



The Czech-Italian Cooperation in the Aerospace Industry and the Partnership's Challenges

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ABSTRACT

The aerospace industry has experienced increased importance for the Czech Republic and Italy. Both economies have many small companies dealing with aerospace strategic sectors and entertain partnerships and agreements, through a network ranging from research to industry. The deep and developed bilateral cooperation in the field of aerospace and have the power of developing further cooperation and synergy. Particularly, high-qualified medium-sized companies have become crucial players in the aerospace industry of both countries. A wide universe of small enterprises dealing with satellites, tech, and digital tools all dedicated to the development and implementation of aerospace projects, with a close orientation to the future challenges of the aerospace industry – including investment in the sectors, the importance to mix fields of knowledge and info sharing; and finally lowering the costs – characterizes the current Czech-Italian relations in the field of the aerospace industry. The challenges ahead should not scare investors.

RESUME

The purpose of this paper is to show the current cooperation between the aerospace industries of the Czech Republic and Italy. Both countries have many small and medium-sized companies that can cooperate to increase synergy in terms of manufacturing and research in the aerospace industry. The launch of Vega is an example of this partnership.

In terms of methodology, the paper is based on both non-academic and academic sources. The latter are generally scarce due to the originality of the topic under investigation, which has no scientific publications.

At the level of results, the paper confirms that cooperation between Rome and Prague in the aerospace industry is strong, but more synergies should be created. There is a need for more investment in the European ambit, as well as more research at university level and lower costs as a result of more investment in small and medium-sized companies.

Future research should be based on analysing the evolution of the partnership between the two countries considering the challenges analysed in the paper.

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Introduction: Space Activity: A Crucial International and Regional Sector

“Space is about the generation and dissemination of advanced scientific knowledge, and the development of state-of-the-art systems and services” (ESA 2015). The economies of the Czech Republic and Italy are composed of many companies dealing with this strategic sector – along with its opportunities and emerging challenges – and entertain intense partnerships between them, both internationally and regionally. Since the Czech Republic joined 2008 the European Space Agency (ESA, which implements EU member countries’ space activities) many companies have been involved in the development of special software and sophisticated components for satellites and other equipment in cooperation with Western EU companies, allowing deep synergies in the aerospace sector. On the other hand, many Italian high-qualified medium-sized enterprises have become crucial players in the aerospace industry and occasionally among the world leaders in the field, conscious about the challenges ahead, Prague and Rome do cooperate effectively within the aerospace sector, increasing potential cross-areas and forms of cooperation and partnership. When dealing with space activities,

many related fields are included: from military to research, from university to communication, from air traffic to environmental surveillance, and from satellite-in-orbit to space data systems.

Aerospace encompasses many fields. From geopolitics to education, from national defense to civil protection. Space activities aim to exploit the opportunities space offers, including satellite navigation and telecommunications, Earth observation, space transport, and data collection (Ministerstvo dopravy 2019). The GSA, European Global Navigation Satellite Systems in Prague supports the EU's investments in satellite systems in terms of competitiveness *vis-à-vis* other realities, providing and promoting economic growth and benefits for users (GSA 2020b). Within the GSA and its large-perspective programs – such as the European Geostationary Navigation Overlay Systems (EGNOS) and Europe's Global Navigation Satellite System (Galileo) – the Czech-Italian relation in the aerospace industry finds an optimal platform of integration. What is the current situation in the Czech and Italian aerospace industries and how is cooperation between them? Who are the actors involved and the future challenges of this partnership?

In terms of methodology, given the lack of scholarly literature on this topic, the paper relies on quite a bit of non-academic literature. However, precisely because the Czech-Italian partnership has not been much addressed at the academic level, this paper can be useful in understanding the critical and most important elements of this cooperation, bringing new points of discussion in the academic debate on Czech-Italian aerospace relations. The objective of the paper is to provide an overview of Czech Republic-Italy relations in the field of aerospace, considering the challenges and opportunities. Starting with a historical and current overview of the aerospace activities in both countries, the relations between Czechia and Italy are kept into consideration and the success of the latest Vega launch is shown as the main example of potential cooperation between the two countries. The implications of this cooperation and future relations are equally considered for both countries – a Prague-Rome Axis in the field is highly desirable for the future. Finally, three main challenges and future perspectives are outlined: the concerns over investment in the sectors, the importance of mixing fields of knowledge, and the costs issue.

