THE **SPACE ECONOMY** INITIATIVE

Making the Case for Space **Insights Report**

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UNITED NATIONS
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INTRODUCING THE **SPACE ECONOMY**

The level of political and economic capital being invested in space is higher than ever. Estimates indicate the global space economy grew to $ 414,75 billion in 2018. Space and satellite technology are pillars of modern society. They provide policymakers with invaluable data and information, helping make effective fact-based decisions across a range of policy areas – from urbanisation to national crisis response, with the COVID-19 pandemic being the most recent example of 'space-enabled' policy decisions being made at scale.

Expanding the global space economy, responsibly and sustainably, is a fundamental driver behind efforts to bring the benefits of space to everyone, everywhere. Further, these developments can support countries in efforts to 'build back better' using space services to face policy challenges, while contributing to innovation, job and revenue creation.

Around the world, many space activities at the national level include a role for a publicly funded 'space agency' or similar institution. This central public entity is often also part of a much broader stakeholder ecosystem including both private and other public sector entities, all contributing to the national space sector. Moreover, to truly identify and realise the socio-economic benefits of a strong space sector, we must look beyond just the immediate context; from agriculture to finance, from education to transport, space is making tangible contributions across a huge range of fields.

At the United Nations Office for Outer Space Affairs (UNOOSA), 'Space Economy' is a concept that captures, in the broadest sense, the role space is playing to support sustainable socio-economic development. Unpacking such a complex picture is what we aim to achieve with the Space Economy Initiative. We seek to spotlight insights, success stories and experiences from across the international space community. We want to identify the key elements of growing healthy, prosperous space economies and then share such building blocks with all stakeholders pursuing responsible and sustainable space economy growth.

THE **WEBINAR SERIES**

To unpack how different countries are strengthening their respective space sectors UNOOSA has established a webinar 'space economy' series to bring together space economy experts from across the international space community.

The sessions are designed to tackle this complex subject by focussing on some of the more fundamental elements of a healthy space economy. For example, we will provide a platform to share insights from commercial space entities on how to go from the 'start-up' phase to being well-established. Further, we will look at financing space activities, exploring success stories on how mixed public-private funding models are helping space economies thrive. The series will touch upon the nexus between government, industry and academia, and how to leverage this nexus to maximise innovation and growth in the space economy. We will also look at what this all means outside the immediate domestic context and the link between growing space economies at the national level and supporting responsible and sustainable space activities at the international level.

All these considerations will be taken in the context of the current developments with regards to how space economy can play a key role in supporting socio-economic development, as countries build-back-better in response to the COVID-19 crisis.

The series is composed of topic-specific sessions, touching upon the elements below:

- **Introducing 'Space Economy'**
- **Making the Case for Space:** building the policy case, public support and initial investment.
- **Scaling-Up**: Success stories from the scale-up to established phase.
- **Access to finance:** building a sustainable financial system for space
- **International cooperation to grow responsible and sustainable space activities**: bringing the international normative framework into the domestic context.
- **Innovation and growth in the Space ecosystem:** the nexus between government, industry and universities.
- **Using space to building back better:** supporting countries post-COVID 19 recoveries.

During the series UNOOSA collates the experiences being shared by experts, to build insights of 'what works' with regards to building strong, responsible and sustainable space economies.

These success stories will play a key role towards publishing a set of 'building blocks' that can be used as a reference point in support of further growth in the global space economy and how this growth can help bring the benefits of space to everyone, everywhere. The following section includes the summary reports of each webinar, with "Introducing Space Economy" being the first one

INSIGHTS REPORT

MAKING THE CASE FOR SPACE

This insights report captures the remarks and experiences shared during our second webinar session with space economy experts. Building on the kick-off webinar where several key building blocks for healthy space economies were identified. After the first webinar, we shifted from the general to start breaking down this complex concept block by block.

In this session, we explored one of the most crucial aspects of a healthy space economy – 'Making the Case for Space'. We looked at how countries are identifying baselines to build the foundations for space economy growth. We also heard how to build and maintain the policy and public support for space activities, over the near and long term.

Experts from Space in Africa, the US Bureau of Economic Analysis (part of the US Department of Commerce) and Azercosmos, the national space agency of Azerbaijan all joined us to share insights on the work they are doing on these matters.

