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# Space-based Sustainability Management System (S-b SMS) : Bridging the Gap

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## Abstract

This paper prepares a practitioners' guide towards the development and application of a proposed space-based sustainable management systems (S-b SMS). This proposed management system framed in the context of sustainability, reinforces the challenging case to adopt cost effective sustainable solutions; which are highly demanded in the aerospace industry. Considering the strengthening of mutual sustainable development policies and promotion of energy efficient operation for industrial applications, the aviation industry has proven to succeed in distinctive measures. In spite of this progress, the incessant international initiatives towards achieving sustainable competitiveness, with emphasize of astrospace contribution; calls for added innovative measures. This exploration of various reality driven scenarios and possibilities for application of Scientific methodologies pinpoints future research agendas for the S-b SMS initiative. The extended outcome includes a coverage of trivial priorities: economic, energy, and environment issues based on a holistic contribution from other practitioners during the initial and mid-phase of the S-b SMS discussion. The highlighted possibilities for S-b SMS underlines a collaborative research engagement towards sustainable space-based innovation. Mainly, fostering a management system or planning framework that befits the parameters of widely recognized climate policies, organization protocols, and sustainable agendas.

## 1. Introduction

Exploratory research had shown the increasing emphasize of addressing sustainable measures for full operations in both aerospace industry [1;2;3]. Putting aside the imperative of achieving optimal cost operations (mainly sustainable funding), scholars [4;5] had identified other challenging aspects (e.g. governance for space resources). Aerospace organizations are critical in meeting these challenges across space-based activities and managing the change process required for new space market entrants to receive sustainable support systems. In order to sustain market growth across space-based organizations, a reference platform exemplified by the aims of Sb-SMS (space based sustainability management systems) is an efficient way to begin (especially during decision making process or performance benchmarking).

Recent publications [6;7] have highlighted the advancement in aviation systems and policies framework that cultivates a safer, reliable, and efficient aerospace field operations. These improvements are yet to be fully attained in most large space-based organizations [8]. Thus, best practice solutions in aerospace industry can be motivated by reformed policies and protocols that aims to make better progress towards achieving sustainable competitiveness. Sustainable solutions for space-based applications calls for innovation; to leverage various resources while accrediting the best energy efficiency performance. Often, these energy-efficient measures and integrated resource planning contributes towards de-risking funds set aside to finance new constellation programs and meteorological missions (for instance). This paper initiates a research agenda targeted to identify existing and emerging applications of hardware, software, and information communication technology (ICT) tools (such as surveillance network systems) used to support a future development and practical implementation of space-based management systems (S-b SMS). As the sustainable use of aerospace industry has been persuasively shown to be an intricate task to manage. The obscureness of 'space-pollution', can be addressed by probing discussions supported by effective interventions as well as proven science, technology, engineering and mathematics (STEM) methodologies.

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### 1.1 Identifying the Gap

Evidence from reviews of sustainable guidelines in aerospace industry demonstrates that a cooperative *(or co-creation practices)* by market players and policy makers play an essential role in developing rigid space-based activities regimens. In order to fulfil the plans for developing a framework *(contributing towards Sb-SMS)*, joint-dialogues with established Aerospace market players (mainly astrospace stakeholders) will report insight on current space sustainability concerns and priorities. A collective learning engaged by the participatory process of Aerospace expert views provides recommendations for improvement (and priority-areas for development). Simultaneously, a cluster analysis of the uniform standards made available by *knowledge transfer* forms well-founded conditions for quality investigation and data analyses.


Figure 1: Causal-loop diagram of proposed S-b Sustainability Management System (S-b SMS)

## 2. Research Methodology

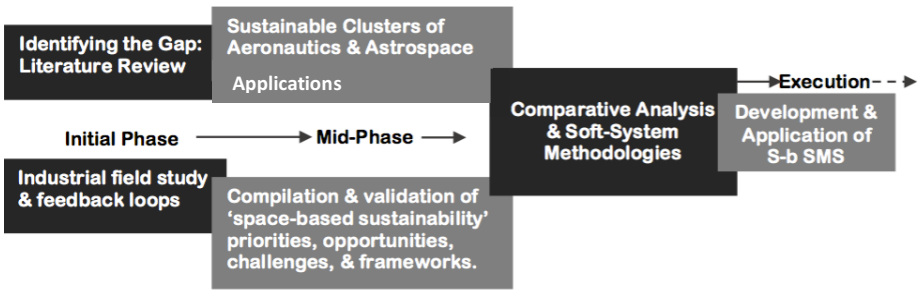


Figure 2: Innovation Funnel Diagram towards S-b SMS

The development and application of S-b SMS requires a step wise approach as figure 2 depicts. Combinatorial decision modelling techniques, operation research methods and engineering system theories frames the main research procedures. In order to align the research plan process with the desired outcome of S-b SMS, the overall investigation is performed based on evidence-based practices including phenomenological approaches. This is to ensure that the sustainable clusters identified is feasible and pertinent towards the application of space-based systems.

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## 3. Conclusion

The identification of relevant sustainable indicators and research methods contribute towards the investigation of S-b SMS potential. Hereby, this paper incites useful discussion among various stakeholders; primarily, both in the aeronautics and sustainable energy sector. Departing from the initiative and exchange of feedbacks, it also promotes the consideration of exploiting other recommended analysis methods that complements the sustainable assessment domains. Considering the initial phase of research whereby limited attention is paid towards the feasibility of the application of S-b SMS; in this paper context, the identification of gap is bridged by the contribution of various inputs and elements by the audience (industry stakeholders, research practitioners, policy makers, and etc.) as well as insightful recommendations that motivates towards the improvement of investigation procedures in Scientific disciples.

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