Czechia: From 1989-Backwardness to Galileo's Dynamicity

Former Czechoslovakia always showed concerns over space sectors and activities. Interkosmos 1 was launched in 1969 and was the first satellite carrying instruments made in Czechoslovakia, while nine years later Vladimir Remek became the first Czech astronaut (SGAC 2019). Major cooperation with global partners occurred after the political, social, and economic changes of November 1989. The arrival of foreign direct investments, the country's entrance into NATO in 1999, and the EU prompted the sector. In 2004 the Czech Republic signed the Plan for European Cooperating State Charter in Prague, which allowed the country to participate in broad science activities in the aerospace industry. This led to the accession to ESA in 2008, when Jean-Jacques Dordain – then Director General of ESA – and Mirek

Topolánek, then Czech PM, signed a historical accession that enhanced Czechia's capacity for Earth observation, space, and scientific research. ESA supports the global competitiveness of the European industry and coordinates space programs and related technology (NSP 2019). ESERO – ESA's largest educational project – offices opened in the Czech Republic in 2015, helping to increase its competitive, technological, and innovative capacities (ESA 2015).

After the US GPS (Global Positioning Systems) and Russian GLONASS (GLObal Navigation Satellite System), in 2016 the EU's Galileo – Europe's Global Navigation Satellite System (or GNSS) – was born. Based in Prague and independent from the (local) military system, Galileo allows citizens to know their exact position with much precision (GSA 2020a), making European roads and railways much safer. The European Commission first mentioned Galileo's system, the only civil and not military navigation system, back in 1999. Its results today are more positive when satellites are more dynamic than ever and astonishingly vital for people's lives. The Prague-based agency furtherly improved Galileo in terms of efficiency and international cooperation. Years ago, the Czech industry's involvement in Galileo and EGNOS was low (NSP 2019). Little after, the level of competence in the European space business made the Czech Republic a reliable partner at the level of the aerospace industry. Indeed, Czechia's aerospace sector has grown in recent years. Many small and medium-sized enterprises deal with satellites and communication, geo-information, and geo-localization systems, rather than software and aerospace marketing, or manufacturing of electronic devices or IT systems (Spacebiz GUIDE-b 2020).

The academic world also plays a prominent role in the Czech aerospace industry, which cooperates with European agencies. Today, many Czech universities offer study programs focused on aerospace engineering, astronomy, and astrophysics (SGAC 2019). The primary source of specialized personnel is the Czech universities (NSP 2019). Important programs have been launched and offered to the new generations, such as ESA BIC. The ESA Business Incubation Centre is a European network providing financial support to projects related to the aerospace industry. A new European space agency opened in Prague in 2021. Created by expanding the GNSS Agency, the new EUSPA – EU Agency for the Space Program – has seven hundred employees and will concentrate on the EU's capacities to monitor the Earth's close surroundings (Johnston 2019). For the period 2020-2025 in 2019, the Czech government has approved a new crucial National Space Plan that builds on the State's support of the scientific and aerospace industry. From 2008-2018, Czech companies and universities implemented 350 space-related projects (NSP 2019). This is surprising considering the early difficulties due to the transition of then Czechoslovakia from a planned to a market economy.

Italy: Where Small and Medium Enterprises Meet and Cooperate

Italy is the third ESA contributor (ASI 2020a) and hosts many facilities. Italy has always been very active in the aerospace field. The Italian Space Agency (ASI) is crucial in this sector. Born in 1988, ASI has a leading role at the European aerospace level. The collaboration with

American NASA and other European partners has been growing for decades. ASI's aerospace studies and research are aimed at deepening the knowledge of the planet as well as the space of the universe (ASI 2020a). According to the "Piano Integrato Della Performance 2020-2022" (integrated performance plan 2020-2022), Italy "is one of the few countries in the world [...] to have a complete supply chain of knowledge and products, [...] characterized by a wide range of applications in the civil and military fields, a strong international technical-scientific positioning" (2019 4). The size of the Italian aerospace industry allows both vertical and horizontal development. From an interregional point of view, despite the many differences, the cooperation between North and South in Italy is capital, as well as with bases and antennas located in the islands. Vertical from the interstate point of view, that is the intra-European cooperation, since Italy has a large network of relations, promoting manufacturing and research.

Several companies are connected to the military and defense fields. Many enterprises joined forces to start processes of aerospace collaboration and cost reduction, as well as research and development from the regional to the European and international levels. Under the SME4SPACE project, AIPAS – Companies for Space Activities' Association – gathers European agencies, from France to Spain, Luxemburg and the Czech Republic, Greece and Hungary, Latvia and Lithuania, Belgium, and Poland. The aerospace sector in Italy boasts seven thousand technicians in six hundred companies with a turnover of almost three billion Euros (Ricci Bitti 2020). The Italian economy is based on a wide network of small and medium-sized enterprises, and SMEs, which makes Italy one of the greatest European and world excellence, and prestigious economic areas. "Geographical proximity matters for inter-firm innovation-related knowledge exchange" (Biggiero-Sammarra 2010). Indeed, there are great harmony and integration between the system of SMEs at the interregional level of the EU. Regions of Central Europe, South Germany, and Western France are active and strategic partners for small businesses.