The recording of the kick-off webinar is available on oosa.org and can be viewed here.

SPEAKER
INSIGHTS

Space Economy experts from across the international space sector were each give time for remarks on their personal experiences working in the field before switching into a moderated discussion to dig deeper into the topics and insights that had been shared.

- *Mr Temidayo Oniosun,* ***Space In Africa***
- *Ms Tina Highfill,* ***US Bureau of Economic Analysis***
- *Mr Abbas L. Mammadov,* ***Azercosmos***

Temidayo Oniosun
Space In Africa

Temidayo is the Founder and Managing Director of Space in Africa, the authority on news, data and market analysis for the African space industry. With over seven years of experience in the industry, Temidayo advises Governments and Commercial space players in the African Space Industry value chain. Temidayo is a TEDx speaker and regularly appears on various media commenting on the African Space Program.

Temidayo gave an overview of the work that 'Space in Africa' does, noting that it focuses on the analysis of space and satellite industries in Africa starting over two years ago in 2018. Last year they released the 'NewSpace Africa Industry Report' which is a comprehensive publication of space activities taking place across the continent. The research and analysis behind the report also allowed Temidayo and his team to develop an estimate of how much revenue the industry in Africa was generating annually. Using such methodology, Space in Africa, expects the space economy in Africa to grow over 40% in the next 5 years.

Looking across the continent, Temidayo noted that 11 countries in Africa have launched satellites so far. Political and public support and interest in space activities are growing quickly. For example, last year alone eight new satellites were launched by African countries, with several of these satellites being the first for that country. Through analysis of current projections at the national level, this increasing investment is expected to see over 20 countries in Africa will have a satellite in space by 2024.

Current analysis by Space in Africa indicates that revenue from space activities in Africa is currently $7.37 billion annually. Most of this revenue is being generated by satellite television services, with the next largest economic segments being FSS & MSS and then GNSS services.

Looking at current investment trends, there is a rise in the number of African space companies focusing on upstream and downstream applications. Currently, however, there are more downstream companies in Africa than upstream – with around 200 companies focusing their activities in the downstream sector. Many of these companies are communications capabilities and earth observation data to underpin the revenue generation of their commercial applications.

Temidayo stressed that it is not just the countries that have satellites in space that are benefitting, but also those who use downstream data. When new countries join the space sector, the first step is often using freely available open data for applications and countries then begin to develop the capabilities they need. Public and civil investment is required to get to the stage where open data can be used to drive economic growth. For example, some countries are looking first at how they can enhance their human capacity in this regard by, for example, sending students abroad to learn relevant skills. In this context, Temidayo noted that many capacity-building satellite programs being delivered at the international level have and education and development programs built into the approach. This means it is not just launching a satellite into orbit, but building the skills and capacity surrounding such endeavours that create a more long-lasting and sustainable benefit. In this context, Temidayo notes that capacity-building alongside economic development is working well.

Mr Onison's slides can be downloaded here.

Tina Highfill
US Bureau of Economic Analysis

Tina is a Research Economist at the Bureau of Economic Analysis (BEA), which is a part of the US Department of Commerce. Tina's work at BEA includes the recently launched Space Economy Satellite Account (SESA). SESA is a new, collaborative effort to measure the relative importance of the space sector on the U.S. economy, with a special emphasis on the growing commercial space segment. She is an award-winning, published economist with extensive experience leading research for high-profile and multifaceted economic analyses, including several that originated from the U.S. Congress. Recognized as a subject matter expert in economic measurement, an expert SAS programmer, and a prolific writer.

Introducing the work of the BEA, Tina outlined the responsibility of BEA to produces official economic statistics for the United States such as GDP, trade, employment, compensation, and output. In addition to those core statistics, she noted that the BEA also produces economic statistics on specific parts of the economy. This specific section of the economy is termed 'satellite accounts' and would include categories such as manufacturing, retail, and the information industries. The 'space economy' is now one of these 'satellite accounts' that BEA is working on.

Tina noted that the steps to begin economic assessment are, broadly speaking, the same for any satellite account, with the 'space economy' account being no different:

- Step 1: Identify relevant commodities (goods and services) within the area – for space economy. This includes R&D, aerospace production, etc.

