networks	Stakeholder collaboration
<p>“Our new office has created over 200 jobs in the local community and supports green tech development.”</p>	Job creation Positive local economic impact	Financial benefits extending beyond the organization	Stakeholders’ economic contributions
<p>“Our work complies fully with international environmental standards, and we publish an annual report on our sustainability efforts.”</p>	Adherence to international environmental standards	Meeting global regulatory standards	Environmental standards

tral to sustainability decision-making. In contrast, space advocacy groups, while highly invested in ethical and environmental issues were described as having less influence, thus fitting into the high-interest but low-influence quadrant. Venture capitalists and institutional investors have rising influence as their Environmental, Social, and Governance (ESG) expectations are increasingly embedded into due diligence and reporting protocols.

The implications of these matrix positions are substantial for SME strategies. Regulators’ high influence often leads firms to invest proactively in compliance-oriented innovations such as real-time orbital tracking or PMD protocols. Meanwhile, advocacy groups, though lacking enforcement mechanisms, serve as reputational gatekeepers, pressuring firms to adopt transparency standards, green branding, or climate pledges. Investors, depending on ESG weighting, can either accelerate or temper sustainability

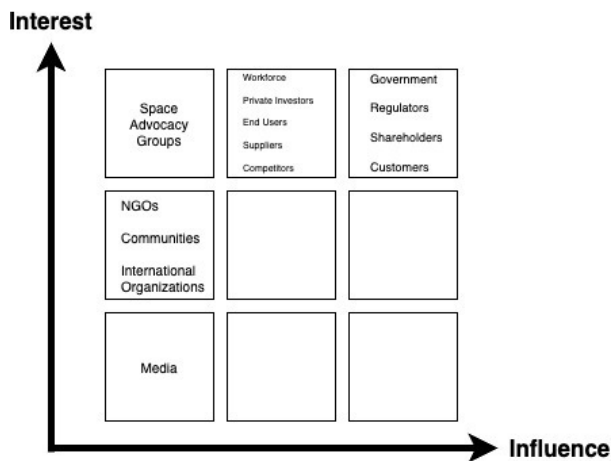


Fig. 3. Stakeholder interest vs. influence in space firms.

trajectory. These varied influences require differentiated stakeholder engagement strategies: formal for regulators, narrative-driven for advocacy groups, and performance-linked for investors.

Of the seven case firms and 10 interviews examined, all were engaged actively in initiatives directly supporting environmental sustainability. These firms concentrated on development of satellites, software-related services, and space debris removal activities that help advance various stakeholders' interests. These firms' primary environmental sustainability objectives included monitoring heat waves, supporting smart-city planning, and analyzing vegetation patterns. Such efforts highlight a commitment to leveraging space technology to address pressing global environmental challenges, thereby aligning with broader sustainable development goals and fostering long-term value for both public and private stakeholders. Case Firm G noted the following: "A three-satellite Earth observation constellation that we delivered could significantly contribute to developing solutions for emerging environmental crises, particularly by enabling quick response times in applications such as natural disaster management".

The case Firm A that we examined is utilizing satellite technology progressively to monitor and manage maritime activities, thereby delivering critical insights for sectors such as commercial fishing. As Firm A emphasized, satellite imagery provides an extensive overview of coastal regions and port areas, allowing regulatory authorities to track fishing vessels, oversee border security, and detect potential threats or illegal activities effectively. This capability emphasizes the importance of space-based data in enhancing operational efficiencies and supporting sustainable resource management practices. According to Firm A, "To effectively utilize satellite imagery, the primary step is to monitor fishing boundaries, as it provides a clear view of the number of vessels in the port and allows for the detection of any potential encroachments or impacts on territorial borders".

Generally, space firms are harnessing advanced satellite technologies to bolster environmental conservation efforts, thereby delivering substantial benefits to stakeholders, including governments, environmental organizations, and local communities. By utilizing tools such as hyperspectral imaging, these firms can monitor ecological changes and actively contribute to biodiversity preservation. This capability equips stakeholders with essential data for making informed decisions regarding resource management and conservation strategies. As Firm E highlighted, this technology plays a vital role in managing natural resources and protecting species by offering detailed insights into environmental conditions: "There are capabilities for environmental monitoring and coal resource management, and with the aid of hyperspectral imaging, it is possible to distinguish species, thereby supporting biodiversity conservation".

