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Building Inroads into the Future of Space: Experimentation, Learning and Leadership for a Better World | *Lynette Tan*

Notwithstanding global uncertainty, the space economy grew to US$546 billion and is forecast to reach a trillion by 2040. Fuelled by a global space movement, it stands as a vital economic pillar, offering a unique arena for innovation, experimentation and big data implications. As satellites create a mega data set, bridging the talent gap through a STEM 2.0 revolution and strategic partnerships will be critical for governments and companies racing to unlock the vast potential of the ever-expanding space industry.

The space economy is resilient and expanding.

At the height of COVID-19 in 2021, the global space economy hit US$469 billion in value, up 9% from the previous year, despite the uncertain global environment. Today, the global space economy is valued at US$546 billion and is expected to grow at a compound annual growth rate (CAGR) of 6.84% from now till 2026 and reach a trillion in value by 2040. These numbers make space an important economic pillar in the very immediate future.

The steady growth is driven by the growing commercialisation of space, enabled by lower launch costs, rapid developments in ancillary sectors such as electronics, and a cult movement in space that has been growing steadily in the past decade and has drawn in talent from all over the world.

The confluence of these factors creates tremendous implications for the space economy in the areas of innovation, experimentation and big data.

Space Is the First Frontier for Innovation and Experimentation

Space offers one of the most unique hostile environments that could help scientists better understand a wide range of biological processes.

With rising temperatures on earth, how can we use the hostile space environment to help us develop more resilient crops? What can we learn about the impact of the space environment on plant biology that could eventually help to address food sustainability on earth?

There are countless other applications of the zero-gravity environment in different areas of research. We are today only exploring the tip of a very large iceberg, and with more advances in research technology, there will be more opportunities to experiment in space.

Space Data Will Lead the Next Big Data Revolution

In the past few years, mankind has launched a record-breaking number of satellites into space. Add that to the relative ease of launching a satellite and the entrance of many private sector players all wanting a piece of the space pie, and you have an exponential amount of data forming what we can only call a **mega data set**.

This data set is going to be ubiquitous, persistent, multi-layered and hyperspectral. Think of Google at a much larger universal scale and we are a little closer to the magnitude of this mega data set.

And with rapid developments in AI and machine learning, we will progressively have more tools to make sense of this data and put it to good use across everything from climate tech innovations to agriculture and management of earth resources.

But as the space economy opens up for smaller countries, more governments and more private organisations to participate in, the space industry is still a difficult one to crack.

Talent, R&D and Industry Ecosystem Development are Key

Closing the talent gap in the industry remains one of the single biggest challenges of unlocking the industry’s growth potential.

While the world is still talking about STEM education for youths, the space economy demands a STEM 2.0 revolution for the workforce to have industry-ready and

industry-relevant STEM skills. Governments will be challenged to accelerate such training because it involves a pivot in their education policy. A more likely and sustainable model is partnership with the private sector to complement formal curricula.

Companies will struggle with tapping into space to enrich their R&D roadmaps: understanding what space can offer, knowing which partners to work with, being able to review different space-based technologies that are relevant will be hard to do at scale and in short order. Companies will need help to redesign their R&D roadmaps, yet they will be under tremendous pressure to do so quickly for competitive advantage.

Governments will need help developing their industry roadmaps, but there will be few parties well positioned for this because the space industry has long been a strong government-only play, with a lot of space expertise and networks tied up with political interests.

Developing the roadmap for talent, R&D evolution and industry development will be key to unlocking the potential of the space industry – and working with the right partners to scale and operate with speed.

About the Author

Lynette Tan is CEO of Space Faculty, leading a global platform that works with government, corporations, and education institutions to expand the space economy and leverage space technologies. She has more than 18 years of experience in growing business in Asia, holds a Master's in Chemical Engineering from Stanford University, and a Karman Fellowship from The Karman Project.

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