- Step 2: Separate space and non-space economic activity within commodities. The purpose of this step is to how much of those relevant commodities are related to the satellite account of interest.

Existing definitions of what is and is not encompassed by the space economy are not specific enough for national accounting purposes. BEA's definition of the space economy will, therefore, incorporate stakeholder feedback. This engagement with stakeholders is crucial for the BEA to understand which activities should or should not be part of the space economy – activities such as exploitation of satellite data and imagery, television broadcasting, solar energy, educational services.

In terms of timelines, BEA is working towards finalising both a definition of the space economy and of the associate statistics to perform economic analysis by the end of 2020.

As a non-political body, it should be noted that BEA is focussed exclusively on getting the economic data correct. While it is noted that such data could be used as part of the broader policymaking process which sees BEA maintain a connection to other U.S. government agencies which do make the policies.

In response to a participant's question on the availability of open-source studies on space economy, Tina noted that there are a lot of good reports on space economy. For example, OECD has a program

related to the space economy and puts out reports that are timely and publicly available. In the US context, the Satellite Industry Association produces an industry report annually that gives detailed info about the use of satellites and where revenue comes from.

Ms Highfill's slides can be downloaded here.

Abbas L Mammadov
Azercosmos

Abbas serves as an advisor to the Chairman/Chief Executive Officer of Azercosmos. Established by Presidential decree in 2010, Azercosmos implements the launch, operation and use of satellites for the Republic of Azerbaijan. Azercosmos provides customised solutions based on advanced technologies for peace and prosperity to establish Azerbaijan as a driving force of the global space industry. Abbas draws on a long career of working in the internatial relations field. He represents Azercosmos in several international fora and conferences, including as a delegate of the Republic of Azerbaijan to the United Nations Committee on the Peaceful Uses of Outer Space.

Abbas gave a brief overview of Azerbaijan's space-related activities, dating back to the 1970s. After a period of dormancy in 2008 political leadership restarted the interest and investment in space activities, with Azercosmos established in 2010. As the national satellite operator, Azercosmos carries out satellite communications and Earth observation services for both public and private customers.

The strategic direction of Azercosmos sees activities delivered across five key areas:

1. Supporting national socio-economic development:
2. National security
3. Expanding and strengthening commercial activities
4. Leading national Research & Development on space technologies,
5. Represents Azerbaijan in the international space arena.

Azercosmos currently has three satellites in its fleet, two satcoms and one earth observation, which are already delivering in line with above noted five areas of activities. The services include telecoms and optical imaging products to over 100 public and private entities. The main goal of the most recent state program for the development of remote sensing for the 2019-2022 period is to support the socio-economic and technological development of Azerbaijan through remote sensing services in agriculture, environment, urban planning, land-use monitoring, maritime, natural resources and other fields. This range of sectors underlines the scope of the positive economic spill-overs that go beyond the immediate context of the space sector itself. Further, this state program and anticipated establishment of the National Spatial Data Infrastructure (NSDI) will also support, to the fullest extent, achieving the goals set out in the 2030 Agenda for Sustainable Development.

In 2017, the president of Azerbaijan issued a decree to make Azercosmos an independent state entity reporting to the government, with several functions of the space agency. The organization has been involved with international activities and other functions since to generate public support and interest in space at the national level, as well as expand Azerbaijan's links to other space-faring nations. At the

national level, Azercosmos partners with the Ministry of Education to deliver an annual CanSat Azerbaijan model-satellite competition. Moreover, in April 2019 Azercosmos held a festival for rocket modelling among students. Festival participants-built rocket models that were launched to the height of 350 meters. Such cross-ministerial collaboration to bring the realities of space science and technology to a wide audience helps build public support and interest. At the international level include hackathons with ESA, CNES and NASA, a model satellite competition, a new space businesses accelerator program, and involvement with many international organizations and initiatives such as the Space Climate Observatory.

The strong political and public support for space activities proved to be a solid foundation for the recent successful bid to host the International Astronautical Congress. Originally scheduled for 2022, but now postponed to 2023, Baku will host the IAC under the theme of "Global Challenges & Opportunities: Give Space a Chance".