It is a pressing issue that firms play a crucial role in advancing the SDGs through their innovative services, which focus on monitoring and optimizing Earth's resources. As one interview described it, "Our services are dedicated to the scientific observation and management of Earth's resources, ensuring their equitable and responsible allocation," thereby highlighting their commitment to addressing critical global challenges, such as climate change and food insecurity (Firm G). Another case, Firm B, noted that "through the provision of actionable insights derived from satellite data, these firms facilitate the implementation of sustainable practices across diverse sectors, including agriculture". For example, they evaluate whether farmers are utilizing regenerative farming methods that sequester CO₂, as one respondent stated: "We are pioneering the use of technology to advance regenerative farming practices, leading to increased carbon sequestration" (Firm C). "Moreover, these firms enhance ecological preservation and community safety by providing timely warnings for environmental hazards, such as wildfires and methane leaks." Ultimately, as noted, "The information we provide serves as the foundation for our customers' decision-making processes, thereby contributing to the achievement of multiple global sustainability goals" (Firm G).

Partnerships between businesses, local governments, and urban authorities are becoming more prevalent as collaborative efforts to address the effects of climate change gain momentum. Through satellite-based monitoring services, these firms help track environmental changes, such as temperature fluctuations, that impact urban areas. This collaboration not only aids in climate adaptation strategies, but also provides valuable data for stakeholders, facilitating improved urban planning and promoting sustainability initiatives: "We offer products and services within Thailand, particularly in large cities, where climate change may lead to significantly high temperatures. Through collaboration with our partners, we can monitor this phenomenon and

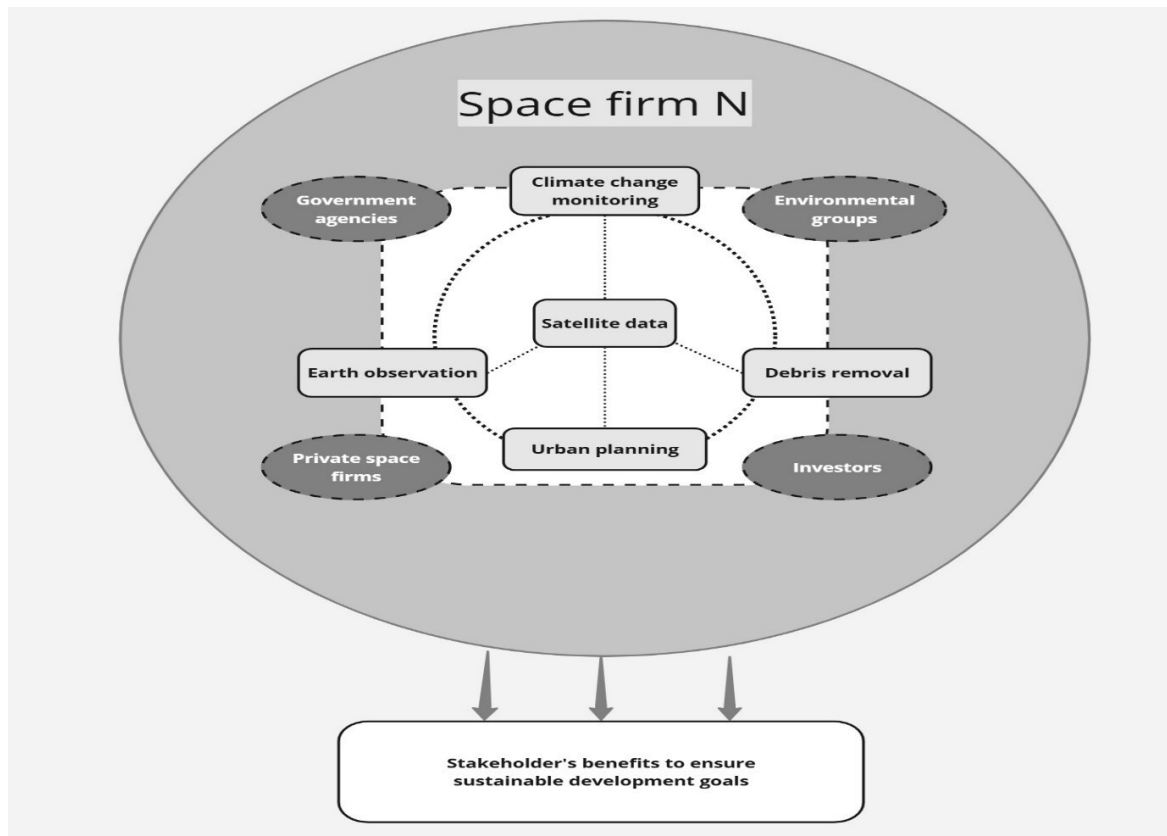


Fig. 4. Conceptual framework.

assist clients, particularly in urban areas, in managing its impacts” (Firm C).