The attention of the aerospace industry has captured many SMEs – the aerospace industry is focused on design and manufacturing competencies (Corallo et al. 2013). Some SMEs are focused on education, others deal with highly specialized services and devices, others care about automation control while others are specialized in screening processes Some deal with manufacturing, and others with defense and security (Spacebiz GUIDE-a 2020). Among the most important projects, Italy has in the field of aerospace are related to climate change as well as the monitoring of the cryosphere. Measurements and studies to this effect, with expansion in the maritime field, are currently underway and space monitoring systems are essential to carry out missions that would avoid natural disasters. The Space Strategic Vision 2020-2029 document develops itself according to four important future challenges: city space, growth space, future space, and safe space. Indeed, according to the "Piano Integrato Della Performance 2020-2022" (2019), challenges are related to key objectives like innovation and

support for research; economic growth and promotion, development and use of space services and applications; consolidation of Italy's role at international level as a leader in the aerospace sector.

Vega: The Symbol of Czech-Italian Cooperation and Success

Czech and Italian companies closely cooperate for many years in common aerospace projects. Both countries are keen on making greater use of the high potential of various forms of partnership. After a series of previous problems and impediments, as well as failures and postponements, despite Covid-19, the cooperation between Czechia and Italy in the aerospace industry has not stopped. Prague and Rome were successful in the launch of the Vega rocket, which ascended the sky at 3:51 on September 3rd, 2020, CET from the European base of Kourou in French Guiana. ESA (2020a) refers that Europe's light-lift Vega rocket was launched for the first time in February 2012. The Vega VV16 mission is partly funded by the EU under the Horizon 2020 program (European Commission 2020), to facilitate access to space by reducing launch space costs. Vega improved its launch capabilities at the European level.

Particularly, the participating states in Vega development are Austria, Belgium, Czech Republic, France, Germany, Ireland, Italy, Netherlands, Norway, Romania, Spain, Sweden, and Switzerland. The Italian Embassy in Prague (2020) refers that the mission has put fifty-three small satellites from thirteen countries into orbit that will be used for multiple applications, including Earth observation, telecommunication, science, technology, and education. The successor of Horizon 2020, Horizon Europe is the Framework Program for Research and Innovation 2021-2027 (European Commission 2020). Its goals are to support the creation of knowledge and technologies, support and implement EU policies and innovative solutions in industry and society, as well as strengthening innovative solutions (NSP 2019) and synergies.

Vega's mission was to bring seven microsattellites and forty-six smaller satellites, the CubeSats, of twenty-one companies from thirteen countries, eight of which were European (Musso 2020) to an orbit over a five-hundred km high. Vega VV16's launch represents a benchmark for the world. The availability and distribution of satellites are thanks to the platform-dispenser SSMS (Small Spacecraft Mission Service), produced in Brno. This gives a profound perspective on the Czech-Italian integration and management of the enterprise. SSMS is the most valuable Czech component launched into space since the Czech Republic accessed to ESA (Ministerstvo dopravy 2020). SSMS missions with the next-generation Vega C occurred in 2021 and it represents a remarkable achievement in the integration of the Czech Italian industry and systems.

CZ-IT: For a European Interregional and Interspace Network

Vega's mission is part of a European Czech-Italian interspace collaboration and is a capital example of Czech-Italian cooperation in the aerospace industry. Several technological centers of innovation and competence are connected and active in this sense Europe-wide –

and innovation is a critical factor in national and regional development (Calabresi *et al.* 2013). The EU itself is giving priority to research and regional interconnections. The EuroSME project, for example, is coordinated by local space agencies and involves the collaboration of crucial European regions and districts: Campania and Basilicata in Italy, Moravia in the Czech Republic, Hamburg in Germany, and North-West England in the United Kingdom. These technological innovation poles cooperate with research centers and universities, while local working groups create opportunities for all the implied actors: space is today a tool of foreign policy (ASI 2020b).

The EuroSME Partnership is the first aerospace partnership under the European Commission Thematic Smart Specialization on Industry Modernization. In conformity with the European Commission's goals, the interregional project works for the aircraft and aerospace of the future. Covid-19 affected the aerospace industry, but the new technologies' opportunities must be exploited in their synergic inter-complementarity. University research, innovation, and the 4.0 industry must become unique things. Info and data sharing are important in a European interregional cooperative framework, as well as the fusion and or hybridization of military and urban technologies. Czechia's goal in the next years is to further strengthen its aerospace industry, attracting foreign capital and expertise, as well as "focusing on promising technologies and applications such as flexible solar panels for satellites, rocket parts, advanced materials" (Johnston 2019).