Azercosmos is currently developing their space strategy looking at downstream applications, different tax and other incentives for investors, terms and conditions for joint investment projects, with an overall ambition to become a space and high technology hub in the region. Building on experiences of the past, Azerbaijan as an emerging space nation, has needed to enhance the awareness of all its stakeholders from high-ranking state officials to the next generation of aspiring scientists, and the general public as to why we need to give space a chance.

In Azerbaijan, the government remains the main driver. The approach of Azerbaijan has been unique in many ways with Azercosmos established partly to diversify the economy. Azercosmos was a state-owned company developed for the launch and operations of satellites. Azercosmos has gone from being only a satellite operator to now having a number of space agency functions. It is anticipated that Azerbaijan will look to establish national spatial infrastructure capabilities for the usage of satellite imagery for socio-economic and technological development. As part of Azercosmos' activities getting the private sector more involved in space economy activities is important. The space sector does not exist in a vacuum, one challenge, for example, is losing specialists and investors to the general Information Technology sector because, by comparison to space, IT tends to have a quicker return in investment success rate.

Mr Mammadov delivered remarks without slides.
His insights start at 16:46 min in the recording here.

CONCLUSION and **NEXT STEPS**

All three speakers provided insights and experiences of measuring and building the case for strong space economies. We heard first-hand on the growing space sector in Africa, with more countries than ever before investing political capital in developing domestic space economies. Many space economies in Africa have a legacy of focussing on downstream applications, particularly Satcoms and television (around 75% of current space economy revenue). There are signs however that this landscape is changing, with further investment in downstream activities including GNSS and earth observation also becoming clear in recent years. A growing commitment to connecting the potential of space economy growth with academic investment is also highlighted. This is true not just for the African countries with well-established space economies but also for those countries looking to scale up their sectors; estimates point to nearly 20 African countries operating satellites by 2024, as part of a rapidly expanding economic sector. A minority of African satellites continue to be built by African institutions. While interest in growing space economies across the continent is becoming increasingly well established, steps are required to secure buy-in and investment to maximise gains across the space economy and beyond into other sectors.

We also saw the importance of identifying solid economic baselines for measuring a space economy. Defining where the impact of space economic growth starts, and stops is not an easy task. During the session, examples of economic-led initiatives demonstrated the importance of engaging with stakeholders both within and beyond the space sector. Such engagement is a crucial part of building the economic baselines required to understand in quantitative terms the role space is playing in a national economy. For many countries, this is a new area of economic analysis. In this context, methodologies will take time to define, design and implement, but is a required element for evidence-based policymaking on space economy matters over the long-term.

Remarks around the role of education and public engagement, especially with younger generations, were also brought to the fore. The session opened a range of examples of how competitions are being used to engage with young audiences and to illustrate the power of space technology to support a sustainable future. Likewise, the role that space can play in a country's socio-economic development is also an important narrative to be maintained for policymakers from high-ranking officials to the general public. We heard how crucial sustaining this narrative about the importance of space for securing the political interest and investment to take space economies to the next level. In the same vein, insights were shared on how space economies can develop quickly, with economic and civic positive spiller overs in evidence from the launch of a country's first satellite.

Looking ahead to the next session, we will be speaking to experts working in the business of 'scaling-up'. Most space enterprises start small and the road from start-up to an established entity is not an easy path to walk. The insights shared on July 24, will help unpack these crucial first steps to getting a space economy off the ground.

THANK YOU

The Kick-Off Space Economy webinar was made possible with time, support and expertise of our speakers; Mr Temidayo Oniosun, Ms Tina Highfill and Mr Abbas Mammadov.

Thank you to all UNOOSA colleagues who supported the webinar's delivery, including Julia Milton for her assistance in drafting this report.

Moving forward, the Space Economy Initiative aims to support healthy space economies in both theory and practice. For an initiative funded entirely by voluntary contributions, donor support is crucial to realising this vision. Should you be interested in contributing to this work to build responsible and dynamic space economies that accelerate sustainable socio-economic development, please get in touch with Ian Freeman at ian.freeman@un.org or Veronica Cesco at veronica.cesco@un.org.