While actively engaged in space debris removal, Firm F helps maintain the sustainability of Earth’s orbital environment. In the context of space debris management, our findings highlight the significant opportunity for active debris removal (ADR) to serve as a viable business line. By targeting objects in orbit that lack identification plates, currently classifying them as space debris, companies can play a critical role in mitigating growing risks posed by this debris to operational satellites and space missions. Collaborations with governments provide a strategic framework for tackling the issue at scaling, offering mutual benefits: Governments gain access to solutions that address national security concerns and space sustainability, while private entities can capitalize on the emerging market for debris removal services. This symbiotic relationship is essential for creating a sustainable space environment in which both public and private stakeholders can thrive through joint efforts in debris mitigation: “We are targeting objects in orbit that lack identification plates, which are essentially current space debris, and are focusing on active debris removal as a business line by collaborating with governments to address this issue” (Firm F).

The findings also indicate that case firms recognize the importance of incorporating sustainability into their satellite deployment strategies as part of their collaborative ef-

forts with stakeholders. These firms ensure that as they expand their operations, they prioritize sustainable practices to minimize their activities’ environmental impact. By adopting such an approach, they not only comply with regulatory requirements, but also secure long-term benefits for stakeholders, including governments, customers, and the broader space industry. This focus on sustainability helps enhance the firm’s reputation, fosters collaboration with environmentally conscious partners, and contributes to the overall goal of maintaining a safe and sustainable space environment: “While scaling our business, we are committed to deploying satellites with a focus on sustainability, ensuring that our growth not only drives innovation, but also brings lasting benefits to all stakeholders. By integrating responsible practices into our operations, we contribute to a safe and sustainable space environment for future generations” (Firm E).

5. Discussion and Conclusion

In this study, we sought to examine how stakeholders impact space SMEs’ sustainability practices. To address the aforementioned research question “How do stakeholders influence space SMEs’ sustainability practices?” we employed stakeholder theory as a framework to analyze the mechanisms through which space SMEs deliver stakeholder value while simultaneously pursuing growth

and scaling objectives. By focusing on the intersection of sustainability and business expansion, our study contributes to a deeper understanding of how stakeholders influence firms in the emerging space sector and how these firms navigate the challenges of expanding operations without compromising sustainability principles (Freeman, 1984; Donaldson and Preston, 1995). Supported by findings and analysis of case firms' interviews, we created a framework (see Fig. 4) and a comprehensive analysis (see Table 4).

5.1 Theoretical Contributions

Our application of stakeholder theory provides a valuable lens through which to examine how space SMEs manage competing interests and diverse stakeholder expectations in an international context. As these firms expand, they must include the demands of various stakeholders, including investors, customers, regulators, and communities while ensuring that their practices align with sustainability goals (Mitchell et al., 1997). This balancing act becomes even more complex when considering the space industry's global nature, in which firms must adapt to a range of national and international regulatory frameworks, technological standards, and environmental expectations (Barney and Hesterly, 2019).

Our study contributes to the international business literature by extending stakeholder theory to the context of space SMEs and the influence that stakeholders exert over them. While stakeholder theory has been applied widely in traditional industries (Greenwood, 2007), its application in the space sector remains in its nascent stages. By integrating stakeholder theory with sustainability research, our study offers new insights into how space firms can balance business growth with the imperative to create positive social and environmental outcomes (Barney and Hesterly, 2019). Furthermore, our findings highlight the importance of adopting a long-term perspective in decision-making, in which the focus is not only on short-term profitability, but also on the lasting impact that these firms can make on the communities they serve (Echols and Tsai, 2005).

Our analysis revealed how the constellation of stakeholders, particularly government regulators, space advocacy groups, and private financiers, collectively shape the strategic behavior of these firms. For instance, Firm D's implementation of Active Collision Avoidance (ACA) and satellite deorbiting planning, illustrates how compliance expectations can generate entirely new business models. Similarly, Firm B's alignment with SDG focused government contracts demonstrates that stakeholder demands not only constrain but also create innovation spaces. This confirms that sustainability in the New Space economy is increasingly seen not only as a compliance necessity but as a competitive and strategic imperative, contributing directly to theory development in stakeholder and sustainability-oriented entrepreneurship.

