POLITECNICO DI MILANO

PhD in INGEGNERIA GESTIONALE / MANAGEMENT ENGINEERING - 40th cycle

PNRR 630 Research Field: FROM SUPPLY CHAINS TO ECOSYSTEMS: LEVERAGING PLATFORM-BASED APPROACHES IN SPACE SYSTEM DEVELOPMENT PROJECTS

Monthly net income of PhDscholarship (max 36 months)
€ 1500.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Traditionally, space systems have been developed through a First-of-a-Kind (FOAK) logic, where each space system and project is uniquely planned and delivered, leading to inefficiencies. The motivation behind this research stems from the necessity to evolve beyond the conventional project supply chain model. The fragmented nature of current supply chains results in inefficiencies, high cost, and extended project timelines. As satellite technology advances and commercial interest in space grows, there is an urgent need to transition to more integrated and dynamic ecosystem approaches. These ecosystems can leverage platform-based methodologies to enhance collaboration, streamline processes, and foster innovation. The success of platform-based models in other high-tech industries, such as information technology and automotive, highlights the potential benefits of adopting similar approaches in the space sector. This transition promises not only to improve efficiency and reduce costs but also to create value for a broader range of stakeholders, from suppliers to end-users. This research aims to provide valuable insights and practical tools for space companies, enabling them shifting from a supply chain configuration to a platform-based ecosystems. Four main objectives will guide the research project:

	•To understand the implications of this transition for relevant stakeholders within the space industry, including suppliers, manufacturers, regulatory bodies, and end-users. This involves identifying key success factors and potential challenges that may arise during the transition. •To explore how platform-based ecosystems can contribute to a more sustainable and collaborative future for the space industry. This involves examining the long-term benefits of enhanced innovation, reduced time-to-market, and increased stakeholder engagement. •To develop a comprehensive framework that enables space companies to transition from a fragmented supply chain paradigm to an integrated ecosystem model. This framework will outline the key elements of platform design, stakeholder value creation, and governance structures necessary for successful implementation. •To develop actionable guidelines and strategies for space companies to effectively implement platform-based ecosystem models. This includes recommendations for overcoming challenges, optimizing processes, and fostering a collaborative culture.
Methods and techniques that will be developed and used to carry out the research	A qualitative and mixed-method approach will be implemented: •Semi-structured Interviews: Conduct semi-structured interviews with key stakeholders across the space industry, including project managers, operation managers, intermediaries and end users. These interviews will aim to gather detailed insights into current practices, challenges, and perspectives on transitioning to ecosystem-based models. The interviews will be analysed with a thematic analysis to identify and analyze patterns within qualitative data. •Case Studies: Develop comprehensive case studies of industries that have successfully transitioned to platform-based ecosystems. This will involve analyzing

	documented experiences, conducting interviews with industry experts, and examining relevant business models and strategies. •Surveys: Design and distribute structured surveys to a broader audience within the space industry. The surveys will aim to capture quantitative data on the perceptions, readiness, and potential challenges associated with adopting platform-based approaches. •Stakeholder Analysis: Conduct detailed stakeholder analysis to understand the interests, influences, and potential impact of various stakeholders within the space ecosystem. This will inform the development of governance structures and value creation strategies within the proposed framework. •Conceptual Framework Development: Develop a conceptual framework based on insights from qualitative research and analytical techniques. This framework will outline key elements such as platform design, value creation, and governance structures necessary for the transition to an ecosystem-based model. A focus groups with diverse participants from the space industry to discuss preliminary findings, validate the proposed framework, and gather additional perspectives. •Validation Workshops: Conduct workshops with industry stakeholders to present the conceptual framework and gather feedback. These workshops will serve as a platform for iterative refinement of the framework, ensuring it meets industry needs and addresses practical challenges.
Educational objectives	•Theoretical Knowledge: to enhance the understanding of platform-based ecosystem theories and their application in hightechnology industries. To explore and expand the body of knowledge on the transition from traditional supply chains to ecosystem models, particularly in the context of space systems. To integrate insights from engineering management, aerospace engineering, and