Prague wants to "manufacture more complex satellite systems or small satellites [...] and engage more in international cooperation and supply chains" (*ibid.*). Building-wide Czech aerospace capacities and increasing competitiveness, maintaining an active position at the European level are among the most salient objectives of the Prague government (Ministerstvo dopravy 2019). As for Italy's goals, the country is one of the main players in space development. ASI (2020b) underlines that recently space-related issues have grown important and space itself has established itself as a resource for Earth monitoring. "Synergy between firms and local institutions may lead to success even in an economic environment which cannot offer competitive advantages to high-tech industrial clustering" (Siddivò-De Chiara 2012).

A Prague-Rome Axis?

The aerospace industry no longer entails just science. It would be a mistake for the European States' political ruling classes to ignore the aerospace industry. This latter encompasses geopolitics, engineering, and university. Vision and strategy should continue to be the compass of the future relations between Czechia and Italy. Participating in international organizations and networks benefits both. Delegations play a crucial role in the synergic processes and enable further development of industrial capabilities (NSP 2019). Space-related issues have become even more part of people's everyday life: mobile phone navigation, synchronization of banking, and weather forecasts are possible also because of satellite

services. Satellite navigation and Earth observation are used in transportation, logistics, agriculture, and environmental monitoring.

The main challenges that the aerospace industry will have to address are related to three main areas. 1) Investing in European space technology is economically important. Private actors must be integrated with space-related projects, both in terms of transportation outside the Earth and research. Since they often provide direct investment and have interconnected and developed SMEs in Czechia and Italy, they should implement their inter-cooperation to be more efficient, coordinated, and competitive. This, of course, should be carried out efficiently and transparently, to avoid suspects of personal interests to the detriment of the public. The evolution of space's components and related artifacts has become complex over time. They should be more interconnected and be able to include also other sectors in both countries.

2) Mixing fields: universities and research, think tanks and laboratories, space agencies, and big and small companies must work together for common goals in strengthening the aerospace industry. Connecting all these actors of the two countries in a cooperative task force will not be easy, but it will have positive repercussions in terms of efficiency toward a more transparent and stable framework. 3) Lower costs: costs can be contained and perceived by many more as investments than mere monetary losses. In a cooperative framework, costs are lowered, and this helps not just big corporations, but also SMEs to be part of space projects (Musso 2020). Sectors that normally would prevent the entrance of these small actors because of high costs can be opened to many actors, thanks to competition and cooperation lowering expenditures. This of course did not prevent the widening of the sector – “the last decade has witnessed a pronounced increase in space commercialization, as multinational companies have expanded their business activities in transportation and launching services, communication satellites, and remote sensing” (Petroni-Verbano 2000).

Conclusion: Future Cooperation, Projects, and Challenges

This paper addressed the current Czech-Italian relations in the field of aerospace. The Czech Republic started from a backwardness situation and positioned itself as a crucial European partner. As for Italy, the SMEs have benefited the country in aerospace and international cooperation in this field. Vega is an example of a European interregional and interspace network and is the symbol of a very developed and cross-cooperation among countries. The three challenges that impact the Czech-Italian cooperation regard, not just this specific partnership, but also other partnerships among other countries in the aerospace industry. Dealing with and investing in the aerospace industry is an investment for the future, and governments – along with other (private) actors – have a better understanding of it to be more competitive in the field of research and cooperation between Rome and Prague – a Prague-Rome Axis is indeed desirable in the field. Indeed, “companies develop innovations reciprocally and most relationships are bidirectional” (Capone-Zampi 2019).

Overall, the situation of Italian-Czech cooperation in the aerospace industry is well-developed and the bilateral cooperation between the two countries is based on a close partnership among small enterprises. However, the sector might evolve into deep cooperation if the countries can address together the current challenges of the aerospace industries. The cooperation between Italy and the Czech Republic is a positive example for other countries to be followed. Both countries understood the importance of the aerospace industry. There are no reasons to believe that this partnership will not be deepened in the future. Future academic research should shed light on the evolution of this cooperation and observe whether the three challenges identified in this paper have been answered and whether the two fields are more integrated with each other. The challenges ahead should not scare investors. Czech and Italian cooperation is strong and efficient, and it will be strengthened: international collaboration and integration are mature enough to allow this partnership to go on.

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