Furthermore, our analysis showed that successful Nordic space SMEs integrate key strategies to adopt and maintain sustainability in their businesses. First, they prioritize partnerships and collaborations with stakeholders who share their commitment to SDGs. These partnerships not only facilitate the exchange of resources and knowledge but also help firms align their activities with broader global objectives, thereby enhancing their credibility and reputation in the international market (Luo, 2007). Second, these firms tend to invest in innovations and technology that allow them to improve efficiency, reduce costs, and minimize their operations' environmental impact. Third, they adopt transparent communication practices to engage stakeholders and demonstrate their services' positive impacts on social and environmental issues, thereby reinforcing their commitment to sustainability further.

5.2 Practical Implications

Our findings indicate that all the case firms examined effectively are integrating sustainable practices as they expand their operations. This provides valuable insights for managers and businesses as to how small and medium-sized space firms in the Nordic region leverage stakeholders' influence in advancing stakeholders' interests to help achieve the SDGs. Our analysis reveals that these firms implement mechanisms that focus on technological innovation, driven by internal policies and organizational philosophies. This approach reflects a convergence between sustainability and growth, in which firms aim not only to expand their market presence, but also to ensure that their activities are aligned with global sustainability objectives.

Given the rapid pace of change in the space industry, space firms must recognize that they cannot independently drive their future. Collaboration through partnerships becomes crucial, and continuous learning plays a key role in adapting to new challenges and opportunities. To work sustainably, firms need to prioritize development of internal capabilities and invest in knowledge-sharing practices that align with their sustainability goals. This could involve fostering innovation within the firm, engaging in joint research and development (R&D) projects, or collaborating with external stakeholders—such as governments, NGOs, and academic institutions—to remain at the forefront of technological advancements while reducing their operations' environmental impact. Furthermore, adopting circular economic practices, such as reusing satellite components and optimizing data use to reduce waste, can provide a more sustainable approach to expansion. By focusing on these sustainable practices, space firms can ensure that their growth benefits a diverse range of stakeholders—such as local communities, customers, and investors—while contributing positively to global sustainability goals.

Table 4. Explanation of conceptual framework.

Component	Activities (based on interview data)	Empirical evidence	Explanation in the conceptual framework
Climate change monitoring	Space firms influence satellite data to track greenhouse gas emissions, deforestation, and other climate-related changes.	Empirical evidence suggests that space firms play a critical role in real-time climate monitoring, identifying trends in carbon emissions and global temperature variations.	Satellite data serves as a foundational tool for identifying and forecasting climate change patterns, and enabling proactive mitigation and adaptation strategies, thereby contributing to SDG 13 (Climate Action).
Earth observation	Space firms utilize high-resolution imaging and analytical tools for disaster response, agricultural monitoring, and environmental assessments.	Empirical findings indicate that space firms provide critical data for monitoring environmental risks, such as floods, droughts, and natural disasters, while also aiding in sustainable resource management.	Earth observation through satellite data allows for better decision-making in environmental and disaster management, directly supporting SDG 15 (Life on Land) and SDG 6 (Clean Water and Sanitation).
Debris removal	Space firms are advancing technology to identify, track, and remove space debris, thereby minimizing orbital risks.	Case studies reveal that the complexity and cost of space debris removal remain significant challenges, with limited global collaboration.	The removal of orbital debris is crucial for space operations' long-term sustainability. By mitigating space debris risks, space firms contribute to the continued viability of space exploration and infrastructure.
Urban planning	Satellite data are used for urban development, infrastructure planning, and optimization of transportation systems and energy resources.	Empirical examples have highlighted how space firms provide geospatial insights for the design of smart cities, optimization of land use, and identification of energy-efficient infrastructure.	The integration of satellite data into urban planning fosters sustainable development by improving urban resilience, optimizing land use, and supporting the efficient delivery of essential services, in alignment with SDG 11 (Sustainable Cities and Communities).
Space service	Space firms provide comprehensive services—such as satellite launches, space exploration support, and consulting for space-related operations.	Empirical evidence reveals that space service offerings are critical for firms and governments relying on specialized expertise and access to space infrastructure.	Space services bridge gaps between technology, operations, and end-users, contributing to advancements in sustainable space development aligned with multiple SDGs.
Ground station	Space firms maintain and develop ground stations to collect, process, and distribute satellite data to end users in various industries.	Empirical data suggest that ground stations play a critical role in real-time communication, data dissemination, and operational management for satellites.	Ground stations support data-driven decision-making, facilitating timely actions in areas such as disaster management, communication, and resource planning, thereby enabling SDGs 9 and 11.
Satellite communication	Space firms provide satellite-based communication services for remote areas, disaster recovery, and global connectivity.	Empirical findings have indicated that satellite communication is essential for connecting underserved regions and enabling real-time disaster response.	Satellite communication enhances global connectivity, supports education and healthcare delivery in remote areas, and enables efficient disaster response, contributing to SDGs 9 and 17 (Partnerships for Goals).
Satellite data	Space firms provide high-resolution satellite imagery and analytics for monitoring, planning, and decision-making across industries.	Empirical evidence indicates that satellite data are used for agriculture, environmental monitoring, and infrastructure development.	Satellite data underpin various applications, including climate tracking, disaster response, and urban planning, directly supporting SDGs, such as SDG 2 (Zero Hunger) and SDG 11.
Development of satellites	Space firms design and build satellites tailored to specific industries, focusing on Earth observation, communication, and environmental monitoring.	Empirical evidence has highlighted advancements in lightweight, cost-efficient satellite technologies for diverse commercial and government applications.	Developing specialized satellites ensures efficiency in data collection and supports sustainable goals, such as SDG 13 (Climate Action) and SDG 15 (Life on Land).