	business management, fostering a multidisciplinary approach to solving complex industry challenges. •Research Skills: To develop advanced qualitative research skills, including designing and conducting interviews, surveys, and case studies. To gain proficiency in analytical techniques such as thematic analysis, comparative analysis, and content analysis, enabling the systematic examination of qualitative data. •Analytical Thinking: To cultivate critical thinking and problem-solving abilities by analyzing complex systems and developing innovative frameworks for industry application. To enhance the capability to synthesize information from diverse sources and draw meaningful conclusions to inform strategic decision-making. To learn how to develop and validate conceptual frameworks, ensuring they are grounded in empirical evidence and practical insights. •Industry Engagement: To understand the practical challenges and opportunities within the space industry by engaging directly with industry stakeholders through interviews, focus groups, and workshops. To translate academic research into practical guidelines and strategies that can be readily adopted by space companies. To develop project management skills by planning and executing research activities, managing timelines, and coordinating with academic and industry partners. •Communication: To enhance communication skills by presenting research findings to diverse audiences, including academic peers, industry professionals, and regulatory bodies. To learn how to effectively communicate complex ideas and frameworks in a clear and accessible manner. To foster a collaborative research environment by working closely with academic advisors, industry co-supervisors, and peers. To develop teamwork and networking skills, essential for successful collaboration in both academic and industry settings.

Job opportunities	Industry: Design, implement and Managing the supply chain/ecosystem of advanced satellite systems and other space technologies in aerospace organisations. Applying platform-based ecosystem principles to enhance efficiency and innovation in space projects. Leading complex projects in aerospace companies, focusing on the integration of new technologies and methodologies to streamline development processes. Managing cross-functional teams and ensuring successful project execution from conception to deployment. Overseeing supply chain operations in aerospace or other high-tech industries, implementing ecosystem-based models to optimize processes. Developing strategies for supply chain integration, stakeholder collaboration, and value creation. Academia and research institutes: Working in research institutions or universities, leading projects focused on innovation in space systems and other high-technology sectors. Engaging in advanced research projects that extend the findings of the PhD dissertation. Collaborating with interdisciplinary teams to explore new applications of platform-based methodologies in various industries. Consultant: Advising companies on transitioning to platform-based ecosystems, helping them navigate the challenges and leverage the benefits of such models. Conducting market analysis, feasibility studies, and strategic planning to drive innovation and competitive advantage. Establishing and managing innovation labs within larger corporations or research institutions, focusing on the development and commercialization of new technologies. Government and agency: Working with government agencies, such as European Space Agency, to develop policies that support the growth and sustainability of the space industry. Analyzing industry trends, technological advancements, and regulatory impacts to inform policy decisions. Ensuring that aerospace projects comply with national and international regulations. Engaging with regulatory bodies to advocate for policies that facilitate ecosystem-based approaches in the space sector.

Composition of the research group	2 Full Professors 1 Associated Professors 2 Assistant Professors 6 PhD Students
Name of the research directors	Paolo Trucco, Giorgio Locatelli

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	750.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	ThalesAleniaSpace- Italia
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	ThalesAleniaSpace- Italia
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Educational activities, Teaching assistantship, Computer availability, Desk availability.

To strengthen their overall understanding of the space economy ecosystem and expand the network of industry and institutional relations, the PhD candidate will be involved in the research activities of the Observatory on Space Economy of the School of Management.
The PhD candidate will have access to all the Department's resources; the PhD offices are organized with a desk sharing logic.

•Involvement in projects: "For the overall development of their capabilities, PhD candidates will work on sinergical projects to favour empiral data collection and network development for their career. Projects will give candidates the opportunity to work in group (peers and other senior professors)".
•Teaching and tutoring: "If coherent with the development of their doctoral program, the PhD candidate will have the opportunity to be involved in: teaching activities, tutoring to master

students, tutoring to PhD candidates for administrative processes".

Funding for educational activities: 6.100,00 Euros for three years.