In our study, we found that Nordic space firms tend to have a strong stakeholder engagement approach, reflecting the region's tradition of high levels of social responsibility and community involvement. These companies frequently engage with a wide range of stakeholders—including governments, NGOs, and the public—to ensure that their services align with different stakeholders' social and environmental priorities (Freeman, 1984). They also actively seek partnerships with organizations that share their values that are related to sustainability, co-creating value that benefits both their businesses and the broader global community. This approach often leads to collaborative efforts on global challenges, such as climate change and environmental monitoring (Schultz, 2014).

5.3 Limitations and Future Studies

One limitation of this study is its reliance on the small sample size of only seven case firms operating within the space industry. Due to this limited sample size, we could not conduct any comparative analysis, but this could be conducted in the future. Given the qualitative nature of the research and the focus on a limited number of firms, the findings may not be fully generalized to all small or medium-sized space firms globally. These seven firms' experiences and strategies may not reflect the broader dynamics or diversity of approaches taken by other space companies, particularly those operating in different geographic regions or under different regulatory environments. Furthermore, the study exclusively applies stakeholder theory as the analytical framework, which, while offering valuable insights into stakeholder relationships and sustainability practices, may overlook other important theoretical perspectives or external factors that could influence how space firms operate sustainably. Future studies that incorporate a larger sample size, additional theoretical frameworks, or mixed methods approaches could provide a more comprehensive understanding of the challenges and strategies that space firms employ in balancing growth and sustainability.

In conclusion, based on our research question “How do stakeholders influence space SMEs' sustainability practices?” we highlight the critical role that stakeholders can play in understanding how small space firms grow sustainably. The study also emphasizes the need for these firms to align their growth strategies with diverse stakeholders' expectations, while maintaining a firm commitment to sustainable practices (Freeman et al., 2010). Our study provides a foundation for future studies that can examine the dynamics of sustainability and stakeholder engagement further in the rapidly evolving space industry. Further research also could delve into how different stakeholder groups (e.g., investors, customers, regulators, Non-Governmental Organizations (NGOs), and local communities) perceive space firms' sustainability efforts and how these perceptions influence firm strategies. These studies could use methods such as surveys, interviews, or content analysis to capture

stakeholder expectations, identify potential gaps between stakeholder needs and firm practices, and examine the dynamics of stakeholder engagement in the space industry.

Availability of Data and Materials

All data reported in this paper will be shared by the corresponding author upon reasonable request.

Author Contributions

ST and EM prepare the questionnaire together. ST, EM, and AO performed the research work and collected data from the interviews. ST initially wrote the manuscript, and AO edited it, transcribed the interview audio files, and provided his comments. EM also contributed to the writing. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

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Conflict of Interest

The authors declare no conflict of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

For the initial grammatical check and academic English writing, we have used Chat-GPT 3.5. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the publication's content.

Appendix

See Appendix 1.

Appendix 1. Interview questionnaire.

Basic info about the interview:	
Company:	De-identification code:
Company inception year:	Date and time:
Interviewee:	Duration:
Position:	Interview conducted via:
Overall work experience:	Location (if face-to-face):
Working in the company (year):	

No.	Interview questions:
	<i>Overview/evolution of the company</i>
1.	Could you briefly tell us about yourself and your role at the company?
2.	Could you briefly tell us about the history/evolution of the company? [an overview] How did the company come into being? When?
3.	How did the company start developing solutions/services, and where did the ideas come from? Is it because of a market need or does the company want to introduce something new?
	<i>Space solutions</i>
4.	Could you briefly tell us about the space solutions [services] that your company develops and offers around space?
5.	What are the main resources [e.g., technical] that you need to run your products in space [or ground]? How do you manage these resources? Are there any additional resources that you need?
	<i>Internationalization</i>
6.	Can you briefly explain the company's internationalization journey? [what does internationalization [effort] mean for your company] In what point did you get your first international partners? [Which year?] Was this firm a supplier [provider] or customer? How did that partnership come about? Which country and why?
7.	How does getting your products into markets depend on other actors (e.g., customers, government, space agency, suppliers)? How do your assets are dependent on digital/physical assets of other actors for commercialization or vice versa?
8.	Briefly, which upstream (e.g., prior to asset handover in space) or downstream (e.g., after handover to operator) activities are international (or global)? [you may have a different view]
9.	How are the company's assets deployed (e.g., ground, space) and how do they interact? [also interact with partners' assets]
10.	How are you now developing and managing [new/existing] international partnerships? [international expansion through networking and finding new partners for collaboration]
11.	What are the challenges [may also create opportunities] that your company faces to organize and commercialize the solutions? How do they impact the firm, and how do you overcome them? Some illustrative examples: a. Technical challenges b. Societal challenges c. Environmental challenges d. Strategic challenges e. Management challenges f. Cross-national cultural challenges g. Geopolitical challenges h. Regulatory challenges i. Other: [Example 1: How does technology play in your internationalization process? [Any specific challenges related to technology transfer or any technology bottlenecks] How does the company cooperate with partners to overcome such challenges and capitalize on opportunities? Example 2: How do geopolitics or regulations enable or hinder commercialization or internationalization?]
	<i>Expansion strategies</i>
12.	What were the primary motivations to internationalize? [when and why did the company decide to expand internationally]

No.	Interview questions:
13.	What exact internationalization strategies [e.g., exports, joint ventures, foreign subsidiaries, suppliers] have you engaged in? How?
14.	What initial markets did you target? How did the company select the target international markets? [criteria on market selection]
15.	Could you elaborate on the adopted strategic approach to establish a presence in these markets?
16.	Did your company form any partnerships or collaborations with local or international entities to support internationalization? What were the key objectives behind such partnerships or collaborations?
17.	Do you need to localize or standardize the capabilities/solutions or business model to suit the needs of international markets? If so (or not, why), what drives you to that? [e.g., local cultures, regulations, or market preferences]
18.	How would you evaluate the success of your company's internationalization? What key performance indicators (KPIs) do your company use to measure the effectiveness of its internationalization strategies?
19.	What are the company's future regarding international expansion of your space solutions?
<i>Environmental sustainability</i>	
20.	How does your company's satellite data [data-driven solutions] contribute to environmental sustainability efforts (e.g., climate action, responsible sourcing)? Please provide an example of specific applications in a particular country. How do such applications/solutions positively impact on environmental sustainability efforts?
21.	What are the main customer segments?
22.	What value-added services (e.g., data analysis tools, training programs) do you offer to end-users to help them leverage the data-driven solutions for environmental sustainability? How?
<i>Artificial intelligence</i>	
23.	Do you use any AI [machine learning]? If so, how does AI is organized [in what point of process do you use] in your space-related capabilities/technological solutions? [What does it do, a concrete example please]
24.	How does AI change or improve any tasks that relate to machine-machine or human-machine interactions in space [or on the ground]?
<i>Closing</i>	
25.	[Optional] How do you see trends in commercialization, technology, sustainability, and regulation in the near term (1–5 years) and mid-term (5–10 years)? [if any, can you specify those]
26.	Do you have any further remarks or any additional point that we may miss in the discussion?
27.	Do you want to share any other relevant documents/links for our understanding (e.g., brochures, slides, white papers, reports, product catalog, meeting notes, website, blog post, news articles)?
28.	Filling out the basic info about the interviewee(s) listed above.

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